The Development of Chemistry at Indiana University 1829-1991

by

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Dedicated to Herman Thompson Briscoe

“You cannot find his equal in fitness and promise”

H. B Wells
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>Chapter I</td>
<td>Beginning of Chemistry At Indiana University: 1829-1874</td>
<td>1</td>
</tr>
<tr>
<td>Chapter II</td>
<td>Chemistry from 1874 to 1895: The Van Nuys Years</td>
<td>42</td>
</tr>
<tr>
<td>Chapter III</td>
<td>The First Twenty-Five Years Under Robert E. Lyons: 1895-1920</td>
<td>90</td>
</tr>
<tr>
<td>Chapter IV</td>
<td>The Last Seventeen Years Under Lyons: 1921-1938</td>
<td>151</td>
</tr>
<tr>
<td>Chapter V</td>
<td>The Briscoe Years: 1938-1941</td>
<td>250</td>
</tr>
<tr>
<td>Chapter VI</td>
<td>The Shriner Years: 1941-1946</td>
<td>281</td>
</tr>
<tr>
<td>Chapter VII</td>
<td>Frank C. Mathers, The Interim Chairman in 1946-47, and His Research in the MidForties</td>
<td>334</td>
</tr>
<tr>
<td>Chapter VIII</td>
<td>The Gucker Years as Chairman: 1947-51</td>
<td>371</td>
</tr>
<tr>
<td>Chapter IX</td>
<td>The Day Years as Chairman: 1951-62</td>
<td>433</td>
</tr>
<tr>
<td>Chapter X</td>
<td>Overview, 1962-1991</td>
<td>506</td>
</tr>
<tr>
<td>Chapter XI</td>
<td>Brief Survey of the Beginning and General Status of Chemistry at Other Colleges and Universities in Indiana</td>
<td>561</td>
</tr>
<tr>
<td>Appendices</td>
<td>Table of Faculty Appointments (Tenure track)</td>
<td>592</td>
</tr>
<tr>
<td></td>
<td>Table of Non-Academic Staff Appointments</td>
<td>606</td>
</tr>
<tr>
<td></td>
<td>Partial Table of Librarians (Professional)</td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Index</td>
<td>626</td>
</tr>
</tbody>
</table>
LIST OF ILLUSTRATIONS

The first laboratory building viii
Theophilus Wylie 13
Thomas C. Van Nüys, M.D. 43
Wylie Hall as it looked when first opened in 1885 65A
A Chemical Laboratory in Wylie Hall (second from left Earl Blough, BA'99) 65B
Robert E. Lyons 91
1931 Chemistry Building 239A
Physical Chemistry Laboratory in 1931 Building 239B
Herman T. Briscoe 251
Ralph L. Shriners 282
Frank C. Mathers 335
Frank T. Gucker, Jr. 372
Harry G. Day 434
Organic Sulfur Conference, 1951 441
1931 Building showing the 1964 Addition on the right 474
V. Jack Shiner, Jr. 507
Riley Schaeffer, Eugene Cordes, Adam Allerhand, Paul Grieco 509
Main Entrance to 1988 Wing 557
A considered recording of important facts and opinions concerning the developments of chemistry in the university at Bloomington has been undertaken for several reasons. No comprehensive history exists. All persons who are alumni or are aspiring to get degrees in chemistry will benefit from knowledge of the current department and its background. Also, such information will be of importance to others interested in Indiana University.

The roots of chemistry virtually extend to the beginning of the institution. They have always intertwined with other disciplines and collegiate interests. Thus the tracing of the developments of chemistry here inevitably reveals much concerning the entire university.

Fortunately much of the impressive facts and understanding of the first several decades are found in the extensive diaries of Theophilus A. Wylie, who was intimately involved in the teaching of chemistry and physics for nearly fifty years. He was one of the most important of the small faculty. The contents of these fragile diaries, from 1832 to 1892, were made readable, available, and their contents preserved for posterity through the painstaking and thorough transcriptions by Elizabeth M. Greene in chemistry. She had the generous cooperation of Dolores M. Lahrmann and others then at the University Archives. Several good copies are now readily available on campus.
Apparently many of the students during more than the first fifty years were stimulated and they appreciated the instruction, but empiricism dominated the thinking here during the first one hundred years. The significant breakthrough occurred in 1935. This was featured by H. T. Briscoe’s publication of his book, the “The Structure and Property of Matter.” As he wrote in the preface, it was an attempt

“to interpret from the chemist’s point of view some of the facts and opinions concerning matter as they have been discovered or suggested from the time of Aristotle to the time of Bohr and Schrödinger.”

In the fourth decade of this century Briscoe and the new president, H. B Wells, were the principal forces that led to the reorganization of chemistry and physics at Indiana University. As supported by the record, this should not seriously disparage the efforts of most of the chemistry faculty here during the first one hundred years. They reflected the thought patterns and constraints of their contemporaries in most of the American institutions at that time. However Briscoe had the necessary imagination and drive to break with chemical tradition at I.U. and Wells, as the new president, had the wisdom to accept his views.

A comprehensive history of the department is needed especially by students and alumni because we should have meaningful connections with our antecedents. Knowledge of the past gives guidance for the future. And, being curious, there is satisfaction in knowing about the past that is closely linked to us. This record is intended to assist all the readers in sensing the experiences and feelings of life in the university before our times. To accomplish this, many events and situations are dealt with in some detail and others are barely mentioned. It is hoped that the choices made will be interesting and rewarding to the readers.

But to enhance the perspective on the development of chemistry at Bloomington some background is furnished in a chapter on the early years in chemistry in many of the other institutions in Indiana granting baccalaureate degrees in chemistry. For much of the information I am indebted to at least one person identified with each of the institutions.

I am deeply indebted to many of the faculty members for encouraging me to write this record. I am especially grateful to some for specific suggestions and information. These include E. Campagne, M. Marsh, E. Davidson, P. Greico, C. Kaslow, C. Parmenter, and J. Huffman. Alumni who were notably helpful included N. Sommer, T. Mathers, and C. Davis.

Much is owed to Miss Dolores M. Lahrmann and others then at the University Archives in making records available. I am indeed grateful to Miss Elizabeth M. Greene for diverse and endless help. This started
with a complete and faithful transcription of the many volumes of all the extant diaries by Theophilus A. Wylie. Because Latin, Greek, and French were used in some degree she made arrangements for all the translations. I am indebted to Esther Weber Adams who reviewed the chapter covering Professor Lyons' last years as head of the department. She, in 1930, was the first secretary (part time).

Above all I deeply appreciate Miss Greene for ceaseless typing and word processing, as well as the endless indexing and myriad other tasks.

I am especially grateful to Chairman Grieco for his encouragement and approval of the program whereby the book became the property of the department. Finally special thanks are due to Chester Davis for making the publication possible.

A debt of gratitude is owed to the Alumni Association for generous assistance in the sale and distribution of the books.

Harry G. Day

Department of Chemistry
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May, 1992
The first laboratory building
Chapter I

Beginning of Chemistry at Indiana University: 1829 - 1874

Chemistry was practically only a gesture in the curriculum of Indiana University from its introduction in 1829 until approximately 1874 when the first faculty member was appointed with primary responsibility for chemistry. Also, until that time chemistry and natural philosophy (physics) as taught were general and not intended to lead to specialization in science. Over this period five faculty members were successively responsible for chemistry and/or natural philosophy and each had other responsibilities that required much time. They were: John H. Harney, A.B., A.M. (1827-1832), Ebenezer N. Elliott, A.M. (1832-1836), Rev. Theophilus A. Wylie, A.B., A.M. (1837-1852, 1854-1886), Rev. Robert Milligan, A.M. (1852-1854), and Col. Richard Owen, M.D. (1864-1879). The latter alternated with T. Wylie in the responsibilities for chemistry. Thomas C. Van Nüys, M.D. (1874-1895) was the first faculty member with advanced training in chemistry and he was the first to have the title Professor of Chemistry.

But throughout this nearly half century chemistry as a science and in its applications was much more advanced than the attention given to it here indicated. Its overall status in 1830 was well stated by the noted Thomas Thomson, Professor of Chemistry in the University of Glasgow. He wrote in his History of Chemistry (1, p. 1, 2nd ed):
"The field (chemistry) which it now presents to our view is vast and imposing. Its paramount utility is universally acknowledged. It has become a necessary part of education. It has contributed as much to the progress of society and has done as much to augment the comforts and conveniences of life, and to increase the power and resources of mankind, as all the other sciences put together."

In 1828, in Germany, urea was synthesized in the laboratory and the significance of this accomplishment, including its discreditation of the stifling beliefs in vitalism, began to be slowly recognized. In several European countries following this breakthrough a number of organic compounds were synthesized thus opening the way for explosive advances in organic chemistry and its applications. During the period from 1829 to 1874 the number of known elements was increased from 39 to 50. In 1846 Benjamin Silliman encouraged Yale University to establish a chair of agricultural chemistry and vegetable and animal physiology. At Harvard the Laurence Scientific School was established in 1847.

As described comprehensively by Clark (1), and a few other historians of Indiana University, the groundwork for the development of this university was precariously laid in January 1820, four years after Indiana was admitted to the Union. Six weeks before the crucial vote in the General Assembly Governor Jennings emphasized that the time had arrived to move toward the establishment of schools in the state. Four years before at the State Constitutional Convention the mandate was adopted that

"It shall be the duty of the General Assembly as soon as circumstances will permit, to provide by law, for a general system of education, ascending in a regular gradation from township schools to a state university, wherein tuition shall be gratis, and equally open to all."

That sweeping commitment embodies a presumption that substantial financing of the school system could come from the sale of the newly available public lands. Also, it was presumed that the state university would be promptly evolved from the original seminary intended to prepare young men for the ministry.

The newly available public lands were a township in Gibson County and Perry Township in Monroe County. The chartered but floundering Vincennes University had an uncertain claim to the former land. Presumably for this reason, and for political reasons, Governor Jennings proposed that the General Assembly locate the envisioned seminary near or in Perry Township in Monroe County. The crucial vote on this proposal was tied in the Senate but the tie breaking vote of the Senate president
was affirmative. The House approved the bill and Governor Jennings quickly signed it into law on 20 January 1820.

A Board of Trustees for Indiana Seminary was soon designated and David H. Maxwell, a physician in Bloomington, Indiana, was made board president. In July 1820 the board designated a parcel of land no larger than a modern city block in Bloomington for the site of the seminary. This was approximately one-half mile south of the courthouse square and near the north boundary of Perry Township. The first, temporary, courthouse was a small double log cabin just south of the public square that had only recently been cleared of the last of its native forest trees. As Clark wrote (p. 28),

“Bloomington in 1820 was scarcely more than a dot on the vast map of forest lands of south central Indiana.”

In 1820 the General Assembly designated a special committee to prepare and propose a general state educational plan. Daniel J. Caswell, an attorney, chaired the Committee.

The Caswell committee recognized the educational need for a rapid transition from seminary to college and ultimately to university, thus to serve the needs of the rapidly growing state. Also, it anticipated a much higher yield from the sale of public land than actually occurred. It recommended the designation of a president and several professors to provide instruction in “College Logic, Metaphysics, Moral Philosophy and Criticism, Mathematics and Natural Philosophy, Geography, Ancient and Modern, and Astronomy.” They also stated that instruction should be given in Latin, Greek, and Hebrew languages. They anticipated the teaching of law, theology, and medicine. Chemistry was not mentioned.

In general this expansive dream was realized, but the time span was far longer than the committee probably anticipated. There were to be numerous frustrations and near collapse of the institution before the momentum for growth in strength and respect gradually occurred. This required more than half of a century.

Historians of the university differ on the time that the little state seminary opened for instruction. T. Wylie in his history covering the first 70 years of the university includes a chapter by David O. Banta who unequivocally stated that “On the first of May, 1824, the seminary doors were opened for the reception of students, and ten boys were admitted.” However, Thomas D. Clark, with the advantage of greater archival resources, in his three-volume history, firmly asserts that “Monday, April 3, 1825, is the correct date.”

There was one two-story brick building with a low mid-roof bell tower. It provided a chapel and four recitation rooms. The cost was $2,400. The professor's house was built nearby at a cost of $891.
The only teacher during the first two years was the Rev. Baynard Rush Hall, a native of Philadelphia with training at Union College in New York and Princeton Theological Seminary. As reported by Judge D. D. Banta in Woodburn’s History of the University, Hall and his young wife moved to the New Purchase (Indiana), in the vicinity of Gosport, about the time the new seminary was being established. Relatives here may have been an important reason for the move. Banta wrote that he had reason to believe

“that it was the new State Seminary that led Hall into the Indiana wilderness. He (Hall) was scholarly, and his brother-in-law, Isaac Reed, must have seen that if he were only on the ground when the time came for the election of a professor he would surely be the chosen one.”

The gifted Hall apparently was well educated in the classics and instruction in the new school emphasized classical learning for a long time. Hall was reported by Banta as stating that he was “the very first man since the creation of the world that read Greek in the New Purchase.” Clark concluded that

“Hall was a warm hearted person who quickly developed affection for his neighbors, but at the same time he perceived the limitations of their intellect.”

Thus it is not surprising that the board selected this god-send to be the first teacher.

Hall taught only Latin and Greek, and apparently his effectiveness in this frontier environment could not have been excelled. But there were strong feelings in Bloomington and elsewhere against such an exclusively impractical educational program. Thus it became clear that the curriculum had to be expanded and another teacher would have to be appointed.

JOHN H. HARNEY AND CHEMISTRY

Some broadening of the curriculum occurred in early May 1827 with the appointment of John Hopkins Harney, a graduate of Miami University. He was the first person connected with the university-to-be who eventually had any responsibility for instruction in chemistry, but his background of training and knowledge in this field must have been extremely limited. The salary was $250 per year, but after six months the salaries of Harney and Hall were raised to $400 each. Harney was to leave the institution in 1832 and much of the time he was to be embroiled in different controversies.
More than fifty years later T. A. Wylie wrote in his *History* that Harney was born in Kentucky in 1806 and was raised in the family of Judge Benjamin Mills, a relative, and a law partner of Henry Clay. Harney spent six months at Miami University and in 1827 he received an A.B. degree. That institution granted him an A.M. degree in 1831. Soon after his graduation in 1827 he walked from Oxford, Ohio to Bloomington with a young friend Robert Caldwell and made his application for appointment in person. According to Judge Banta, in Woodburn’s *History* (p. 20),

“Much uncertainty seems to have existed in the minds of some of the applicants for the place as to the real work to be required of the new professor, and the qualifications requisite for doing it.”

This is understandable because the position was vaguely described as advertised in the *Indiana Journal* Indianapolis (20 March 1827).

Apparently, as related by Banta, Harney and his friend arrived in Bloomington a few days before the trustees were scheduled to make a selection. On his arrival, Harney wrote a letter to the trustees that attracted their attention at once. Banta apparently had seen a portion of the letter. He wrote that it could be concluded from the letter that Harney was courageous and self-reliant. Also, that he

“...had ideas concerning the branches of learning that ought to be taught from the chair to which he aspired; and, next to money, ideas were what the trustees most wanted to enable them to carry on the work of the Seminary.”

On the day of the trustee’s meeting, 10 May 1827, as stated by Banta,

“Harney, being a stranger, was without backers; nevertheless, the trustees had not been long in session in the Seminary building, when it was made apparent that he was their favorite. The news flew to the town, and at once an uproar begun.”

Opposition to Harney was expressed to the trustees, but they soon voted and Harney was selected. Among the dissenters was the Rev. James B. Farris, a resident of Bloomington, and some of his Jacksonian partisans. He felt that he was better qualified and more deserving for the appointment. Harney began his duties at once since it was time for the new term to start.

Unfortunately, as stated by Banta (Wylie, p. 45)
“No records remain of classes; no records even of the names of students in attendance, but the few old men yet living who were students during Seminary times, all speak in glowing terms of the activity of the (two) professors and the application of the students.”

Evidently Harney’s principal contributions were in mathematics. Banta recorded that “Harney had a genius for Mathematics.”

Apparently Harney made a good impression in the seminary. Within approximately six months after he had begun to teach, the Board of Visitors, including Governor James B. Ray and Supreme Court Judge James Scott, came to the seminary. Banta writes that they “went away charmed with what they had seen and heard.” On 24 January 1828 the seminary by legislative action was transformed into Indiana College. Four months later a newly created board of trustees invited Rev. Andrew Wylie, President of Washington College, Pennsylvania, to become the president of Indiana College.

As indicated by Clark, Wylie was the only candidate and the information about him was sketchy. Wylie knew nothing about Indiana College, but in this first selection of a president the entire faculty—of two persons—played a key role. Apparently both Hall and Harney nominated Wylie, but it is presumed on good grounds that a recent governor of Indiana and at the time U. S. Senator William Hendricks also suggested Wylie. The two had been fellow students at Jefferson College in Pennsylvania.

It seems probable that Wylie would not have accepted the presidency had it not been for the persuasiveness of both Hall and Harney. Immediately after the board had selected Dr. Wylie, Hall wrote to him saying:

“Mr. John H. Harney, Professor of Mathematicks and myself, who both have long proposed and desired your election to the Presidency of the College of Indiana, cannot but be extremely solicitous that you should accede to the wishes of the board of trustees . . . .”

The State Seminary became in fact Indiana College on 29 October 1829 when Dr. Wylie became president of the institution. This marked the transition from a two-man faculty to a three-man faculty because President Wylie also had substantial teaching responsibilities. The professors and academic titles of the incumbent faculty were:

Wylie. Professor of Moral and Mental Philosophy, Political Economy and Polite Literature
Hall. Professor of Ancient Language
Harney. Professor of Mathematics and Natural and Mechanical Philosophy and Chemistry
The professorial title given to Mr. Harney in 1829, two years after his arrival, is the first indication of awareness that chemistry should be included in the curriculum. The significance of 1829 as the beginning point for chemistry at this institution was emphasized in a responsibly prepared review article on the department of chemistry in the *Indiana Daily Student* on 28 April 1932.

Myers (History of Indiana University I, p. 484) states that in 1830-31 the Board of Trustees desired to provide courses in chemistry and physics, but they were handicapped by lack of equipment. In October 1830 they informed the legislature that it "is painful to the Board to be compelled to state that the college has no philosophical apparatus." An appropriation was requested. Myers believed this was the first plea for support in procuring laboratory equipment. Apparently the apparatus was obtained in 1831. The reported cost was $388.71 (Woodburn, p. 65).

The first catalog was published in 1831. It covered the year 1830-31. A course in physics was announced for the Junior year. Chemistry was not included although its availability was indicated in the new academic title for Mr. Harney. The four-year course of study outlined in that first catalog was as follows:

**Freshman Class**
- Greek Testament, Minora, Majora last vol. Majora 2d vol.
  - commenced.
- Compositions in English and Latin. Greek Theses.

**Sophomore Class**
- Majora finished, the Iliad, Colburn's Algebra, Cambridge Mathematics.
- Compositions and Themes, as in the Freshman Class.

**Junior Class**
- Mathematics finished. Mechanics, Astronomy, Physics, Mathematical and Physical Geography. Dissertations, and compositions, as before.

**Senior Class**

An annual report of Indiana College in 1832 has the following graphic entry:
- Total college faculty: 4
- Total college enrollment: 53
Chemistry faculty:
Mr. John H. Harney, A.M. Professor of Mathematics and Natural and Mechanical Philosophy and Chemistry

Equipment: A chemical and philosophical apparatus has been procured and a foundation of a well selected library laid.

When Ebenezer Elliott came to the school the next year he reported that the philosophical apparatus consisted in part, or possibly in whole, of an electric machine with battery and discharger, a galvanic battery, a small galvanic pile, an air pump with three receivers, and the mechanical powers complete. Presumably Harney was the first to use the apparatus (Woodburn, p. 65).

It is apparent that Harney did not give any instruction in chemistry until 1831-32. There is no indication that he had received any training in the subject or that he provided anything that stimulated any students to become significantly aware of chemical knowledge. Lewis Bollman, who came to Indiana with Dr. Andrew Wylie in 1829, stated that there was “no chemistry in any shape.” McKee Dunn, who received his degree in 1832, stated that chemistry was taught so inadequately that when he graduated he did not even know what a crucible was. (Woodburn, p. 59)

It is obvious that the institution was lacking in various elemental necessities. This is illustrated by the action of the newly appointed president who solicited library books and funds for the college before he took up residence in Indiana. The appointment was made in 1828, but Rev. Wylie and his large family did not move to Bloomington until late in 1829. With the encouragement of the College, Wylie went to Philadelphia and New York in late spring 1829, both for personal reasons and to solicit donations for the new school in Indiana. As stated by Wylie, in writing to the president of the College Board, he first “prepared the way” by preaching on the Sabbath “in two of the churches,” and then he took some time to make some acquaintances. Then, he wrote,

“I design to spend (the rest of the week) soliciting donation and hope to succeed in some degree—I shall try hard to raise funds enough in this region to procure an apparatus for our College.” (Woodburn, p 149)

When the president of the board wrote his report to the General Assembly in 1830 he stated that 235 volumes of books worth about $600 had been obtained by President Wylie. The necessity for “the newly elected college president to go on a begging tour for a state institution” was deplored by D. D. Banta who stated further,

“But a library and chemical and philosophical apparatus were so much needed, and there was such a dearth of funds, that in their
extremity the College authorities humbled themselves and their state, by asking the full purses of the East to contribute to their wants.” (Woodburn, pp. 48-49)

Banta further stated that at the beginning of Indiana College

“Great stress was given to the languages, the mathematics, the mental and moral sciences, and to belles lettres. The sciences form a very inconspicuous part of it. Outside of the applied mathematical subjects, there was but one purely scientific study in the entire course—chemistry. And inasmuch as there was no apparatus of any kind on hand, and no experimental work of any sort done, we can see that the scientific instruction given at that time in the Indiana College must have been exceedingly meager.” (Woodburn p. 59)

Soon after Wylie came to Indiana the general harmony began to fracture. Banta speculated that it was primarily attributable to the feeling of Hall and Harney that President Wylie was too dominating and he treated the two like ushers. This festered and erupted in a stormy dispute one Saturday morning in Chapel. It involved the denunciation of a student by Wylie, the entrance of other students into the angry exchange, and the participation of Hall and Harney. Wylie then turned on the two faculty members. A part of the confrontation grew out of Wylie’s charge that Harney was threatening to attack him with a pocket knife. In retrospect there was no basis for the charge because Harney frequently stropped his knife on his boot and he happened to do this during the dispute. Hall stood by his faculty colleague.

There were other incidents and there seemed to be no way to reverse the disharmony between Hall and Harney, (the faculty) and Wylie, the president. Consequently in this very disruptive “faculty war” both faculty men left. Hall resigned and Harney stubbornly stayed on until he was dismissed by the trustees in late 1832. Harney became professor of mathematics and astronomy at Hanover College. After four years there he became Professor of Natural Philosophy, Chemistry and Geology. He next moved to the Collegiate Institute in Louisville as Professor of Civil Engineering, but he soon made another change and became editor of the Louisville Democrat. The paper became popular and influential. He remained in Louisville and died there in 1868. There is no indication that he ever had serious interest in chemistry.

Banta concluded (Woodburn, p. 95) that the bitter confrontation of approximately twelve months between Harney and President Wylie was

“...like a pall over what many thought was a dead college. No other calamity, whether from fire, or adverse litigation, or political
or sectarian ascendancy, or what not, ever proved so great a calamity to the institution."

Apparently much of the blame for the sad struggle is attributable to Harney, the first person in the institution with any responsibility for instruction in chemistry! However, the name remains enshrined at this University. An area in the Joseph H. Wright Quadrangle is named for Harney.

**EBENEZER N. ELLIOTT AND CHEMISTRY**

The board soon replaced Hall by the appointment (election) of Beaumont Parks, and Ebenezer N. Elliott was chosen to replace Harney. After this action it adjourned in the assumption that the college would not survive. It did not meet again for two years.

Elliott, like Harney, had A.B. and A.M. degrees from Miami University. As described by Banta (Woodburn, p. 99), he "was endowed with an inordinate egotism." At 27 years of age Elliott came to Bloomington with his new wife. He had been head of a classical school at Rising Sun, Indiana. His new colleague Parks had been head of a similar school at Madison, Indiana.

Little is known about what subjects were taught by Elliott during his four years at Indiana College. Apparently like Harney he was interested largely in mathematics. In June 1836, Dr. David Maxwell, the faithful and resourceful head of the board, had proposed to have engineering taught at the new school. This was based on the assumption that Elliott would teach the engineering and mathematical courses.

In the annual catalog of Indiana College in September 1835 Elliott is listed as Professor of Mathematics, Natural Philosophy and Chimestry (sic). It is indicated that he gave "a course of experimental lectures" using Mitchell’s textbook of chemistry. Presumably this was *Elements of Chemical Philosophy* by Thomas D. Mitchell and published in 1832. The course was in the "second session" for the "Junior Class" and it was included with others as follows: Cambridge Mechanics Physics and Optics, Statistics Dynamics, Hydrostatics, Hydrodynamics, Hydraulics, Acoustics, Mitchell’s Chemistry, with a course of experimental lectures by Prof. Elliott. In that year there were five faculty members and 104 students. The first year was largely Greek and Latin with rhetorical reading in English. This was continued in the first session of the second year, and all mathematics in the latter half of that year and first half of the third year. The fourth year reviewed some of the first two years and it included "Logic, Mental and Moral Philosophy; Evidences of Christianity in connexion with Natural Religion, Political Economy. Constitution of the United States."
Elliott and the first band. The first band in the institution was organized by Elliott and Mr. Austin Seward, the blacksmith. It met weekly for practice in Elliott’s recitation room. He remained the band’s president until he resigned from the College. The connection with Mr. Seward is notable because the Seward family is one of the oldest in Bloomington. Mr. Seward established a foundry in 1821 and with modifications from time to time the business continued to 1984 when it was dissolved. The name remains honored in Southern Indiana.

Elliott the lobbyist and conciliator. Elliott also had skills in lobbying on behalf of the College. This was illustrated in 1833 when he persuaded members of the State Senate to defeat a bill that would have reorganized the College into a work-study manual labor institution. The bill would have provided for the purchase and equipping of a large farm on which students would work part-time during the week and all day Saturday. In principle they could study part time and earn their way to a degree. Elliott went to Indianapolis at his own expense. He approached the senators one by one and pointed out that the provisions of the bill would absorb much of their revenues, drive off all the students, and cause the College to close. The bill was soundly defeated. Without doubt Elliott made a greater impression on members of the Senate on the importance of the College than he did on the students on the nature and importance of chemistry and physics.

Another contribution of Elliott and his wife was their attempt to heal the deep wounds caused by the faculty controversy during the first years of President Wylie at the College. As described by Banta (Woodburn, I, p. 100) when the Elliots arrived in Bloomington in the fall of 1832,

“In Bloomington the suppers were Hall and Harney suppers, or else Wylie suppers. An adherent of one faction was seldom or never a guest of the other.”

The Elliots decided, as stated by one source,

“. . .to ignore both parties and invite all, and make the resuscitation of the College the paramount object.” (Woodburn p. 1).

It is reported that both parties came and the Elliots, aided by Mrs. Elliott’s two young nieces, did all they could to promote harmony and good will. Following this salutatory event feelings did improve, but even six years later, when the College was being designated a university, the Hall and Harney and the Wylie factions were still recognizable.

Although Elliott seemed to remain in good standing during his four years in Bloomington, Clark wrote (p. 52) that President Wylie and Elliott
'could not work together harmoniously.' Elliott left Bloomington in 1836 to become President of Mississippi College. Subsequently he successively became president of three other southern institutions. His versatility and deep commitment to the South was reflected in other ways including service as a minister in the Southern Presbyterian Church and as a surgeon in the Confederate Army. Also, he lectured extensively, and he compiled and was in part author of a large work entitled "Cotton is King, and Pro-Slavery Arguments." Approximately 53 years after Elliott left Bloomington, T. Wylie wrote of him in his History (p. 105) that "he keeps well posted in theology, literature, science and politics of the day." It may be concluded that the second faculty member with any responsibility for chemistry at the fledgling institution proved to be a valuable healer and leader in various significant ways.

When Elliott left Bloomington there were four full-time professors (A. Wylie, B. Parks, E. Elliott, and J. Dodds) and there were two tutors. Troubles abounded through a combination of totally inadequate financing, dissension among the faculty, and restive students. On the other hand this feeling in some parts of the State was leading toward a change in name from Indiana College to Indiana University. Thus in February 1838 the General Assembly made this name change, but little was done to help make it significant. President Wylie, in spite of his unskillfulness in administration and diplomacy, recognized most of the problems.

**EARLY YEARS OF THEOPHILUS A. WYLIE**

In this atmosphere of austerity, dissension, and uncertain goals, the appointee to the faculty to replace Elliott was Rev. Theophilus A. Wylie, a first cousin of President Wylie. T. Wylie joined the faculty in May 1837 as Professor (Pro-Tern) of Natural Philosophy and Chemistry. At that time there was no designated professor to teach mathematics and in the interim between the departure of Elliott and T. Wylie's assumption of duties at the College apparently no form of chemistry was taught.

T. Wylie was born and educated in Philadelphia. When he transferred from a school for classical education to the University of Pennsylvania in 1828 his father, Rev. S. B. Wylie, was appointed Professor of Languages. T. Wylie graduated in 1830 receiving A.B. and A.M. degrees. For some time he taught in the Academy of the University and reluctantly studied theology in the Theological Seminary of the Reformed Presbyterian Church. As revealed poignantly in his diaries, especially in 1835-36, he was lacking in self-confidence and his heart was not in theology. In 1836 he was licensed to preach. In accepting an appointment at Indiana University he requested it to be on a pro tempore basis.

In his first year, in 1837, the Annual report of Indiana College refers to Rev. Theophilus A. Wylie, A.M., Professor, pro tem, of
Moral(sic) Philosophy and Chemistry. It states that in Wylie's course, taken by the Junior class, the textbook was “Mitchell’s Chemistry” and there were “experimental lectures.” In the report for 1838 he was designated Professor of Natural Philosophy and Chemistry. The textbook had been changed to “Turner’s Chemistry.” There were six faculty members, including President Andrew Wylie, and 123 students.

Some illumination of Wylie’s feelings about the position during his first few months in Bloomington and his predecessor E. N. Elliott is recorded in his diary. As stated, within approximately a year after Elliott had resigned he then applied for a reappointment. Wylie wrote on 25 September 1837,

“This day my labors for the term ended, my class was examined in mechanics optics & a little touch of chemistry. It has been an exceedingly anxious time with me.”

He was concerned because the trustees were meeting at that time and they would decide whether to give him a regular appointment or discontinue his service and reappoint Elliott. In the same entry in his diary and before he knew the outcome of the trustee’s deliberation, Wylie wrote:

“My opponent is Prof. Elliott, who was here before, and left this place for a larger salary in the south, his golden bubble having bursted, he is here on the lookout for his old situation. He is a good looking man much more dignified and professional like than your humble servant, and very probably a much better scholar, ergo the chances are against me. I am not however without friends, that is a comfort.”

Wylie’s anxiety proved to be groundless. He was reappointed and Elliott was rejected.

In late 1838 Prof. Wylie returned to Philadelphia and married Rebecca Dennis of Germantown. There were eight children. One son, Richard enlisted in the Union Army in early August 1861 and was killed in a Civil War battle in late October that year. In early December his body was brought to Bloomington and was buried with military honors in Rose Hill cemetery. The grave is in the prominent family plot which contains the remains of the parents, the son Richard, the son Samuel Brown, and several children who died before reaching adulthood. The various informative comments in the Wylie diary concerning Richard and the Civil War are largely matter of fact, but the expressive language reveals clearly the affection held for this youth as well as for other children and Mrs. Wylie, who frequently was referred to as Reb. For example,
concerning the return of Richard's body and the funeral, Professor Wylie made the following entry in the diary on 8 December 1861:

"Last Monday the remains of our Richard arrived at 3 o'clock. The metallic case was opened at Prof. Woodburns. Everything connected with the inhumation had been well attended to by Cap'n Charles. The body taken to the ch (church). Prof. Ballantine officiated, Dr Nutt (then President) led in prayer. From the ch. we followed to the grave. The parting salute was fired, the grave filled, &c we with sad hearts returned home."

With the exception of two and a half years as professor at Miami University, during 1852-54, Wylie was to spend the rest of his long life on the faculty and in retirement at Indiana University. Even without significant training in chemistry and other sciences, his teaching and influence marked a significant advance in the long period before chemistry moved into a position of importance in the university. His contributions were diverse, and his marked respect for learning must have influenced the students to give attention to chemistry and science as a whole.

**THE FIRST CHEMICAL LABORATORY**

It is obvious from the bits and pieces of evidence, including some entries in his diary, that he talked with President Wylie on the urgency of providing scientific laboratory facilities for instruction at least in chemistry and natural philosophy (physics). This led to action by the president. As reported by Clark (Vol. 1, p. 54):

"Andrew Wylie informed the trustees in a lengthy communication that much better provisions had to be made for the teaching of natural philosophy and chemistry. Storage cases had to be constructed to house instruments and chemicals. The college building was unsafe for use of inflammable materials; water was not available to conduct experiments or to quench accidental fires. ... He said the time had come to construct a separate science building. The penu­rious board, however, felt this request an unnecessary extrava­gance."

This was followed up by T. Wylie at the close of 1838. As he stated in his History (p. 55):

"... the Professor of Natural Philosophy and Chemistry laid before the Board a paper presenting the wants of the department. In the existing buildings there were no conveniences for experimental illus­tration. The Board promptly replied to the suggestions, and ar­rangements were made for the erection of a suitable building. This
building was ready for occupation a little over a year after the application had been made to the Board."

Information on the provision and use of space for chemistry and other scientific work in the first several decades is scarce and somewhat conflicting. In Cravens' historical review in 1922 (I.U. Alumni Quarterly IX, 156-164, 1922) reference is made to early construction reports to the Indiana General Assembly by David Maxwell, President of the Board of Trustees. In December 1829, shortly after the inauguration of President Wylie, Maxwell wrote about the beginning of the second building for instruction which was "intended to afford additional recitation rooms, library, and chemical laboratory." This three-story structure was not ready for full use until 1836. There were 19 rooms in this "College" building. An attic room was intended for a museum of natural history and mineralogy, but it was never used for that purpose. It has not been learned where chemistry was taught in that building.

In 1838 the board responded favorably to the long standing request for better facilities for natural philosophy and chemistry, perhaps in part because they were anticipating the beginning of work in civil engineering and in medicine. However the requested building (Old Laboratory Building) was not erected until 1840. The cost was $2,000. The one-story red brick structure faced the south. It was 48 feet long and 32 feet wide. At the south side there was a second story containing one room. The north two-thirds of the building was used for lectures and recitations. The north side probably was about 60 feet south of Second Street and about 160 feet west of Walnut Street. This was the university's first building providing opportunity for laboratory instruction.

In 1841, there were five faculty members and 81 students. The courses were the same as in 1839. A major change had been the completion of the building to provide space specifically designated for chemistry and physics. The significance of this is indicated for the first time in a succinct statement in the Annual Report and Catalog for 1841:

"The Chemical lectures, as well as those on Natural Philosophy are illustrated by a course of experiments. A Laboratory and Lecture Room have recently been erected on the University campus, entirely separate from the principal building, for the express accommodation of this department. It offers to young gentlemen, who intend ultimately to devote themselves to the Medical Profession, great advantages."

There were three recitations or lectures each day. The students in each class (year) took the same subjects. For the third year (class) "Turner's Chemistry" was listed for the first session (semester) and "Inorganic
Chemistry" was in the second session. For the second session of the fourth year "Chemistry (was) Completed." These are the only references to chemistry in the listing of subjects to be studied during four years.

The austerity of the struggling university is reflected in the declining enrollment near the time the Laboratory Building was constructed. In 1839 only 62 students were in the four college classes and 27 in the preparatory program. The next year only 41 were in the college classes and 23 were in the preparatory program. After this, the enrollment slowly increased, but disputes, factionalism, and the meagerness of financial support plagued the university in varying degree for several decades.

There was practically no scientific equipment and little had been accomplished to augment the meager library which was started by President Wylie more than ten years earlier. For example, as reported by Clark (p. 68), in 1840 the board authorized President Wylie to buy a mercurial pneumatic trough on his planned trip to Philadelphia, but he was required to find a cheap one, and to buy it on credit if possible.

During these difficult times, reported by Wylie (p. 109), Jacob Ammen, a graduate of West Point Military Academy, was appointed Professor of Mathematics in 1840. He left Indiana three years later. His principal responsibility was to teach mathematics and conduct military drill instruction, but apparently he had some responsibility for chemistry. Judge Banta wrote many years later (Indiana Student, 5 Jan. 1891) that Ammen was superior in teaching mathematics, but "his teaching of chemistry was a farce." In his brief History of Chemistry at Indiana University (p. 11, 1931) R. E. Lyons stated that Ammen was a professor of Natural Philosophy and Chemistry during 1853-54. No evidence in support of this is given in Wylie's History of Indiana University and no other evidence to substantiate it has been found. It is not known that Wylie made any reference to Ammen in connection with chemistry.

Professor Wylie spent considerable time in the one-story Laboratory Building. Occasionally his interests and activities were recorded in his diaries. The entry made on 28 January 1841 is illuminating:

"after dinner went into town, my attention was called to some specimens of limestone, by a man, who told me that when it was heated in the fire an oil oozed out of it. On breaking it, it had the very same smell as naphtha. Spent the PM in examining it, tried it with boiling water but no naphtha appeared; did not ascertain whether the heat had driven it off or not.---Heated some in in (sic) a florence flask as hot as I could with a spirit lamp. There was the odor, but no condensation of the oil. Tried it with muriatic acid which I found did not, at least in my expt dissolve naphtha, but could detect none. With the mouth blowpipe, the oil oozed out on a cool part of the stone, & the parts of the stone most heated were
turned white.—In Comstock, found bituminous limestone described
wh. description I think coincides with this character of this stone."

This entry on a specific topic was much longer than customary.
The next day Rev. Wylie made a very brief entry about the recitation of
a class and then commented further on the specimens of limestone:

"...must not forget to state that one of the vessels in which I dis­solved some of the bituminous limestone appeared this morning
covered over with a bituminous film. ...Might state that one of the
vessels in which I have treated the pulverized stone after having been
biled (sic) in water, with HCl did not exhibit this appearance, so
that it would seem that the boiling had driven off the Naphtha. If
so it might be collected by a retort."

Wylie's notations, purely for personal reasons, and the analytical
approach to the understanding of something about the "specimens of
limestone" are consistent with nearly all the available information about
him. Although he was obviously curious concerning the unusual qualities
of the specimens, and he knew how to make a cursory examination, it
is probably significant that there was no further reference to such "bi­tuminous limestone." The Wylie's diary was kept until June 1892. Ob­viously Wylie was dealing with oil shale.

Another notable instance of Wylie's wide ranging interests and
depth of understanding concerns his interest in the occurrence of gold in
Indiana. For example, in the Journal of the Franklin Institute for June
1850 there is a letter from Wylie to a Prof. J. F. Fraser of the University
of Pennsylvania whom he knew for many years. The letter announced
for the first time the recent findings of small amounts of gold in Indiana.
It was accompanied with specimens of the gold and of the black sand in
which it might be found. The locations reported were in the beds of small
streams in Brown, Greene, and Morgan counties. Monroe county was
not listed. The letter gave no indication that Wylie believed mining or
other searching for the gold might be profitable. Wylie's only interest in
the gold concerned the factors that might account for its occurrence in
these areas. The letter was read at the meeting of the Institute in May
1850. Apparently nothing more was published. It is not indicated how
Wylie obtained the information concerning gold in Indiana.

SOME RESTRUCTURING IN THE 1850s

Rev. Wylie was the pastor without salary of the small New Side
Reformed Presbyterian Church (Covenants) from 1838 to 1852 and
from 1855 to 1869 when the congregation disbanded. Thereupon he and
a majority of the group joined the United Presbyterian Church. His diaries
are replete with references to the congregation, sermons by himself and others, and other religious matters. During this time he preached more than 50 sermons per year, conducted funerals, performed marriages, and made innumerable pastoral calls. Of course he continuously devoted much time and thought to the students and other university responsibilities.

From 1852 to 1855, as pointed out by Clark (p. 80), the General Assembly "made considerable statutory headway in restructuring Indiana University." The beginning was the reorganization act in March 1852 which included the selection of a new board of trustees. This new board, with one holdover from the preceding board, in April 1852, started an extensive review of the university. Also, the few faculty members at the same time submitted a stimulating report. As Clark wrote (p. 81),

"Motivated by the faculty, the fervor of its new membership, and the fermentation of the age, the board set out to bring Indiana University more nearly into harmony with the fresh challenges."

In its new thrust in 1852 the board added the bachelor of science degree. It stated that students should have opportunity to prepare in chemistry, mathematics, and natural philosophy. Moreover, as Clark (1, p. 82) interpreted their action,

"The two degrees should have equal weight, and science courses should have the same place in the university's offerings as the traditional ones."

For the first time the annual catalog, in 1853-54, listed "Works of Reference" which apparently consisted of the available books believed to be the most valuable for all the students. Of the thirty, four were chemistry books: Graham's Chemistry, Knapp's Chemistry applied to the Arts, Brande's Manual of Chemistry, and Ure's Chemical Dictionary.

The various entries in the catalog for this year included one listed as Apparatus and Cabinet and stating:

"The apparatus for chemical and philosophical illustrations is respectable. The Mineralogical Cabinet contains many valuable and interesting specimens, to which additions frequently are made. Donations to this department are respectfully solicited from the friends and patrons of natural science."

*Robert Milligan* (1852-54): Actually the chemical equipment and stock of chemicals were meager and there was no person to teach and reflect the knowledge and understanding in the scientific world at that
time. Rev. Robert Milligan became professor of mathematics. In the same year (1852) Wylie resigned and accepted an appointment at Miami University. Thus Milligan was made responsible for much of Wylie's teaching assignments. The new faculty member's background was almost exclusively theological. Unlike Wylie he seemingly did not have an inquiring interest in nature and scientific matters. However, the catalog designated him as Professor of Natural Philosophy and Chemistry. Silliman's textbook was listed for chemistry.

As described by Wylie in his History (p. 117), Milligan was born in 1814 in Ireland. His limited education was in a private academy and at Washington College, both in Pennsylvania. Immediately after receiving an A.B. degree in 1840 he was made a member of the faculty at Washington College. As stated by Wylie, "In 1842 he was formally ordained a preacher of the gospel."

Little is known about Milligan's activity and stature in his two years at Indiana. After two years he resigned "account of the health of his family, and accepted a Professorship in Bethany College, Virginia." There he engaged in various religious activities which included the editorship of Millennial Harbinger and the publication of several books including "Prayer," "Reason and Revelation," and "Grace and Good Works." Milligan died at Harrodsburg, Kentucky in 1875. There is nothing in Milligan's background or in his professional life after he left Indiana University that suggests he ever had any special training or interest in any area of science or mathematics.

Agricultural Chemistry: The Annual Report and Catalog for 1853-54 made reference for the first time to the "Agricultural Department." It stated:

"In this department are embraced Natural Philosophy and Chemistry, both organic and inorganic, including an account of nutrition, growth, respiration in the vegetable and animal economy, and analysis of soils and manures, ores, marls, etc. as connected with agriculture (sic). The course also includes Mineralogy and Geology."

The inclusion of agricultural chemistry in the curriculum, and in association with basic chemistry, was initiated in 1852, but reference to it as a department was obviously euphemistic. As stated by Woodburn (1, p. 177), in that year a committee of the board of trustees recommended expansion of the curriculum to increase the usefulness and popularity of the university. The expansion was to include: (a) a course of agricultural chemistry; (b) a program offering instruction and preparation for the teaching professions; (c) engineering; and (d) full recognition of students who took the "Scientific Course."
Adversity became more pressing and this, coupled with insufficient public interest and leadership in the state, kept the full program from being implemented. However, a normal school was announced in 1852-53 as a part of the university. This designation also proved to be eufhemistic. The unfulfilled action antedated by approximately fifteen years the beginning of the State Normal School (now Indiana State University) at Terre Haute. It was not until 1908 that a School of Education with high promise was established at Indiana University. The authorization for the founding of Purdue University in 1869 marked the beginning of state support for training and developments in agriculture and engineering. This also ended any serious consideration of expansion along such lines at Indiana University.

**UNUSUAL FINANCIAL STRINGENCIES**

The efforts to establish agricultural chemistry were promptly dropped in 1854. Grave financial stringencies prevailed and no progress was occurring in chemistry. In addition to the insufficiency in operating funds, the situation was exacerbated in April 1854 when the main building of the university and many records and books were destroyed by fire. The starkness of the situation is expressed in the financial report of August 1854 by the secretary of the Board, Dr. James D. Maxwell, son of Dr. David H. Maxwell the “essential man” in the founding and nurturing of Indiana University (Woodburn, p. 228):

"The ordinary expenses of the University for the ensuing year will probably amount to $6,000, viz.:

<table>
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<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
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<tr>
<td>President and Professors</td>
<td>$4,600.00</td>
</tr>
<tr>
<td>Board of Trustees</td>
<td>500.00</td>
</tr>
<tr>
<td>Treasurer and Secretary</td>
<td>125.00</td>
</tr>
<tr>
<td>Janitor and wood</td>
<td>180.00</td>
</tr>
<tr>
<td>Incidentals, say</td>
<td>595.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$6,000.00</strong></td>
</tr>
</tbody>
</table>

Productive Fund, at Indianapolis 70,240.00

Interest invested, as per account of Governor Wright 7,760.00

**Total** 78,000.00

**Income**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Interest at 6 per cent of $78,000</td>
<td>4,680.00</td>
</tr>
<tr>
<td>Tuition fees, probably</td>
<td>1,000.00</td>
</tr>
<tr>
<td>In hands of Commissioner Berry as per report</td>
<td>118.30</td>
</tr>
<tr>
<td>Cash in Treasurer’s hands</td>
<td>1,625.00</td>
</tr>
<tr>
<td>Notes at interest</td>
<td>2,523.81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>947.11</strong></td>
</tr>
</tbody>
</table>

Deduct expenses 6,000.00

3,947.11

Deduct proceeds of note discounted by Sinking Fund 1,860.00

**There remains** $2,087.11"
Handicapped by such severe financial limitations and uncertainties the size and effectiveness of the university remained nearly static even though the legislative reorganization actions from 1852 to 1855 favored progress.

Following the disastrous fire another building, First "University" Building, was erected in 1855. It provided laboratory space in the basement area at the east end. In 1858 the old (1840) Laboratory Building was sold for $211 and removed. The salvageable materials were used to construct a public school building at the southeast corner of Sixth and Washington Streets.

The return of T. Wylie to the faculty in time for the beginning of the 1854-55 year gave him exclusive responsibility for instruction in natural philosophy and chemistry until Colonel Richard Owen, M.D., was appointed effective in January 1864. The poverty of the institution in funds and breadth of educational stimulation during this period and throughout the Civil War is well illustrated by Clark (p. 102) who wrote:

"In the opening semester of 1860 there were four full-time professors in the university, plus the adjunct professor of languages, who was also principal of the preparatory school. The law professor functioned separately and was paid on a contingent basis. Theophilus Wylie occupied the all-embracing chair of natural sciences and was president pro tem [From Feb. 1859-Sept. 1859]. Elisha Ballantine taught languages, the newly appointed Henry B. Hibben was professor of English literature, Daniel Kirkwood taught mathematics, and James Woodburn was principal of the preparatory school and adjunct professor of languages. James R. M. Bryant taught law as a sideline to his Bloomington practice; he was not strictly considered a member of the faculty. Thus the teaching program was reduced to the barest essentials in courses. In 1865 Amzi Atwater said of the school, 'I use the term University, for that was its official designation, but there was little about the institution to differentiate it from the better western colleges except for its small law class of seven Seniors and eight Juniors...' This condition reflected the stultifying plans made by the trustees and the almost total neglect of the university by state officials. Any meaningful talk of conducting courses in the new fields of agriculture, engineering, or professional education was for now purely academic. The university was entering a decade in which it would be merely a holding operation."

The reports and catalogs in this period reflect the grimness of the situation, but the leadership was not totally overwhelmed by the problems. In the catalog for 1853-54 it was pointed out that Bloomington

"... is pleasantly situated on the New Albany and Salem Railroad, in an elevated and well watered limestone region."
This favorable description was included in the catalogs in various forms for several decades.

The seriously crippling effects of the fire in 1854 are shown in different ways in the Annual Report and the "Catalogue for the Academical (sic) Year, MDCCCLV-VI," which was published in 1856. The number of books in the "Works of Reference" had decreased from 30 to 23 and only two were in chemistry. Four had been listed in the catalog two years before.

Referring to the fire and an adverse judicial decision on the complicated legal suit by Vincennes University (See following paragraph), the catalog included a one page statement on "Condition and Prospects" by the President of the Board, John I. Morrison (father of the woman who was to become the first female student at I.U.). The full statement is included herewith because it was reported near the lowest point in the struggles of the institution, and an upward movement was surely occurring:

"It is known to the public that the Indiana University has suffered a series of calamities unparalleled in the history of any literary institution in the country. By a judicial decision, nearly its whole endowment was swept away. Its principal edifice and libraries were consumed by fire. Not only was its prosperity retarded, but its very existence rendered uncertain by these disasters.

"Equally remarkable have been the interpositions in its behalf. The Congress of the United States made it a donation of a township of land. The State Legislature, with a noble munificence, at its late session, granted indemnity for all losses sustained by adverse judicial decisions. Its funds are thus rendered more and more ample and secure than heretofore. A new edifice, in addition to those now on the College grounds, and far more commodious and beautiful than the one destroyed, is already erected, and in rapid progress of completion. Every important and agitating question affecting the interests of the University has been fully and finally settled. The institution is placed in a stable and permanent condition. If it was possible to retain the officers and students, and maintain a respectable rank, when it seemed that each College session would be the last, it surely is not unreasonable to anticipate a great increase of usefulness and prosperity, now that all causes of apprehension and distraction are removed, and the University is left free and unembarrassed in its appropriate work."

BEGINNING OF A SCIENTIFIC CURRICULUM AT INDIANA UNIVERSITY

A B.S. program began to be recognizable in 1841 when the first listing of students in a scientific curriculum appeared in the catalog for that year (Clark 1, p. 168), but the first B.S. degree was granted in 1855.
Four were awarded. In this year Wylie was again listed as professor. The catalog for 1853-54 listed 34 "studies" that were "to be completed in order to graduation" to the degree of Bachelor of Science." Of course the B.S. degree did not represent specialization in any subject. Such concentration in a limited area was not to occur for several decades.

The catalogs in the 1850s gave in some detail the "Course of Instruction." There were three terms of approximately three months each. The "studies" for each term and class were listed. "Chemistry (Silliman)" was given in the first term of the Junior year and "Agricultural Chemistry" was in the second term of that year. No other form of chemistry was included in the entire four year program. But there were many other studies. Included in the first term of the Junior year were: Rhetoric (Campbell); Elements of Criticism; Tacitus; Greek Drama; Analytical Geometry completed; Calculus, commenced (Davis); and Exercises in English Composition and Declamation. Others in the second term were: Mental Philosophy (Reid); Geology (Hitchcock); Physiology, Juvenal; Greek Drama; Calculus; and exercises in English Composition and Declamation. For the third term the studies were: Mechanics, commenced (Bartlett); Logic (Whately); Evidences of Christianity; Juvenal; Greek drama; Calculus, finished; and English Composition and Declamation.

The Senior year included more mechanics, acoustics and optics, astronomy, surveying, and civil engineering. There was more Latin and Greek classics, moral philosophy, Constitution of the United States, international law, and English Composition and Declamation. The only optional studies were in this year. They were German Language and Literature, French Language and Literature, and Hebrew Language and Literature.

In addition to all of this, compulsory chapel exercises were held every school day. As stated in the 1853-54 catalog.

"A portion of the Bible is read, and prayers are offered every morning in the University Chapel, at the calling of the roll."

In 1855-56 a "New University Building" replaced the main building which had burned. Four years later the catalog showed that agricultural chemistry had been replaced by organic chemistry. The Report and Catalog for 1861 stated that Stockhardt's chemistry textbook was being used. It commented regarding the New University Building:

"Under one wing where the ground falls considerably (East), a convenient laboratory has been fitted up, and provided with the apparatus necessary for the experimental illustration of the chemical course."
After describing the location of the building with reference to “the principal street (College)” and the nearby railway (Louisville, New Albany & Chicago), it is stated that “the apparatus for chemical and philosophical illustrations is respectable.” This description had been used for the first time six years before.

During the first decade after Wylie’s return to Indiana he was the only person responsible for teaching chemistry and related disciplines, but of great importance Daniel Kirkwood was his close and admired colleague. They evidently saw each other daily and owing to the spirit and smallness of the academic community there was a stimulating intimacy between the two, and many of the students.

OTHER INSIGHTS ON WYLIE

The nature of Wylie’s influence and his effectiveness is graphically indicated in his personal diaries. They show, as do other records, that much of his time and thought were devoted to students and his ministerial duties and interests. They also reflect open mindedness and a feeling for unity between nature and God. This is illustrated in the following excerpts from some of the entries in the first few months of 1857:

Jan 24 ... P.M. mended clocks. Helped Dick (the son who was to die four years later in the Civil War) carry in wood. Read over lessons in acoustics & mechanics. Thought about tomorrow's work....
Monday Jan 26 ... Heard Juniors in Mechanics. Seniors Acoustics. Nodal parts of vibrating charts. P.M. Silliman’s journal. Found nothing very interesting...
Tues. Jan. 27 ... Arranged apparatus for ... figures. P.M. Read Silliman, a sensible article on the formation of the peninsula of Florida ... read lessons & some in Draper’s Physiology on the ear ...
Thurs. Jan. 29 ... P.M. went to see Prof. Kirkwood. Evg Read. It is now past 12 o’c.
Fri. Jan. 30 ... Recitations in Mechanics & Acoustics—Chapter on musical intervals—rather hard for the class ...
Mon. Feb. 2 ... After tea (supper), read Optics and Mechanics....
Sunday, Feb. 8 ... (After writing about the sermon he preached at his church he wrote) Read some in Principles of Zoology—on the development of animals from the egg ...
Tuesday Feb. 24 ... (Frequently he made comments about the well being of students.) When hearing the recitation of the senior class Mr Allen came in and announced the sudden death of his classmate Charles Miller. Mr Miller had had the measles & was as we thought recovering .... What distressing tidings will the parents receive ...

CONTRASTS BETWEEN T. WYLIE AND J. PRIESTLEY:
Although Rev. Wylie was little known outside Indiana University, there
was something about his training in theology and his deep religious interests—combined with his innate interest in nature and a myriad of scientific matters—it is natural to compare him in some degree with Joseph Priestley. The primary support for the comparison is in the extensive and unpublished diaries Wylie kept for 60 years. Supplemental support is in the recorded comments some of his colleagues and former students have made. In marked contrast with Priestley he had virtually no publications except his history of Indiana University published in 1890.

In many of the entries in the diaries there are theological thoughts and references to the Bible. His interpretations of such matters as creation and resurrection were devout and rational. He thought and wrote as a scientist. He commented with great frequency on natural phenomena such as lightning, changing weather, stellar constellations, volcanic action, and electricity. For example, on 12 July 1836 when he was 26 years old, he described an experience with others in “making some experiments with electric kites....” He recorded that “They succeeded however in bringing down a considerable quantity of electricity.” He continued, “I touched the reel (connected by a fine wire to the flying kite) and received a shock as if from a moderately charged Leyden jar.”

Priestley, of course, isolated and studied more new gases than any other person. He wrote extensively on knowledge of electricity, on principles of government, the history of optics, and extensively on Christianity and various religious subjects. Also, he wrote on the French Revolution and other social and political matters. He became highly controversial and long after his death highly celebrated.

Nevertheless, the nationally obscure Wylie and the widely recognized and prominent Priestley did have interests and basic qualities that in some degree warrant comparison.

The various descriptions of Wylie by former students and others who knew him well are almost uniformly the same. These are epitomized by one of Professor Wylie’s students who wrote of him (Woodburn, 1, p. 478):

“Professor T. A. Wylie was a grand acquisition to the institution. He was perfectly at home in every thing connected with his department or with that of the other professors. He was no orator but was a very interesting preacher, invariably bringing out by his criticisms and intimate knowledge of the Greek language the true meaning of the text; and with all his varied learning and attainments was entirely free from any thing like ostentation.”

**Daniel Kirkwood**

The strengths and creativeness of Kirkwood have been written about by various persons, but one of the most discerning descriptions must be the brief sketch by Wylie in his *History of Indiana University*. 

Daniel Kirkwood was born in 1814, four years after the birth of Wylie. He was made Professor of Mathematics at Indiana in 1856, two years after Wylie returned to the university. He retired in 1886 in the same year that Wylie retired, and he died in 1895, within the same week that marked the death of Wylie. Both are buried in Bloomington in Rose Hill Cemetery. Kirkwood never had access to an observatory and Wylie probably was never in close touch with any truly productive chemists or physicists. But Wylie had insatiable interest in astronomical observations and he and Kirkwood shared their interests and thoughts in astronomy continuously. Kirkwood published extensively theoretical and mathematical astronomy and he became internationally recognized. As reported personally by Professor Emeritus F. K. Edmondson, in at least one article Kirkwood used data that were shared with him by his close friend Wylie. However the latter never published anything in science, but he always had an inquiring attitude about astronomy and other scientific areas. Notably he was always the day-to-day doer of much that had to be done for the university and his church. Also, during his time each student had close contact with each of the few faculty members. Hence the specialized scientific and mathematical orientation of Kirkwood and the zest of Wylie for understanding natural phenomena must have had a salutary effect on the students while they were studying chemistry, mechanics, and other subjects taught by these two indomitable supporters of the university.

RICHARD OWEN

When Col. Richard Owen came to the university in late December 1863 the small faculty taught whatever was required without necessarily having expertise in all that was attempted. During the first three years Owen was Professor of Natural Philosophy and Chemistry. From 1867 to 1879, when he retired, his title was Professor of Natural Science and Chemistry. As stated by Wylie (p. 127),

"During these fifteen years he gave instruction principally in Geology, Mineralogy, and Chemistry, and during vacancies in the Modern Language Department, he taught German and French."

During the first six years he was the state geologist. In this capacity he also contributed to the university.

The provision for the state geologist to hold a professorial appointment in the university was inaugurated by legislative action in 1861. Much of Dr. Owen's training in geology was obtained in surveys for the federal government in which his noted brother Dr. David Dale Owen was the director. He made substantial contributions of merit in several different periodicals. Nearly all his published work was focused on ge-
ological subjects. Harding (p. 247) listed 16 scientific publications by Dr. Owen with the first in 1852 and the last in 1890, the year of Owen's death. As indicated in the titles, none of the work had any particular reference to chemistry. However, Owen was the first teacher of chemistry at Indiana University to publish papers or reveal in any other way both expertise and creativity in any area of science. Indeed, until the time of R. Owen, T. Wylie and D. Kirkwood were the only other persons at Indiana University who had seriously given continuing attention to matters of science and mathematics.

Richard Owen was distinguished in several ways. He was born in 1810 in Scotland and his early formal education was in Switzerland. As detailed by the biographer Albjerg, he devoted much time to the natural sciences and he specialized in chemistry. Following this he studied in Glasgow, Scotland, "where he pursued courses in chemistry and physics under the instruction of Dr. Andrew Ure."

In 1828 Richard accompanied his father Robert Owen and brothers Robert Dale and David Dale to New Harmony, Indiana where his father in 1825 had bought the community established by the Rappites. Soon Richard married but this was quickly terminated by his wife's untimely death. He engaged in several pursuits including farming in Lancaster county, Pennsylvania and work for a brewery in Cincinnati, Ohio. Finally in 1837 Richard married Anne Eliza Neff. It was a triple wedding in which the other two brothers were joined. Anna Eliza was the sister of one of the other two brides. Reflective of the closeness of the brothers and the relation to their father, the three couples lived for a time with the father in the large Owen mansion at New Harmony.

Richard's second marriage probably had much to do with his career. It brought him into close contact with the father-in-law Joseph Neff, a major figure in the New Harmony community. Mr. Neff had been a soldier under Napoleon and he had driving ideas about education and social planning for human betterment. Richard lived and worked under this dynamic and intellectual influence—and that of his father and others—in New Harmony. His time was absorbed in farming and teaching until the Mexican War started in 1847. Soon he was commissioned in the Army and he quickly became involved in the War. This included duty in Mexico and the study of Spanish. After a year in the Southwest he returned to New Harmony and then joined his brother David in surveying and geological work in the Northwest Territory. This led to various other useful experiences and a broadening of his interests, especially in teaching. Finally he accepted an appointment with the Western Military Institute of Kentucky and service in the Literary Department of the University of Nashville, Tennessee. Probably without devoting much time to the effort, in 1858 he received the degree Doctor of Medicine at the Medical College of Nashville.
The growing tensions between the Southern states and the North, and his strong opposition to slavery were factors in his return to Indiana in 1859. As reported by Clark (1, p. 109), the return was with the understanding that he would serve as field geologist in the Indiana Survey under the direction of David Owen who had been made state geologist. When David died in 1860 Richard was appointed state geologist.

With his brother David and others at New Harmony a remarkable collection of geological and natural history specimens was assembled. It became widely known as the Owen Cabinet. In addition to the thousands of mineral specimens, that collection by about 1860 contained almost every fossilized form known to occur in the Ohio and Mississippi valleys. Its value in the state was augmented through action of the General Assembly in 1861 which directed the state geologist to collect duplicate specimens of geological value and other scientific specimens during his travels in the state. Such specimens were to be kept at Indiana University. Under the new law, the state geologist was to be an ex officio member of the faculty at Indiana University. Thus the Owen Cabinet at New Harmony and the connection of Richard Owen with the university as state geologist had great prospects of becoming of integral importance to the university. But the outbreak of the Civil War caused many disruptions. Soon Dr. Owen entered military service where he served with distinction. After being involved in three battles Governor Morton promoted him to the rank of full colonel and ordered him to raise and command the Sixteenth Indiana Volunteers. His two sons Captain Eugene and Lieutenant Horace served in that regiment.

The next distinct military action for Colonel Owen was in the management of Camp Morton, a prison camp for Confederate soldiers established in February 1862 at Indianapolis. Colonel Owen's efficiency and humaneness in commanding the camp soon won the high approval of governmental and military officials and the deep gratitude of the prisoners. But in May that year the Colonel and his regiment were returned to battle duty. Soon he and his men, including his two sons, were captured. Owing in part at least to the appreciation felt for his treatment of prisoners at Camp Morton the regiment was paroled and the Colonel was given full liberty.

Soon after this Colonel Owen and his regiment again returned to military action. This included fighting under Grant and then with Sherman. Finally well before the end of 1863 he concluded that the prospects of Northern victory were assured. Because he was primarily intellectual in his interests, he retired from the Army to accept an appointment at Indiana University and on 27 December moved to Bloomington.

This was to have much impact on teaching and research in the university and it was to be a major factor in bringing together the geological collections of the state at his institution. As recorded by Wylie in
his diary, one of Col. Owen's first responsibilities was to address the College Chapel on 24 January 1864. His topic was "On honoring the illustrious dead." He soon became deeply involved in many aspects of university life.

Wylie wrote authoritatively about the Owen collection in his History (p. 79,80):

"In 1870, the large and extensive cabinet of the distinguished geologist, the late David Dale Owen, M.D., of New Harmony was offered for sale, and purchased by the University. The terms were made so favorable ($20,000) that the University was without difficulty able to purchase it. The negotiation with the family of the late Dr. D. D. Owen, was made by Professor B. E. Rhoads (Trustee at I.U. from 1868 to 1872 and Dr. H. Cloud, and the collection was packed and sent to Bloomington. It filled several (railway) cars. There was no room for it in the then existing buildings, and all that could be done was to hire a ware-room and store it away. To utilize it, rendered the erection of another building indispensable."

In describing the resultant building, Science Hall, Wylie wrote

"This building was in length, one hundred and thirty feet; in breadth, fifty feet; three stories high. The collection and chemical laboratory occupied the lower floor. The library, the physical department and analytical laboratory, the second floor. The law department, till its close in 1877, and afterwards the natural history and geological departments and modern languages the third floor."

The building was erected in 1873.

The importance of the Collection is reflected in a letter written by Professor Rhoads, to the Fort Wayne Gazette in 1873 (IDS 15-12-1873). He pointed out that the value of the Collection was being enhanced through the completion of a new building with a laboratory for quantitative analysis in chemistry. Indeed with the development of quantitative analysis considerable attention was soon given to rock analysis in chemistry and the existence of the fine collection had a stimulating effect under the influence of Dr. Owen. This continued after 1874, when Thomas C. Van Nüys became Professor of Chemistry, the first at Indiana University with that title. At that time Richard Owen became Professor of Natural Science and remained in that role until he retired in 1879, owing to deafness. He returned to New Harmony. It is notable that the university chose for his successor a 28-year-old professor of Biology at Butler University, David Starr Jordan.

Richard Owen's importance in the university, and in some degree to chemistry in particular, is demonstrated in various ways. As a measure
of the high recognition of his breadth of knowledge and perceptions of educational needs, in August 1872 he became the first President of Purdue University. But he remained in residence and on full time service at Indiana University. One year later he returned to Lafayette and gave the trustees his plan on the organization of the new university. This was based on ideas he had developed beginning in 1864 while he attempted to have an agricultural school established at Indiana University. The pattern he proposed included broad training in chemistry, physics, mathematics, English literature, and other areas. The plans, including a budget, were characteristically detailed and opinionated in many matters. For example, Owen wrote:

“A dietary should be adopted which should at the same time give sufficient variety from day to day, and be of not the most expensive kind, yet nutritious, palatable and wholesome, avoiding the free use of pork, meats fried in grease, rich pastry and the like, as being highly injurious to those having more work of the brain than of the muscles.

“It is further recommended to give animal food only once a day, and to use largely of corn meal and unbolted flour for bread and mush, in order to avoid the great evils incident on a sedentary life, constipation and hemorrhoids. It is also recommended that to all who will abstain from tea and coffee a somewhat reduced rate of weekly board should be given, also that various farinaceous puddings and the like be substituted most of the time for the rich pastry too commonly used as dessert. For the sake of health, the meals, if three are taken each day, should be at least six hours apart, and served with great punctuality at the appointed hour.”

There were soon major outbursts of strong objection. The general feeling was that neither the plan nor the new president would suffice for the preparation of students to be managers of farms and factories, and builders of roads and machines. As Albjerg stated (p. 89)

“The members of the Board announced that the students were there to learn and supposedly not to saunter in sylvan beauty.”

The upshot was that six months after making his report Dr. Owen resigned from the assignment at the new Purdue.

The difficulties were probably due in part to untimely publicity on the report. Owen had intended it to be the basis for confidential discussions with Purdue’s new Board of Trustees. After exchanging views he had planned to emend the report and make it reflect the policies on which he and the board were in agreement. The outcome was that Owen gave up serious thought of helping in the establishment of an agricultural
school and he gladly directed all of his attention to his interests at Indiana University.

In the aborted involvement with Purdue he had made three trips to Lafayette. Following the resignation he sold his own collection of fossils and minerals to the new institution. He received $976.60 in reimbursements for travel expenses, the fossils and minerals, and for books that he contributed. There was no payment for his time and knowledge.

The trustees of Indiana University were so pleased by Dr. Owen's decision that he was given the curatorship of the new museum housing the exceptional Owen Cabinet. This extraordinarily valuable acquisition had been kept in storage until it could be moved into the new Science Building completed that year (1873).

Dr. Owen was a product of several remarkable cultures, not the least of which must have been his parentage and the innovativeness of individuals and families around him as a young man in New Harmony. Also his early education through private tutors and study in Switzerland and Scotland gave him unusual preparation for his years at Indiana University. The military service in the Mexican War, and during the early years of the Civil War also set him apart. In particular, as commandant in charge of Confederate prisoners in Camp Morton, Indianapolis, his record of humaneness and fairness was outstanding.

Dr. Wylie wrote (p. 128) that

"During his whole life he retained a spirit of liberality to all who conscientiously differed from him in his religious or political views. He always deprecated violence and extreme party spirit."

Considering his high stature in the University and State, and his close association with Wylie during those years, it is of particular interest that he became devoutly and rationally religious. Wylie wrote (p. 128):

"It is not strange that when in Bloomington, associating with Godfearing men in the town and in the faculty of the University, he professed his faith in the Divine Savior and became a member and an office-bearer in the Presbyterian Church."

This aspect of Owen's life apparently was frequently expressed in the daily chapel services which at that time were a significant feature of campus life. As indicated by Wylie's statements and comments in his remarkable diary, Owen's chapel talks were generally Bible-based and admonitory concerning uprightness in living and in personal responsibility for health and good citizenship. For example, as stated by Wylie, on 27 September 1874 the topic was "Faith, Hope, Charity, etc." On 20 December that year the topic was "on the sin of neglecting to care
for one's health.” On 14 March 1875 he spoke “on the fulfillment of
the promises made to Abraham,” and on 3 October that year it was on
the Fifth Commandment of the Bible: “Obedience to constituted au-
thority—and of all to God.”

Concerning Owen’s participation in the religious life of the com-
munity, for a time he conducted a Sunday School class in the Presbyterian
church in which Wylie was the minister until 1869. As the biographer
Albjerg wrote (p. 61):

“His extant outlines reveal that he prepared for these sessions with
the same care that he did for his secular courses. His class developed
into a discussion group which considered a variety of topics such
as religion, morality, economics, politics, ethics, frivolity, and family
relations. From verbal exchanges on such topics it is obvious that
he was permeated with a deep spirituality.”

Regarding science and religion, Albjerg stated (p. 62):

“So far as he (Owen) was concerned, he found nothing in science
that was contrary to Holy Writ. On the contrary, he discovered
much to confirm his belief and heighten his faith in the Creator of
the Universe. ‘I readily admit,’ he said, ‘that Omnipotence could
create the world in seven days or in seven seconds.’”

For Owen “the writings of Lyle on geology or Darwin on biology
did not for him discredit the scriptures.” The views of Owen and Wylie
on science and religion seemed to be remarkably similar.

Dr. David Starr Jordan wrote in 1891 of Owen,

“He taught those well who cared to learn. He believed in large
freedom of the student .... His was the highest type of teacher, of
naturalist, of scholar, of soldier even, because above all his was the
highest type of man.” (Woodburn, 1, p. 364, 365)

From time to time the Indiana Student made reference to Owen
and his teaching of chemistry. On 15 February 1871 the reference was
a small filler:

“A junior in chemistry when asked by Dr. Owen, ‘What is resin?’
replied, ‘Rosin is the residue left after distilling the sugar-water which
runs out of pine trees.’”

On 10 December 1871 the reference was to Owen’s trusting attitude
and his desire to help students with serious interest in learning:
"There has been a new thing introduced into the Chemistry class. A few days ago Professor Owen was called away and in lieu of the recitations he assigned a certain subject connected with Chemistry, to each of the members of his class, to be written upon. Thus now we are daily regaled with choice essays, some of which are very interesting.—"

As reported by Woodburn (p. 364) Jordan concluded that Owen:

"... had neither skill nor taste for the work of drill-master. He taught those well who care to learn... His students were on their honor, and those who had no honor abused their freedom."

Albjerg (p. 50) wrote of Owen:

"To him the classroom was not the place for entertainment, light bantering, or exhibition of the instructor's personality, but rather for the revelation of a theory or the exposition of a principle... Bright students with an inquiring mind eagerly lingered after class for further discussion of the subject under consideration, and none of them left without having peered a little farther into the unknown."

In 1879 owing to his impaired hearing Owen retired. He returned to New Harmony and worked primarily on seismology. In a letter to the Indiana Student in 1885 he wrote "My present line of study, as long as I am spared, will be confined to dynamic geology." His days seemed always to be stimulating and rewarding. As concluded by Albjerg (p. 92)

"Release from teaching left more time for reading, research, and writing, with a consequent acceleration in articles published. Many of these were in the field of physics and were concerned primarily with magnetism and the molecular theory."

Less than three months before his death he published in the American Meteorological Journal a significant article on the construction and behavior of magnets. This interest was broad and it focused on paramagnetism in compass plants. It involved a voluminous correspondence with persons of similar interests as well as experiments with plants.

Other interests and accomplishments included extensive recording of thermal and barometric readings; by the use of his seismograph he observed regularly the frequency and character of earthquakes in various parts of the world. With the aid of an assistant he constructed in his study and workshop many maps of every continent and many countries. These illustrated as many of their geographic characteristics as possible.
As pointed out by Albjerg (p. 95) a year before his death he participated in an international contest "for the best system of popularizing geography." There were sixty participants and the prize was awarded to a German professor. Dr. Owen was one of four to receive honorable mention. In retirement as well as before Owen kept up an active correspondence with many professional friends in this country and abroad. The many topics included views on socialism, tornadoes, geology, and physics. He lectured extensively in Indiana and Illinois and he was in demand as a commencement speaker. Occasionally he preached in the New Harmony Methodist Church and he conducted the funeral services of many residents, some of whom were his close friends. He was active in the meetings of the Masonic Order and the Odd Fellows Lodge. Also, his home was the center for various intellectual and social activities. He led groups on nature expeditions and lectured to the participants on botany, geology, and geography. These myriad activities were conducted in spite of the increasing infirmity of deafness and myopia. Even with these handicaps Dr. and Mrs. Owen's large home continued to be the center of gracious and unpretentious hospitality. Guests included former colleagues from Bloomington. Among them was David Starr Jordan after he had become President of Indiana University.

Unfortunately Owen became eccentric about his diet and this led to the practice of drinking a glass of mineral water every evening at a nearby grocery store. On 25 March 1890 by mistake a supply of embalming fluid intended for the undertaker in an adjoining part of the building was delivered to the store and it was given to Owen and an accompanying friend on the assumption that it was the customary mineral water. Apparently the real mineral water had a horrible taste since Owen and the friend took several swallows of the poisonous fluid before recognizing the mistake. The friend recovered but Owen died that night. The body is buried in the old cemetery in New Harmony. The grave marking includes an epitaph of his selection: "His first desire was to be virtuous, his second to be wise." The two sons, several grandchildren, and his wife for fifty-three years survived Dr. Owen.

The University's memorial service for Dr. Owen was impressive and long. One of the best descriptions was given by Wylie in his diary dated 20 April 1890. There were several speakers, including Dr. Wylie, two ministers, and singing by the University choir. The service, on campus, lasted about two hours. As expressed by Dr. Wylie, the "audience [was] pretty large, and remained (2 or 3 exceptions) till the close." The local minister of the Presbyterian church, Rev. Mr. Minton, read "1 Cor. Ch. XIII (a favorite of Dr. Owen's); don't know whether this was told him or whether the selection was incidental." The prayer was by Rev. Halsted of the local Methodist church. The other speakers were:

Prof. Earl Barnes (History) spoke on New Harmony.
Pres. D. S. Jordan discussed Dr. Owens as a naturalist.

Prof. Wylie spoke on "Dr. Owen's religious character, ... his infidel father .... pious mother. Dr. Owen's religious spirit even while skeptical. His conversion to orthodox presbyterianism through the instrumentality of Dr. J. M. Bishop in 1866 ...."

Prof. Amzi Atwater (Latin) discussed Dr. Owen as a teacher and as a citizen interested in public affairs.

Indiana University has well memorialized Dr. Owen. Owen Hall, one of the two buildings that were the first to be erected on the present campus, was named in 1885 for Richard Owen and his two brothers Robert and David. A replica of a larger-than-life size bust of Dr. Owen has for years graced the principal entry way to the original Memorial Union at Bloomington. The original bust was erected and dedicated in the Statehouse in 1913. The funds for it were raised by surviving confederate prisoners at Camp Morton over whom Owen had control during several months early in the Civil War. A large portrait of Dr. Owen graces the Owen room in the Geology building at Indiana University.

**Wylie's Efforts in Acquiring Equipment and Books**

The catalog for 1863-64, the academic year that Owen joined the faculty, recorded that "The apparatus for chemical and philosophical illustrations has had several important additions made recently, and a large telescope, purchased in Boston, is daily expected...." Some illumination of the actual status of the university with respect to such resources is reflected in a handwritten report prepared by Wylie and dated "June 28th 1864." The 3-page statement, now in the University Archives, apparently was intended for the Indiana University Board as an accounting for a fund of $700 given to him by the board in July 1863 to be used for the "purchase of apparatus for the department of Nat. 'Phil.' & Chem."

As shown in the report, and slightly supplemented by some entries in his diary, Wylie went to Philadelphia and Boston for this purpose in the summer of 1863. Of course all of his trips to Philadelphia included visits with relatives and friends. The purchases and other expenses were itemized by Dr. Wylie as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals and chemical apparatus</td>
<td>$65.52</td>
</tr>
<tr>
<td>Philo. App.</td>
<td>61.25</td>
</tr>
<tr>
<td>Ruhmkorff Coil</td>
<td>180.00</td>
</tr>
<tr>
<td>Six cells Bunsens (sic) battery</td>
<td>18.00</td>
</tr>
<tr>
<td>Apparatus for acoustics and packing</td>
<td>18.28</td>
</tr>
<tr>
<td>Griffins' blowpipe apparatus.</td>
<td>12.00</td>
</tr>
<tr>
<td>Guyot's maps.</td>
<td>27.50</td>
</tr>
<tr>
<td>Skeleton</td>
<td>30.00</td>
</tr>
</tbody>
</table>
Wylie stated that he examined several telescopes in Philadelphia and Boston. He made a conditional purchasing arrangement with a Mr. Bates in Philadelphia for one not then completed. After various delays following Dr. Wylie's return to Bloomington he was informed by telegram that the telescope had been completed, "that its performance is excellent," and that it was being shipped. The cost was $200.

Wylie requested the board to allow him $65 "for traveling expenses." He justified this on the basis that the journey was "for the good of the University, and as times are peculiarly hard with those who depend on fixed salaries."

The report included an explanation for not expending all the appropriation. While in Philadelphia he learned that Col. Richard Owen had accepted the professorship of "Nat. Phil.," thus relieving Wylie of some responsibility in this area. Wylie had intended, upon his return to Bloomington, to use some of the balance of his appropriation to provide cases for the apparatus and in making some repairs in the laboratory. Owing to Owen's acceptance he preferred to let him handle this. In the report Wylie added that several of the purchases had been made at the suggestion of Col. Owen.

For considerable time Wylie had much responsibility for the maintenance of the University's scanty library. Thus on the trip he made some purchases for the library. The total for this purpose, including $1.15 for postage and stationary, was $42.50.

The report gave further emphasis to Wylie's (and Owen's) view that Latin and Greek were important. He suggested that it would "be advisable to insist upon the scientific students making some progress in their languages, in order to receive a diploma."

During the decade that instruction in chemistry and physics was shared between Wylie and Owen not much change occurred here in the focus on these fields.

ADMISSION OF WOMEN TO THE UNIVERSITY

A signal change in policy occurred in 1867 when, as described by Wylie (p. 74, 75, 146), women were allowed admission to the university with all the rights and privileges that were enjoyed by men. Sarah Parke
Morrison, daughter of John I. Morrison of Salem, enrolled in the fall of 1867 with advanced standing. She graduated with the class of 1869. Her father was a member of the board of trustees. Presumably she was the first woman to be enrolled in chemistry here because two terms were required in the Junior class (year) for all students in the “Regular Course” as well as in the “Scientific Course” at that time. In the admission of women, as stated by Harding (p. 17),

“Indiana University was, among the State Universities, the pioneer in this movement.”

Even before formal admission was adopted a few women had limited opportunity to observe instruction, at least in chemistry. As remembered by Samuel Weed, Wylie’s daughter (Margaret) and two other young women in the early 1860s

“. . . were permitted to take seats in the laboratory (class room), hear the young gentlemen recite, and witness the experiments. No one, not even the father of Miss Wylie, seemed to notice their presence, although their presence had a manifestly salutary effect on the boys.”

Weed stated that because of Wylie’s small size,

“. . . but more because of his (firm) requirements in class, some of the students called him ‘little Wylie.’ ”

He also commented that Wylie’s

“. . . small legs took him on the run to his appointed duties on time.”

Other women soon enrolled and completed degrees. Probably the first to receive high distinction was Louise Wylie, daughter of T. Wylie. In 1871 the faculty chose her for the scientific oration and named her “Scientificarian.” In that year, as recorded by Wylie (pp. 249-52) six other women graduated with the B.S. degree. They were: Helen Alford, later Mrs. Charles J. Berry; Elizabeth Harbison, later Mrs. James H. Dunn; Ella Fellows, later Mrs. John W. Ewing; Laura L. Turner, later Mrs. James M. Foster; Clara McCord; and Susannah Hamilton, later Mrs. Vincent Anderson. Louise Wylie later became the wife of Professor Herman Boisen.
BEGINNING OF REGULAR FUNDING OF THE UNIVERSITY
BY THE GENERAL ASSEMBLY

Of crucial importance for the university, and for the eventual development of significant work in chemistry, in 1867 the State for the first time appropriated funding from the general funds of Indiana. The initial action was described by Harding (pp. 16, 17):

"The General Assembly, recognizing that the 'endowment fund of the State University' was 'no longer sufficient to meet the growing wants of education and make said University efficient and useful' and believing that 'it should be the pride of every citizen of Indiana to place the State University in the highest condition of usefulness, and make it the crowning glory of our present great common school system,' appropriated $8000 to the use of the University, and in 1873 increased the amount of the annual appropriation to $15,000."

Within two years after the beginning of annual appropriations the Catalog for 1869-70 listed fourteen "Officers and Instructors" in the University. These included as recorded:

Rev. Theophilus A. Wylie, D.D.
Professor of Natural Philosophy
Richard Owen, M.D.
Professor of Natural Science and Chemistry
Daniel Kirkwood, LL.D.
Professor of Mathematics
Professor Edward T. Cox
State Geologist

The College Officers were listed as
Richard Owen, Secretary of the Faculty
Theophilus A. Wylie, Librarian

It is of significance that the page listing officers included the name of the Janitor, Alexander Kilpatrick.

In 1868 following the funding of a portion of the budget by the General Assembly, the "Scientific Course" was lengthened to four years and, as stated by Harding (p. 51), "given a separate schedule of study."

Also,

"The regular course .... at this time received the designation 'classical,' by which term the course in languages continued to be known until the definite introduction in 1887 of the 'major subject' system."

In 1870 the "Scientific Course" included mathematics, Latin, physiology, and history in the first year; mathematics, Latin or modern lan-
guage, zoology, English composition, and botany or physical geography in the second year; mathematics, two chemistry courses—inorganic and organic (Stoeckhardt), natural philosophy—mechanics, hydrostatics and pneumatics, practical surveying and civil engineering, mental philosophy, and constitutional law and civil policy in the third year; and natural philosophy—acoustics, optics and electricity, astronomy, geology, political economy, international law, moral science, and evidences of Christianity. As indicated, relatively little time was given to chemistry. This was changed with the completion of the “Science Building” and appointment of Dr. Thomas C. Van Nüys as Professor of Chemistry in 1874. In that year the amount of course work in chemistry more than doubled. This impetus and the beginning of the presidency of the University by David Starr Jordan in January 1885 constituted the beginning of chemistry as a significant discipline in the university.

In this period the university was indeed in a state of major transition from the “several periods of utter poverty and frustration” (Clark, p. 204) and it was now clear as stated by Jordan (ibid) that

“Among its professors in the ‘70’s were four, grown old in service, who were justly held in high respect by all capable of recognizing a good man. These were Daniel Kirkwood, Theophilus A. Wylie, Elisha Ballantine, and Richard Owen.

During its third quarter of a century, that began about this time, the faculty replacements for these revered pioneers had good opportunity to move chemistry here toward the mainstream of American chemistry, but this did not happen.

Concerning the first five decades of the university it can be concluded with Harding (p. 21):

“That the range of subjects was restricted, but that equipment of the laboratories was meager, that the opportunities for investigation were lacking, must be admitted. .... In some part at least, the want of a variety of courses was compensated for by the close and often intimate relation between the student and the teacher. The contact with such men as Professors Wylie, Owen, Ballantine and Kirkwood was a liberalizing and inspiring influence which wrought in the minds and hearts of the youth subtle and abiding changes.”

Harding pointed out that I.U. “had not kept pace with the younger universities of neighboring states.” This was recognized by all serious students of higher education in the Midwest. Chemistry was definitely included in this slow development, but it began to improve about the time that Van Nüys was appointed Professor of Chemistry. Probably a significant reason for the slowness was Van Nüys’ recurring bouts with
consumption (pulmonary tuberculosis) for nearly two decades, before he resigned owing to the severity of his illness, and from which he died in 1898.

The further involvement of Wylie in the university will be continued in the chapter on the years that chemistry was headed by Van Nüys.

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The most useful references include:
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Chapter II

Chemistry from 1874 to 1895: The Van Nüys Years

The appointment in 1874 of Thomas Carlton Van Nüys, M.D. as Professor of Chemistry was an important step forward both in chemistry and in giving significance to the institution as something more than a struggling college. It provided a basis for pride and expectations for further progress. This occurred simultaneously with the completion of the imposing new building started in 1873. As stated by T. Wylie in his History (p. 80), this original Science Building was erected for the museum and the law, physical, chemical, natural history, and modern language departments, and also for the library.

From the beginning of very modest appropriations by the state in 1867, the unrestricted admission of women in the same year, and the establishment of certification of commissioned high schools for admission of their graduates in 1873, the outlook for the university began to improve. Such opportunities involved various challenges. A major challenge was in making suitable educational use of the extraordinary Owen Cabinet. As described by Clark (p. 108)

“This was one of the most significant archeological and geological collections to be found on the North American continent.”
Its development, and the eventual ownership of it by Indiana University, has been described by several historians of the university. Probably the most authoritative and succinct account is by Wylie (p. 79,80):

"The appliances for instruction in physics, chemistry and natural science, were up to the year 1872, very meagre; the Trustees, always willing to go as far as their means would allow, were enabled by the grants made by the Legislature in 1867 and 1873, to put these departments, requiring so much and such expensive apparatus, on a much better footing than they ever had been before. In 1870, the large and extensive Owen cabinet of the distinguished geologist, the late David Dale Owen, M.D., of New Harmony, was offered for sale, and purchased by the University. The terms were made so favorable that the University was without difficulty able to purchase it. The negotiation with the family of the late Dr. D. D. Owen, was made by Professor B. E. Rhoads and Dr. H. Cloud, and the collection was packed and sent to Bloomington. It filled several (railway) cars. There was no room for it in existing buildings, and all that could be done was to hire a ware-room and store it away. To utilize it, rendered the erection of another building indispensable."

The building to house the collection and serve numerous other related needs was further explained in 1922 by the Secretary and Registrar of the University, John W. Cravens, in the Indiana Alumni Quarterly that year (IX, 161-162):

"This building was located southwest of the building erected in 1855. The northeast corner of the building was about 10 feet south and 10 feet west of the southwest corner of the building erected in 1855. (The east end of the ground floor of the 1855 building was used for chemistry and related sciences until the 1873 building was made available) ... The building was 130 feet long and 50 feet wide. It faced the west, but had an entrance at the north end. The corner stone was laid July 2, 1873. Governor Thomas A. Hendricks and Lieutenant-Governor Leonidas Sexton were the speakers on that occasion. The Owen collection of 85,000 specimens occupied a room 100 feet by 50 feet on the first floor. The chemical laboratory also occupied space at the south end of the same floor. The library, natural philosophy department, analytical laboratory, and two office rooms were on the second floor. The third floor was occupied by the museum of zoology and comparative anatomy and by the law department. After the suspension of the law department in 1877 the third floor was used for modern languages, natural history, and geology."

Cravens noted that after the building was destroyed by fire on 12 July 1883 the walls were still standing and that they
"were later torn down and (some of) the materials used in the construction of Owen and Wylie Halls on the new campus."

Information reported by Clark (p. 117) shows that the state appropriations for the new building were $50,000. Also, as published in the February 1873 issue of the Indiana Student, the appropriations were large enough to provide increases in the salaries of the president and faculty members.

In the report by the trustees for 1875, one year after the beginning of Van Nüys' tenure, the income of the university was improving but there was little change in student enrollment. In this year President Cyrus Nutt was summarily dismissed by the board. Apparently this was due largely to persistent and destructive student criticism for reasons that were not clearly defined except that Dr. Nutt had been in the presidency too long. Van Nüys was to be frequently in communication with the new president and his successors during the years that chemistry was to develop in the new building on the old campus as well as in the new building that was to follow later on the new campus.

World Advances in Chemical Knowledge: Well before the last quarter of the nineteenth century had begun the manifold advances in chemistry and chemical technology created a significant degree of specialization, especially in organic, analytical, and physical chemistry. Knowledge and the opportunity to advance knowledge through research were increasing so rapidly that a significant university needed to have at least two or more faculty members active and competent in each of the major divisions of chemistry.

During much of the nineteenth century progress in organic chemistry had become virtually autocatalytic. By the middle of the century—while Indiana University was struggling to teach the elements of chemistry such as the general textbooks provided—concepts of valence, atomic weights, and molecular size and structure, as well as methods of synthesis, began to evolve meaningfully, thus providing fruitful tools for further advances and commercial applications. Analytical chemistry experienced many breakthrough discoveries such as in spectroscopy, polarimetry, refractometry, and gasometric methods of analysis. Van Nüys was the first to teach this subject at Indiana University, but without much use of instruments other than analytical balances.

Kinetic molecular theory and thermodynamics, and ideas on molecular motion and the nature of reactions were advanced throughout the latter half of the century. This led to some understanding of the dynamics of chemical reactions, especially in the sixth and seventh decades. Conductivity experiments and interpretations, particularly the findings of Kohlrausch in 1874, stimulated new concepts which came to fruition during the rest of the century. Physical chemistry became an
expanding and basic field in chemistry, but it had relatively little if any impact on this university before the twentieth century.

Breakthroughs in the periodic classification of the elements were fundamental. The great test was in 1871 when D. I. Mendeleev assumed that inconsistencies in arranging elements strictly in order of increasing atomic weights could be accounted for after certain other elements were discovered. He predicted basic characteristics of some of the undiscovered elements and gave them tentative locations in his proposed periodic arrangement of the elements. A few other chemists, especially L. Meyer, made major independent contributions to such advancements.

Also, near the time Van Nüys' connection with the university was beginning, breakthroughs were occurring in other areas closely related to chemistry. The beneficial applications of chemistry through industry, agriculture, and health fields were dramatically shown in various ways. For example, the manufacture of synthetic alizarin was begun in 1869 in Germany and in England. During the rest of that century the applications of chemistry to the production of dyes revolutionized and expanded the dye industry. The strong conflicting views of Pasteur and Liebig on the nature of fermentation held the attention of many scientists from the beginning of the controversy in 1854 until the death of Liebig in 1873. It stimulated much fruitful research. Concurrently and related to it there were great advances in the discovery and understanding of enzymes, nucleic acids, proteins, and many other constituents of biological systems. In 1874 the first course in physiological chemistry in this country was begun by R. Chittenden at Yale.

Dr. Van Nüys desired for Indiana University to move in this direction. In 1889 in his annual report (handwritten) to "the President of the Faculty and Board of Trustees" he stated that he was

"...still arranging for full courses in physiological chemistry with as great rapidity as appropriations for the purchase of supplies will permit."

After pointing out that students were increasingly desirous of having such developments he wrote

"...as the only institutions in which full courses in physiological chemistry are given are Harvard and Yale the opportunities for making this institution prominent in this study could not be more favorable."

A small step toward this goal was the inclusion in the budget for the following year of $25.00 for "a centrifugal machine employed in the analysis of blood." The total chemistry budget for supplies and equipment
was $500. Five years before he reported to the president and trustees that

"About $150.00 should be expended in purchasing chemical supplies, anatomical and physiological specimens and a few special works in Physiology."

He was attempting to make advancements. In many institutions advanced work in chemistry was beginning to be viewed as indeed important. In 1863 the first Ph.D. degree in science was awarded at Yale; J. W. Gibbs of Phase Rule fame was the recipient. In 1877 Harvard awarded its first doctorate in chemistry to F. A. Gooch. The name, of course, is indelibly associated with the Gooch crucible which was introduced to analytical chemistry in 1878. It was to be 43 years from this time before Indiana University modestly began to award Ph.D. degrees in chemistry.

There were many other significant changes occurring in chemistry. Notably 1874 was also the year of the first American national meeting of chemists. It was held to commemorate the centennial of Priestley’s isolation and characterization of oxygen. From that meeting of 77 chemists there quickly developed a common interest in forming a national organization of chemists. Thus, two years later, on 6 April 1876, the American Chemical Society was formed. Within several decades it was to become a potent force for the development and utilization of chemists.

Also, 1874 marked the beginning of instruction at the new Purdue University. The first professor of chemistry was Harvey W. Wiley. His background in chemistry was less extensive than Van Nüys’. He also emphasized analytical chemistry and much laboratory work. His robust propensity for growth and change was quickly manifested in his advocacy of a school of chemistry. Chemistry at Purdue soon moved ahead of Indiana University. It was to be many decades before Indiana University caught up.

The beginning period at Purdue and the transitions that were occurring at Indiana University and some of the private institutions in the State at that time were the basis of a succinct review by J. H. Ransom in 1916 on the “Development of Chemical Science in Indiana.” The article included “A roster of the men (sic) who were most conspicuous in the transition.” Indiana University was the first listed and T. C. Van Nüys was named in the roster. The publication was in the Proceedings of the Indiana Academy of Science in 1916. This was in connection with the celebration of the first 100 years of Indiana statehood.
A SMALL BEGINNING OF PROFESSIONAL ASPECTS OF CHEMISTRY AT IU

With the appointment of Van Nüys, instruction in chemistry began to take on professional aspects, but in comparison with some of the eastern universities it was pretty modest and rather narrow. Among the five professors who had preceded Van Nüys in chemistry, he was the first to have advanced training in the subject. Also, he was the second who had received medical training and had not focused on theology; the first was Colonel Richard Owen.

Dr. Van Nüys was born in Switzerland county, Indiana in 1844. He was graduated from the Medical College of Ohio, in Cincinnati, in 1867 and he practiced medicine in Evansville, Indiana until early 1869. Then he became a student of Liebreicht in the chemical laboratory of the Pathological Institute at the University of Berlin. In the fall of 1871 he returned to Evansville and resumed the practice of medicine. In addition he taught chemistry in the Evansville Medical College and in a select school for young ladies. After two years he returned to Germany and studied chemistry and physics in the Scientific Institute at Wiesbaden which had been founded 25 years earlier by Karl Remegius Fresenius. In this famous privately owned institution, still directed by Fresenius, Van Nüys was surrounded by much teaching of analytical chemistry and commercial and governmental consulting and analytical services. Areas of special activity included the analysis of mineral water, wines, foods, and physiological specimens. Some of the services dealt with legal problems. He became acquainted with chemists from various parts of the world who had been attracted to Wiesbaden for the same reason he was there. Naturally he was imbued with enthusiasm for analytical chemistry. After one year he received a certificate to the effect that he had completed the course of instruction. He was now ready for a career in chemistry at Indiana University.

The appointment to the university in June 1874 was well received by the small faculty. A simple entry in Wylie's diary, with other additional diverse notations, is found under the date of 18 August: "Spent yesterday helping Dr Van Nüys to unpack some boxes in College."

In a letter to C. M. Campbell dated 20 June 1879, Wylie wrote about a trip Van Nüys had taken to Colorado, in part to visit miners and assayers. He wrote:

"Our prof. of chemistry, Dr. Van Nüys (pronounced Van Neece)(sic) about ten days ago left this place for a visit to Colorado. He is a young man (comparably), an excellent analytical chemist, & will be quite at home I think among the miners and assayers."
After two years at Bloomington, and after marrying Mary Elizabeth Hunter, daughter of General Morton C. Hunter in December 1875, Van Nüys returned again to Germany for one year and studied organic chemistry in the laboratory of the famous Rudolf Fittig at the University of Strasbourg. While in Strasbourg, in 1876, the first of two sons was born. Not surprisingly the first was named Fresenius Van Nüys. Three years later the second and last child, Morton Hunter Van Nüys, was born. The first son became a physician and the second a lawyer. Fresenius Van Nüys and his son, named after the professor of chemistry, visited the department briefly in 1954. Dean John D. Van Nüys, who was dean of the School of Medicine at Indiana University from 1947 to 1964, was a great grandson of Dr. Thomas Van Nüys.

During the year away from the campus Van Nüys’ duties in chemistry were handled by Wylie and his son, S. Brown Wylie, who at that time was a senior in the university. Concerning this Wylie wrote in his diary on 31 December 1876:

"Dr. Van Nüys having been permitted to spend a year in Germany, the Board gave me the charge of the chemical department.... my part of the labor will commence on Wednesday next. I have Brown for my assistant which will make the labor possible and lighter."

After the end of 1876-77 Brown Wylie was appointed to give assistance in Physics and in Chemistry. The son helped his father in physics and Van Nüys in chemistry during 1877-78. This was graphically stated by the father in his diary on 17 June: "(the Board) .... made Brown assistant to Dr. V.N. & self .... next year at a salary of $500 ...." This continued with varying arrangements for Brown Wylie until the fire in 1883 destroyed all the scientific facilities. The young man secured employment elsewhere. After the new facilities were completed on the new campus in 1885 he desired to return. Van Nüys preferred to have some other arrangement. In 1886 the board accepted his recommendation and Brown Wylie was refused another appointment. The feeling of the father, whose paternalism was pretty strong, were stated in his diary on 13 June:

"Brown is set aside. V.N. did not want an assistant. Notwithstanding our current appeals no opportunity was given to show how meanly he has been treated."

Van Nüys entered the struggling university during a period of partisan and sectarian dissent. One year later, in July 1875, President Cyrus Nutt was abruptly removed by the Trustees. At the time T. Wylie was in Fort Wayne on a short trip and he noted in his diary
“Board met Monday and dont know what they have done. They have removed Dr. Nutt & I suppose by outside pressure & prospects rather gloomy for next year.”

The successor in the presidency was Lemuel Moss whose appointment began in September 1875. It was early enough for him to be present at the beginning of the new academic year. Wylie was the interim president during this interval. For persons particularly interested in chemistry it is to be noted that the welcoming committee to greet the new president on his arrival at the Monon railway station were Theophilus Wylie, Daniel Kirkwood, and Richard Owen. Welcoming resolutions at chapel the following morning were read by Kirkwood, Amzi Atwater, and Wylie. Of course it should be recognized that the anemic university had scarcely any other faculty leaders at that time.

The extent of the university’s lack of funding for its programs in 1875 is indicated by Clark’s description (p. 133):

“The two new buildings presented imposing external appearances if one did not examine the unsightly weeds, bushes, and debris surrounding them. A suggestion to the faculty that trees be planted about the stark buildings was tabled while that body approved giving special attention to cleaning the grounds, especially at the rear of the buildings.”

In spite of the shortage of faculty it was found appropriate for Van Nüys to be absent again for approximately one year to study his subject in Germany. This was his third trip abroad to learn more about chemistry. Indeed he was the first Indiana University faculty member to have the distinction of being granted leave for advanced work.

The sorry state of the university is reflected in the report of the Board of Trustees covering the year 1875:

Receipts
There was received during the year, from all sources, $47,583.50, as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislative appropriation</td>
<td>$23,000.00</td>
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<tr>
<td>Endowment</td>
<td>8,925.00</td>
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<tr>
<td>Loans</td>
<td>12,500.00</td>
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<tr>
<td>Miscellaneous</td>
<td>2.50</td>
</tr>
<tr>
<td>Balance in treasury</td>
<td>1,186.85</td>
</tr>
<tr>
<td>Interest on lands</td>
<td>764.15</td>
</tr>
<tr>
<td>Total receipts</td>
<td>$47,583.50</td>
</tr>
</tbody>
</table>
Disbursements

The disbursements were as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors’ salary (sic)</td>
<td>21,300.00</td>
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<tr>
<td>Trustees’ salaries</td>
<td>601.80</td>
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<tr>
<td>Examiner’s salary</td>
<td>301.00</td>
</tr>
<tr>
<td>Secretary’s salary</td>
<td>132.00</td>
</tr>
<tr>
<td>Treasurer’s salary</td>
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</tr>
<tr>
<td>Librarian’s salary</td>
<td>150.00</td>
</tr>
<tr>
<td>Janitor’s salary</td>
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<tr>
<td>Fuel</td>
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</tr>
<tr>
<td>Advertising</td>
<td>369.44</td>
</tr>
<tr>
<td>Insurance</td>
<td>150.00</td>
</tr>
<tr>
<td>Contingent</td>
<td>578.32</td>
</tr>
<tr>
<td>Meteorological observations</td>
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</tr>
<tr>
<td>Department Natural Science</td>
<td>400.00</td>
</tr>
<tr>
<td>Department Natural Philosophy</td>
<td>293.20</td>
</tr>
<tr>
<td>Department Chemistry</td>
<td>1,352.43</td>
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<tr>
<td>Department Law</td>
<td>684.50</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>370.00</td>
</tr>
<tr>
<td>Buildings and repairs</td>
<td>2,197.95</td>
</tr>
<tr>
<td>Postage</td>
<td>116.80</td>
</tr>
<tr>
<td>Owen cabinet, sixth payment</td>
<td>2,541.00</td>
</tr>
<tr>
<td>Same, cases</td>
<td>1,593.78</td>
</tr>
<tr>
<td>Library</td>
<td>174.99</td>
</tr>
<tr>
<td>Loans paid</td>
<td>12,500.00</td>
</tr>
<tr>
<td>Interest</td>
<td>303.76</td>
</tr>
</tbody>
</table>

Total expenditures: $47,171.46
Balance in treasury: $412.04

Total: $47,583.50

The appointment of Van Nüys and the fact that he had unique preparation for the program in chemistry was given emphasis in the Annual Report and Catalog for 1875 as follows:

"The chemical laboratory is now one of the most complete in the west. It is capable of accommodating forty-seven students, and is furnished with gas, water, atmospheric filters, reagents, balances of the finest and most delicate character, and all other necessary apparatus for making qualitative analyses qualitative and quantitative analyses. Fifteen students, who are aiming to take a thorough course in chemistry, are now under instruction in this department. This is a very encouraging attendance, considering the fact that this is only the second year since this department was established. Specimens of minerals and mineral waters have been sent to this department from many parts of the State for analysis and thus far all demands of this kind have been promptly responded to, either by the professor in
charge, or by the advanced students under his direction. There is no longer any necessity of sending Indiana minerals, earths, and soils out of the State for analysis."

That the presence of Van Nüys on the faculty had some influence on the planning for the decade of the 1880's may be inferred from several developments. As stated by Clark (p. 134):

"The two buildings were woefully inadequate for university functions. By 1880 plans were underway for the projectional buildings. One of them was to serve the needs of chemistry and physics, with special laboratories, classrooms, workshops, and storerooms ... Other academic fields were being expanded and were demanding more space."

The Annual Report for 1875 also gave attention to the significance of the Van Nüys appointment. More than twice as much space was given to descriptions of "The Chemical Laboratory" and the courses in chemistry. For the first time at the university the professorial title was simply Professor of Chemistry.

In describing the facilities the catalog stated that

"The Chemical Laboratory has been enlarged, refitted and supplied with new and complete apparatus for illustration. Ample provision will be made for the practical study of the various chemical processes by each student personally. In addition to this course of analytic instruction, regular didactic lectures on the elementary principles of the science will be delivered, accompanied by a full course of experiments and illustrations. Under the direct supervision of the Professor of Chemistry and his assistants students are offered advantages not surpassed by any institution in the West."

As revealed in this description and in the foregoing report of the trustees, analytical chemistry became the first area of specialization in chemistry at this university. Also, for the first time individualized instruction in this subject was emphasized. This is made clear in the following statement in the catalog of 1874-75:

"It is intended by the Laboratory course to impart a thorough knowledge of Practical Chemistry so as to prepare students to engage in Chemical Analysis, Medicine, or Pharmacy, to do so to a greater advantage than they could without having laboratory experience. The course commences with the study of the metallic oxides, the mineral and organic acids. The next subject is the analytical properties of these bodies in groups and their separation. The knowledge thus acquired is subsequently put into practice in the performance
of a series of analyses so arranged as to lead the student, step by step, from the simpler to the more complex cases, both of qualitative and quantitative analysis. Particular attention is given to alkalimetry, chlorimetry and volumetric analysis in general. No deviation will be made from the general course given in the laboratory, and it is only after the same has been completed by the student that his course diverges into some special line according to the ultimate objects he may have in view. Each analytical process is superintended by the Professor in the department. No classes are formed in this course, as each student works independently. No degree is given to those who complete the course alone, but a certificate of the work completed and the proficiency attained will be given by the Professor of Chemistry. A table, with drawer and shelves, is appropriated to each student—each table being supplied with gas and a Bunsen's burner."

Almost exactly the same statement as well as statements regarding Laboratory Regulations and Text Books and Books of Reference are given in each annual catalog for the next ten years. There is no reference to organic chemistry or any kind of laboratory work other than quantitative and qualitative analysis until 1895.

Pride in Chemistry at IU: The pride in advancements of chemistry felt by partisans of Indiana University was reflected in a full column letter on the front page of the first issue of the new Bloomington Courier dated October 28, 1875. Even at this time the rivalry that was to be long continuing between Indiana University and the brand new Purdue University was unmistakable. The letter was written by Judge B. E. Rhoads who at the time was professor of law and a member of the board of trustees. It first appeared in the Cincinnati Gazette two weeks before and is included herewith:

"The Relations of the Lafayette and Bloomington Institutions—A Card of Explanation

Bloomington, IND., Oct. 14, '75

"To the Editor of the Cincinnati Gazette:

"In yesterday's issue of your paper is a two-column letter from a gentleman of Lafayette, containing a somewhat detailed statement of the troubles, mission, and prospects of Purdue University.

"In that letter the following language occurs: 'The course of study pursued here and at the State University are not only different, but have different objects in view. At Bloomington, study is made the means, here it is pursued as an end. There language, mathematics, physics, and metaphysics are studied for the purpose of general mental culture, that the student may be able to enter any field to which he may have a predilection. Here such culture is for but one
purpose, the principal object being to fit students for some particular vocation. At Bloomington they teach geometry, trigonometry, surveying, and mechanics. Here they make civil engineers, practical surveyors, draughtsmen, and mechanics.'

"I have no doubt that the gentleman who wrote the foregoing paragraph and sent it to the world intended to be just and kind toward this University. His statements, however, are unjust, because they are incorrect. The State University not only teaches chemistry but also makes chemists. Her course in analytical chemistry is the same as that pursued in the great Laboratory of Fresenius, in Germany, and this laboratory is the one to which most American students resort who go to Europe for instruction. If, therefore, Fresenius does not make chemists, it will be admitted that this University does not. If he does, then she does. This view taken by the authorities of this institution, in relation to chemistry, is that it can not be taught successfully without making chemists. Accordingly, the student is put at work in the laboratory, and is required to experiment for himself, and make his own analysis under the direction of his teacher. There is a course for those who wish to make chemistry a specialty. Several young men are pursuing that course, and do nothing but work in the laboratory, some of them eight hours a day at work. They have already spent one whole year in qualitative analysis, and have begun the second year in quantitative analysis. When they shall have finished their course, they will be able to make an analysis of all kinds of ores, earths, mineral waters, coals, and similar matters, such as good chemists are usually expected to work with. The Professor of Chemistry in this institution graduated in the chemical department of the University of Berlin, and afterward at the laboratory of Fresenius, and is not only a teacher of chemistry, but is a chemist. He not only teaches chemistry, but makes chemists. He is now making analysis of ores and mineral waters that have been sent to him for that purpose, from Virginia, North Carolina, Tennessee, and Indiana, and what he does in these respects he requires at the hands of his students.

"This institution not only teaches surveying and engineering, but makes surveyors and engineers of all who desire to make these branches a specialty. She has all the necessary apparatus, and that of a superior quality, and those who elect to take the course are put into the field with compass, level and chain, and are required to do the work of a surveyor or engineer in running out a land or locating a railroad.

"This institution does not make mechanics, but it does make draughtsmen, and it would be a shame if it could not and did not. This institution also teaches geology, and with its magnificent museum, is prepared to make geologists as far as geology can be completely taught in a museum."
"It is gratifying to know that Perdue (sic) University is so well equipped, and is prepared to do so grand a work as that indicated in the foregoing quotation. God prosper her, give harmony to all her counsels, encourage and strengthen her faithful and indefatigable President, and enable her to send out multitudes of chemists, engineers, surveyors and mechanics.

"The State University has grown old, comparatively, in educating young men—and claiming to be inferior in nothing to her sister institutions—offers her facilities for instruction gratuitously to everybody.

B.E.R."

Two years before Judge Rhoads wrote a similar letter to the editor of the Fort Wayne Gazette. This was in response to two editorials that were critical of I.U. The letter pointed with pride to the completion of a new laboratory for quantitative analysis in chemistry. This laboratory, in the new Science Hall (1874), had been provided in part to enhance studies of the geological collections in the "Owen cabinet." Professor Richard Owen had been primarily responsible for having the laboratory established and used in connection with the rocks and fossils in the collection. Judge Rhoads stated in his letter to the editor that

"This laboratory is as large and extensive as that at Yale, and has connected with it two apparatus rooms, a lectureroom and workshop. It is supplied with gas for heating as well as lighting and with all the apparatus necessary for making not only qualitative but also quantitative analysis."

The judge ended his letter with the bold statement, based on a circular from the (State?) Bureau of Education in 1873, that the State University in the last five years has contributed more to science than all the other institutions in the State together.

The importance attached to the chemical laboratory is further reflected in the extensive coverage given to it (for the first time) in the Annual Report and Catalog in 1873. It even records the Laboratory Regulations:

1. Students are required to have some knowledge of theoretical chemistry before being admitted to the laboratory.
2. Students engaged in qualitative analysis have to supply themselves with some reagents, test tubes, flasks and glass tubing. The tuition, gas, ordinary re-agents, and use of apparatus are free.
3. Students engaged in special scientific investigations have to supply the rare re-agents or costly apparatus which they may re-
quire, at their own expense, but no charge is made for the use of re-agents or apparatus in the laboratory.

4. Students in this department are subject to the discipline of the University.

5. The laboratory will open for students from 9 a.m. till 5 p.m.

The narrowness of the program in chemistry during the Van Nüys years is reflected in the list of "Text Books and Books of Reference" that appeared in the catalogs from 1874-75 to 1882-83. The first list specified Fresenius' Qualitative Chemical Analysis, his Quantitative Chemical Analysis, Rose's Qualitative and Quantitative Chemical Analysis, and Mohr's Volumetric Analysis. Eight years later the same listing was being used except there were three additions: Elderhorst's Manual of Blowpipe Analysis, Plattner's Blowpipe Analysis, and Watt's Dictionary of Chemistry.

OTHER ACTIVITIES AND CHEMICAL PUBLICATIONS AT I.U.

During the first several years Van Nüys did not limit his interests to analytical chemistry. From time to time, like other faculty members, he spoke at the frequent chapel exercises, served on committees, etc. The Indiana Student in March 1875 reported that he gave a "Sabbath Lecture" on "The Influence of Climate and Diet upon Health." The conclusion was drawn that

"It was read in a very pleasing style, and contained some very important and valuable suggestions as to the manner in which we should guard our health."

The interest in health was both personal and professional. Several years later, in 1888, Van Nüys published a book of 188 pages titled Chemical Analysis of Healthy and Diseased Urine: Qualitative and Quantitative. This was timely and appropriate when it was written. Obviously with the help of Van Nüys, The Indiana Student in February 1888 (p. 76) gave considerable coverage to the book, in part as follows:

"In my earliest years, a race of quack doctors, almost monopolized the treatment of diseases connected with the urinary organs. A look at the urine of the patient was all that was required. Now because of the great progress of the science of chemistry, the urine has become the most certain test of the condition of the patient. The work of Prof. Van Nüys ought to be in the hands of all physicians for although too many of them have not that chemical knowledge essential to a full comprehension of the numerous tests given in the work, yet every physician will be benefited by the study."
However, as shown in the bibliography of Van Nüys reported by Harding in his history (1904), he contributed little in original research. There were eight publications. Besides the book, the articles included the analysis of water for drinking purposes, estimation of carbonic acid in the air, estimation of albumin in urine, and suggestions to teachers of science or mathematics in the high school. Although limited in scope and significance these were the first chemical publications by any member of the faculty of Indiana University. They appeared between 1881 and 1901.

The first article was stated to be from the “State University Laboratory” and entitled “Report and Analysis of the Indianapolis Water Works Co. and of White River.” It was published in the Annual Report of the Board of Health of 1881. There were 16 pages and it included rather extensive chemical analysis as well as some microscopic studies. Warm acknowledgement was given for valuable assistance: “To Prof. S. B. Wylie, assistant in the Department of Chemistry, and Mr. I. N. Corr, an advanced student in chemistry.” The second publication was of the same nature and it was on “Water from the Deep Wells in Indianapolis.” It appeared in the Annual Report of 1883.

Only two chemistry students are known to be authors or coauthors of chemical research published during the Van Nüys years in the university. They were Benjamin Franklin Adams, Jr., A.B. 1883, and Robert E. Lyons, A.B. 1889, A.M. 1890, Ph.D. (Heidelberg) 1894. Adams was the first. As shown by Harding (p. 251), Adams had a brief paper in Reports of Indiana Geological Survey for 1881, pp. 32, 33, on “Analysis of oolitic limestone (buff and blue) from Dunn and Dunn’s quarry.” His second paper was in 1887, with Dr. Van Nüys, on “Estimation of carbonic acid in the air” (Am. Chem. Jour. 9, 64-66, 1887).

Dr. Lyons’ first two publications were in the same journal and they were with Dr. Van Nüys. The first was in 1890 on “A method for the estimation of albumin in urine,” and the second was in 1892 on “Carbon dioxide in urine.” (ibid. 12, 336-351, 1890; 14, 14-19, 1892.)

The slowness in developing a productive research program in chemistry is shown in the scanty number of publications as compared with other areas of science in the university. Based on an analysis of all the publications reported up to 1904 by Harding, there were approximately 53 in chemistry, 153 in astronomy (nearly all by Kirkwood who was on the faculty from 1856 to 1886), 165 in Botany, 226 in Geology, 143 in Mathematics, 27 in Physics, and 581 in Zoology. The publications from the Department of Chemistry approximately 75 years later, both the number and their scientific and public impact, are remarkably different. In 1982 alone there were 182 articles and nearly all were in critically refereed journals. This does not include the productivity on other campuses of the university. Several had notable impact on the advancement
and application of chemical knowledge. It is improbable that the quality could be judged to be less than that of any other department of science.

**Chronic Health Problems of Dr. Van Nüys**

Dr. Van Nüy's was much plagued by ill health. Eventually it was clear that he had tuberculosis (then referred to as consumption). In 1881-1882, as stated by Wylie (*History*, p. 155), he was absent from the campus for this reason. Wylie’s feelings for Van Nüys were compassionate. On 12 June 1881 he wrote in his diary

“...went to see Dr. Van Nüys this evening. he seems to be improving in health.”

Three years later (2 November 1885) he wrote

“Dr. Van Nüys who has been sick two weeks now able to leave his bed.”

Such problems were to recur repeatedly. As indicated before, the responsibility for chemistry during this period was entrusted to S. B. Wylie, son of T. Wylie. The latter had become Professor of Physics. S. B. Wylie had received B.S. and M.S. degrees from Indiana University in 1876 and 1882 respectively. The assistant to the young Wylie during the year was J. N. Corr. This latter family name was well known in Bloomington for a long time.

**Insights on Standards, Students and Faculty Interests**

The *pro merito* (honorary) M.S. degree earned by S. B. Wylie was the first such degree awarded by Indiana University. Some time later such degrees were discontinued (Payne, in Myers, p. 636).

The quality of the intellectual background surrounding the students was still pretty mixed as it was in earlier times. Although some were pseudoscientists and many were simply naive in relating to the world of things and natural phenomena, faculty members like Wylie, Kirkwood, Owen, and Van Nüys were basically objective and scientifically critical. Fortunately such faculty members had close and frequent associations with the students. Many mythical and unproved views prevailed in sufficient degree to titillate students and others.

Occasionally Wylie in his diary referred to various strange and ephemeral things and happenings. Phrenology was prominent for a time. Although Dr. Wylie never embraced the idea he gave it attention. One of his friends in Bloomington for a long time was Cornelius Pering, who believed in phrenology and some other far out ideas. But this did not
seriously dampen the feeling of respect these men had for each other. Mr. Pering was for some time the principal of the Monroe County Female Seminary. Also, like Wylie, he was a painter and especially gifted in making water colors. Thus educationally and in artistry there was an affinity between the two.

The comments in the diary on 4 December 1881 reflect the nature of this relationship and the quality of Wylie in affecting the education of college students. They also relate poignantly to the social and intellectual structure of the Bloomington-University community. Wylie wrote:

"Attended the funeral of an old friend ... Cornelius Pering ... when I came to B in 1837 ... Mr P had been here then 5 yrs ... I was asked since acquainted with him to make remarks ... which I did ... referring to his history here ... Mr. P. was a fine man on the whole ... had a good school ... but for want of a better word was crochety. I did not say this however in my remarks ... ready to adopt the notions of ultra-phrenologists ... Mesmerists ... spiritualists ... on very little evidence. ..."

The cultural background and academic preparation of the students during the Van Nüys years here are of interest. The Indiana Student newspaper reflects this and there are other indirect sources. In his book Wylie included brief biographical sketches of each student in the graduating classes starting in 1830 and ending in 1887. These are probably the most accurate and succinct sketches available. Probably there are no comparable sketches of any substantive value following 1887.

The reviews from 1874 to 1887, like the earlier ones, gave the occupation of each student, place of birth, schools attended, church membership and religious activity, and special activities and achievements. In the 14 years covered chemistry was mentioned only once and that was in connection with a graduate in 1887 who was "instructor in biology and chemistry, Terre Haute High School." The number of graduates per year during this period was from 17 to 28 and the average was 23. A large majority were public school teachers, or attorneys. Many were pastors or in other religious work. Apparently none continued in chemistry seriously following graduation.

Nearly all the students were from Monroe County and surrounding central Indiana counties. Less than six per cent were women. None apparently were from other countries. Whether any were black is not known but Clark (p. 135) wrote

"There was a Negro student in the university in 1882, but whether he was a regular student or enrolled in the preparatory school is impossible to determine."
Wylie wrote in his diary on 20 August that year:

"Harvey Young, a graduate of Indiana High school came last Thursday intending to enter the Freshman class. He is well recommended has a good appearance—intelligent & neat—will be a pioneer colored student in the College—hope he will do well."

No other information concerning Mr. Young seems to be available. The Indiana Student in January 1883 referred to a black janitor in chemistry writing:

"Russell White, the colored sexton of Walnut Street Presbyterian Church, is making things shine in the chemical laboratory, since his appointment as janitor in this Department."

This was most probably through Wylie’s influence because he was a member of the church at that time.

Although Wylie relinquished most of his responsibility for chemistry when Richard Owen joined the faculty in 1864 he continued to be interested in chemistry as well as physics. These interests were reflected in some of the entries in his diary. For example in June 1881 Wylie recorded some new developments in science which he experienced while visiting in Philadelphia. Two years before the noted William Crookes had extended the knowledge of cathode rays with specially designed and highly evacuated glass tubes. Wylie wrote

"Mr. Wilton showed us Crookes’ tubes of Radiant matter & their operation, for which we were very much obliged."

Two months later the perceptive but self deprecating teacher attended the national AAAS meeting in Cincinnati. Clearly he delighted in seeing and hearing new things, but in relation to the scientists who were advancing knowledge he regarded himself as a common person looking in from the outside. In reflecting on whether to go he wrote in his diary. "... have nothing to show, but can see the things & hear the essays & admire the self important scientists."

However the 67 lines entered in his diary on this visit shows that he took in as much as possible and he had interest in a wide variety of scientific and cultural matters at the meeting. He stayed at the Gibson House. We can easily imagine that this teacher was pretty successful in conveying knowledge and sound concepts to the young Hoosier students. His son Brown also attended much of the meeting.

Curricular Changes: The two decades of responsibility for Van Nüys were marked by major changes in the university’s educational policy
which in particular finally provided all students opportunity to specialize while taking courses giving considerable breadth. During ten years ending with 1877 students took either the Scientific course or the Classical Course and there was virtually no opportunity to deviate from the chosen program of study. Beginning about 1878 the student was expected fairly early, as stated by Harding (p. 56),

"...to select as his major subject the work of some one Department, and from the other departments to elect a sufficient amount of work to make up the prescribed number of hours for graduation."

The changes from 1870 to 1880 are indicated in the following listing of courses and their sequence for students in the "Scientific Course:"

<table>
<thead>
<tr>
<th>1870</th>
<th>1880</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td></td>
</tr>
<tr>
<td>first term</td>
<td></td>
</tr>
<tr>
<td>Algebra, Latin History</td>
<td>Geometry, Latin, French or Greek History, Elementary Ethics</td>
</tr>
<tr>
<td>second term</td>
<td></td>
</tr>
<tr>
<td>Geometry, Latin, History</td>
<td>Plane Trigonometry, Latin, French or Greek, History, Elements of Mental Philosophy</td>
</tr>
<tr>
<td>third term</td>
<td></td>
</tr>
<tr>
<td>Geometry, Latin, Classical antiquities</td>
<td>Spherical Trigonometry, Surveying and Navigation, French or Greek, History, Latin</td>
</tr>
<tr>
<td>Physiology, History Literary Exercises</td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
</tr>
<tr>
<td>first term</td>
<td></td>
</tr>
<tr>
<td>Trigonometry-Plane and Spherical, Latin or Modern Languages, Botany and Physical Geography, English Composition</td>
<td>German or Greek, Latin; Prosode, Analytical Geometry, Physiology</td>
</tr>
<tr>
<td>second term</td>
<td></td>
</tr>
<tr>
<td>Surveying and Navigation, Analytical Geometry, Latin or Modern Languages, Zoology English Composition</td>
<td>English-Rhetoric, German or Greek, Chemistry-Inorganic (Eliot and Storer's Manual), Latin</td>
</tr>
<tr>
<td>third term</td>
<td></td>
</tr>
<tr>
<td>Analytical Geometry, Latin or Modern Languages, English Synonyms and Sentential Analysis</td>
<td>Chemistry-Organic, English-Rhetoric, German or Greek, Latin; Prosody</td>
</tr>
</tbody>
</table>
In 1870 the only courses in chemistry were one term of inorganic chemistry and one term of organic chemistry, but in 1875 the catalog did not give any emphasis to the latter. These were taken in the junior year. In 1880 for students electing to major in chemistry this had increased to inorganic and organic chemistry in the sophomore year and analytical chemistry was available as an elective every term of the junior and senior years. Indeed analytical chemistry was the only science offering in 1880 that was given with such frequency.

The Departmental Plan of the University: During Van Nüys' years of service a general revision of the university-wide instructional program occurred largely through the dynamic leadership of David Starr Jordan who was President from 1 January 1885 to summer 1891 when he became the first President of the new Stanford University. The basic
change was built upon a departmental plan of administration. It had been evolving for nearly a decade. By 1887 the organizational process had become established. It included a major subject system in which the student could elect a significant proportion of the courses both to provide specialization in an area of interest and breadth to provide liberal education. As presented in the University Catalog for 1889 every candidate for the A.B. degree was required to complete work in the four categories described as General, Special, Collateral, and Elective (Harding p. 72).

Under General it was necessary to complete three terms of daily work in Physical Science. This could be selected from "Astronomy, Botany, Chemistry, Geology, Physics, Zoology or Physiological Psychology." In addition, the regulation stated: "Ancient or Modern Languages, one language two years or two languages one year each, daily. English Prose Composition and Rhetoric, three times a week throughout the Sophomore year."

Under Special students were to select for a "speciality" the required work in the department of choice and it was to extend over three or four years. This was the major.

Under Collateral the catalog specified that "The head of each department may lay out, in connection with his course, work in related subjects; such required collateral work not to exceed six terms of daily recitations, and to be especially arranged for each student."

Under the fourth category, Elective, it was stated that "The remainder of the student's work, six terms of daily recitations, he may himself select from any department in the University."

When this system was put into full effect there were 16 departments. In each course there were three daily recitations or lectures of one hour each per week. Two hours of laboratory work were equivalent to one hour of recitation or lecture.

The change to the new system was begun on the original campus, south of Second Street, and concluded on the present site, which was then referred to as University Park. As described by Wylie in his book (p. 85),

"On the 3d of September, 1888, to the gratification of all concerned, the students assembled in their new and commodious halls, for prayers, lectures and recitations. Several new professorship have been instituted, and the Faculty increased in numbers, corresponding to the increased number of the students, and the requirements of the times."

The new program required comprehensive changes in goals, resources, and public support. The new President Jordan moved vigorously and wisely to make all the necessary changes. When he started in 1885
there were only nine professors and four associates. They were (Clark, p. 214):

Theophilus A. Wylie, Physics  
Daniel Kirkwood, Mathematics  
Amzi Atwater, Latin  
Thomas C. Van Nüys, Chemistry  
Orrin B. Clark, English  
John G. Newkirk, History  
Samuel Garner, Modern Languages  
Horace A. Hoffman, Greek  
John M. Coulter, Botany and curator of the Museum

The associates were:

John C. Branner, Geology  
Arthur B. Woodford, Political Science  
William J. Bryan, Philosophy and English  
Joseph Swain, Mathematics

Regardless of the capability of the faculty, the number was too small and the breadth of expertise in the number of established departments was too limited. For chemistry, or any subject to be taught well in the planned program for the university, it was necessary to vitalize and expand the faculty and all the related resources.

The young President Jordan stated the needs repeatedly, and to all who were important in achieving the goals. In his report to the board of trustees in June, 1886, Jordan stated (Clark p. 216):

"The state university can only win or claim patronage from the good work it does. The value of this work depends on the character of its teachers."

This philosophy was clear in Jordan's vigorous moves to enrich the faculty with new and more effective teachers and investigators, and as Jordan emphasized to the trustees, it was necessary to keep strengthening the curriculum, provide more buildings, obtain more books for the library, provide more scientific equipment, and limit teaching to persons who are specialized in the subjects being taught. In chemistry this goal was not attained during Jordan's tenure at the university and this continued for many decades. For example, until Robert E. Lyons became a junior member of the chemistry faculty in 1889 virtually all the teaching in chemistry in any given year was dependent on one person.
Wylie Hall as it appeared in 1885

A Chemical Laboratory in Wylie Hall
(Second from the left, Earl Blough, AB’99)
FIRE AND THE MOVE TO A NEW CAMPUS

The campus newspaper, The Indiana Student, had its beginning in February 1867. For several decades it carried many news items that reflected activities and attitudes of importance to the academic functions including chemistry on campus and in the State. For example, in October 1883 the Student newspaper published an article on The new Buildings that were being considered as basic to the move from the original site to Dunn’s Woods, the present site:

1st. Building for chemistry and physics 2 stories; the lower floor for physics, the upper chemistry to be supplied with lecture rooms, labs, workshops, storerooms and apparatus
2nd. Buildings for natural sciences
3rd. Building for language and literature, 2 stories
4th. A fireproof library
5th. A chapel 2 stories: lower for chapel; for daily uses, office for university officers, receptions, parlors, etc.; the upper floor a large chapel with seating of 2500 (sic)
6th. Observatory
7th. A building for music and for fine arts to be followed by buildings for mechanical Sciences as needed.
The first two to be built at once, the others as afforded.

This portrayal of needs and intentions appeared three months after Science Hall (New College building), built in 1873, was set on fire by lightning and totally destroyed along with virtually all the contents. The loss included the apparatus, supplies and records of chemistry and of physics as well as the university records, the library of 12,000 volumes, and many other treasured possessions. Four months after the fire the board of trustees formally declared that

“‘The present campus is wholly inadequate and unsuitable for the proper development and enlargement of the University, and should now be exchanged for a site that will fully meet all present and prospective requirements.” (Woodburn 1, 334).

The overall stark tragedy of the loss is readily imagined. In his diary of 15 July 1883, Wylie wrote as only a devoted scholar of his time might have written:

“...Last Thursday (12th) night—about 10 o’c the college bell rang the alarm of fire. I immediately ran through the rainstorm—and found the New College building afire—the fire had been smoldering for some time before it was noticed & the building was filled with smoke—and could not be entered.—For a time it was thought that it
might have been controlled, but the flames got the better of exertions made—& the building with all its contents save a few of the tables of the Museum was destroyed.—the prin Library—the large & valuable Museum—Dr. Jordan’s fishes & specimens—& library, Mr. Gelburt’s Panama work—all the apparatus in my rooms, all the Laboratories and the contents—all the Spangler’s things & perhaps Congers—were utterly destroyed.—The fire seemed to have originated in my room thus I will be more implicated perhaps than any other as the occasion of the loss—I feel that it is more than I can bear—Miserere nosti O Deus Salvator! [Translation: Take pity on us, O Lord Our Savior!]

Both Van Nüys and Kirkwood were away when the fire occurred. Wylie recorded in his diary on 22 July:

“Dr. Van Nüys & Prof. Kirkwood returned last Th. I believe—they take things more evenly than I do—Dirigas me O Deus [Translation: Direct me, Oh God]!

In response to the tragedy, as reported by Woodburn (vol. 1)

“A fine tract of wooded land of twenty acres, known as ‘Dunn’s Woods,’ was obtained on the east edge of town. With $20,000 of insurance money and $50,000 liberally donated by Monroe County, two new buildings, Wylie Hall and Owen Hall, were begun there in April, 1884.”

ACCOMMODATIONS FOR CHEMISTRY ON THE NEW CAMPUS

Dr. Van Nüys had the opportunity to begin his career here within the year that the “New College building” was opened for use. The cornerstone for it was laid 2 July 1873 and his appointment began in 1874. He had virtually full responsibility for the development of chemistry in that building. Also, as “the professor of chemistry” he was directly involved in planning for chemistry in Wylie Hall on the new campus after fire destroyed the New College building only ten years after the cornerstone was laid. He was to continue as Head of the Department for ten years after Wylie Hall was completed. Over 40 years later his successor Robert E. Lyons was to be much involved in planning the Chemistry building into which the department moved in 1931.

One of the illuminating documents regarding the planning for Wylie Hall and its use for “the departments of Chemistry and Physics” is a report of a special committee to the board of trustees in the Trustees’ minutes of 27 September 1883. The committee of the board had been appointed at the board’s previous meeting, on 8 September. The members were Banta, Maxwell, and Mitchell. Advisors to the committee were
President Moss and “the professors in the chemical and natural science
departments.” The committee’s report also states that advice was sought
from “other professors connected with other institutions of learning and
with architects and with builders.” On this basis it was concluded that

“...we should take steps at once toward the erection of first: a
building constructed with reference to the accommodations of the
departments of Chemistry and Physics. Looking to the future as well
as to the present such a building ought to be two stories in height
(sic) with a basement. This basement would not only secure a better
foundation to such a building...but would furnish room that would
be useful for certain purposes in connection with the two depart­
ments as if built entirely above ground. The department of Chemistry
with its laboratories, lecture rooms, etc., should occupy the first
floor and the department of Physics the second...”

In estimating the dimensions and costs, the committee proposed
that considerable savings could be effected by use of certain materials
from the burned New College building. The report referred to bricks and
“dressed stone in the doorways of the burned building.” Such salvaged
materials were used in the construction of Wylie and Owen Halls.
The committee next met in Indianapolis and, subject to ratification
by the board, selected an architect. Then on 5,6 October 1883 another
fruitful meeting was held in Bloomington. It was attended by the com­
mittee, architect,

“and the professors immediately interested in the building to be
erected with reference to the chemical and natural philosophy de­
partments.”

The group

“...with the advice of the said professors, determined on the number
and size of rooms and general outline of a structure suitable for said
chemical and natural philosophy departments.”

Apparently neither Van Nüys nor Wylie, or any other faculty mem­
ber except Dr. Jordan had significant input in planning the new building
to be used primarily for chemistry and physics.
The architect was George W. Bunting and at a meeting of the board
of trustees in November 1883 the plans were submitted and adopted. In
November, 1884, the Indiana Student reported that the new buildings
were almost completed.

In 1885 the university moved to the new campus. As announced
on January 9, 1885 by the Bloomington Saturday Courier (Clark p. 141):
"The State University (is) rapidly recovering from loss occasioned by the fire two years ago. The chemical laboratories are models, and occupy almost all the first floor in the main building. All of the books in the library are new and well selected, $8,000 having been expended on books this year. The University is making the departments of Chemistry, Zoology, Geology, and History specialities. The Senior class numbers twenty, nearly all scientific students; the Freshman eighty-four."

The decision to move the campus to Dunn Woods was opposed by some, especially Wylie. This opposition reflects his generally conservative nature. Indeed a majority of the small faculty was similarly parochial in its thinking for the future of the university. As reported by Clark (p. 139) at the meeting on 15 September 1883 the faculty resolved "that it would be to the university's best interest to rebuild on the old campus." To the great credit of the board, and especially to the foresight of David Starr Jordan who was not yet president, more satisfactory facilities for chemistry and other sciences were planned than had been contemplated by the faculty. And the board decided by a majority of one to buy a tract of twenty acres at Dunn Woods and move from the old campus of only twelve acres. This is aptly described by Clark (p. 140):

"...At a meeting in Indianapolis on October 5, the trustees voted by a majority of one to buy the Dunn tract at $300 an acre, allowing Benjamin Dunn to reserve a 375 foot strip across the west end of the tract. Immediate plans were made to erect two main buildings. One of them, two stories high, would be adapted to the use of chemistry, physics, and the other sciences; the other would be a fireproof building to accommodate the library and the liberal arts. It was thought that a solid fireproof brick structure could be erected at a cost of $40,000, or built of wood for $25,000, and the second building would cost $37,000. The science professors were asked to view the plans and make suggestions. On his way home from Europe, David Starr Jordan stopped in Indianapolis and discussed plans for the science structure with G. W. Bunting, the architect, and Trustee James L. Mitchell. He differed sharply with the board and architect over the dimensions of the rooms, and at last persuaded them to agree to increase the size of the science building from 3,000 to 4,000 square feet. The same day the board approved the final plans, and in March the contract was awarded N. Y. Nichol and Son for $59,982, from which B. W. Bunting would receive $899.43."

Several times Wylie expressed his opposition to the move. In his diary on 30 September 1883 he wrote
"Trustees have decided to build in Dunn's Woods ... a bad selection on account of prices I hear—and very inconvenient during the transition & a virtual throwing away of the old building..."

Two days after the board formally acted, on 7 October 1883 he recorded

"Trustees located new site for the university—20 acres in Dunns woods—They could hardly have, me judice, selected a worse site."

Further on in his lamentations he wrote

"...had they contented themselves with fewer acres and a site near the old one, 8 or 10,000 dollars would have been saved for apparatus and books. Hope I am all wrong..."

This feeling persisted. A week later Wylie wrote

"Board will meet two weeks hence. Have lost all my zeal in consideration of new site, wasted funds and property."

The pessimism continued well into 1884. He doubted that the construction would be finished on schedule and, as in the past, he greatly doubted that the General Assembly would be supportive. In this negative vein he wrote on 8 June 1884,

"...the building is to be finished by Jan. 1st 1885 for the physical department—suppose it is & I doubt the possibility, how will they finish it—if unfinished what can be done with it—if a year from this we are in it will be more than I expect."

Again on 2 August 1885 he was still dubious. He reported

"New College buildings—almost finished. Will run us pretty hard to get things fixed up by Sept. 1st."

Three weeks later he referred to experiences that are common to all occupants and would be occupants of nearly all buildings: delays in completion and construction defects or oversights. He wrote

"College buildings not yet in order—find many things defective."

A week later he noted

"College opens next Thursday—hardly ready—dread next term."
Further on he wrote “moved most of our things from the old College.”

The advent of the beginning on the new campus, with new facilities and new opportunities, was marked in the diary with expressions of concern and doubt rather than hope and enthusiasm. He recorded on 5 September

“College opened in the new building (Wylie), last Thursday—new arrangements, new studies, new teachers, new modes of teaching give me much anxiety.”

This gloominess, lack of confidence in others, and self-deprecation is somewhat puzzling. Only fifteen months before, on 10 June 1884, the cornerstone of the larger of the new buildings was put in place and, as stated by Clark (p. 140)

“...the board announced it would be called Wylie House in honor of Andrew Wylie, the first president, and Theophilus A. Wylie, long time professor.”

With this, and many other forms of recognition, the old gentleman should have been happy. It is notable that his diary, which contains an abundance of comment and record keeping about the university, is silent about the naming of the new buildings. The recommendation for the naming was made to the trustees by President Moss in June 1884 who wrote that the name should be Wylie Hall “in honor of the first President of the University and of the present Professor of Physics.”

The only references to the placement of the cornerstone and the events surrounding it are Wylie’s entries in the diary on 8 June and 15 June (It was customary at this time for him to make weekly entries). On 8 June he wrote

“Last night I acted as chaplain—tomorrow have something to do at the meeting—& the next day at the laying of the cornerstone.”

At the bottom of the page he had written, at a later time

“Strange I was not more particular about the cornerstone as I repd the Faculty.”

On 15 June he simply wrote “Commencement over,” and then he proceeded to lament the family problems that weighed on him, especially the action of the board in discontinuing the employment of his son Brown Wylie.
Owen Hall was so-named in honor of the Owen brothers, Richard, David, and Robert. Because Richard, like Wylie, taught chemistry during a substantial part of his time at the university it is notable that chemistry was indirectly recognized in naming the first two major buildings on the current campus.

The original Wylie Hall had two stories and a basement that was high enough to permit outside lighting through windows on all four sides. Initially as described by Wylie in 1888 in his *History of Indiana University*,

"The Chemical Department occupies the first story, its proper place, while the second story is occupied by the Library and several other departments besides the Physical (Physics)."

The basement had various uses but for several years it was the gymnasium for women. A Mrs. Harriet Colburn Saunderson was director, at least as published in the catalogs in 1891, 1892, and 1893 (Woodburn 1, p. 386).

Apparently there was feeling on the new campus that the sciences were being overemphasized at the expense of the old classical learning. In 1886 an editorial in the *Indiana Student* stated:

"Of the three new buildings, two—the two larger and best equipped—are devoted to science. The third, a poor little frame, is used for chapel; and stored away in its attic are four or five little rooms, about 12 x 16, where the student must get his philosophy, political economy, literature, languages, etc....

"In striking contrast to the Literary is the Scientific department. There all the best modern apparatus and conveniences are supplied. Every department full. Buildings heated with steam and lighted with gas. Large and comfortable recitation rooms and laboratories, with a professor at the head of every department and with efficient tutors. It is clear we are heading straight for science."

Woodburn pointed out (p. 387) that in 1887 the editor of the *Student* "made some apologies and recognized that the humanities were being treated as well as the means at hand allowed."

**DR. VAN NÜYS OUTSIDE THE CLASSROOM AND LABORATORY**

It should be noted that during the last years of the university on the old campus and the first years on the new campus Van Nüys was of course responsible for the work in chemistry, but he participated some in other campus activities. In December, 1884, the *Indiana Student* reported that in the College Chapel he had spoken on "The religion of Big
Veda.” It referred to “the excellent address delivered by Dr. Van Nüys recently before the students.”

Wylie did not feel that strongly regarding Van Nüy’s ability to lecture outside the chemistry classroom, but he seemed to be satisfied with most of the classroom teaching. Several years earlier, on 21 March 1875, he wrote in his diary concerning a presentation by Van Nüys at one of the frequent chapel programs on campus: “Dr. Van Nüys Col. Ch. on Climate & Diet ... a good lecture for a weekday.” In the same year, three months later, he wrote simply: Dr. Van Nüys Col. Ch. on Intemperance. Nothing was recorded on the quality or effectiveness of the lecture. The next entry concerning chapel talks by Van Nüys was on 17 November 1875. Wylie wrote

“Dr. Van Nüys on the evidence of design in creation, followed by some commendatory remarks by Dr. Moss (the new President of the University).”

There was no comment on the point of view of Van Nüys or of the quality of the lecture.

However there were times that Wylie apparently had a negative view of Van Nüys’ lecturing effectiveness outside his work in chemistry. In his diary on 10 February 1878 he commented on a talk on creation that Van Nüys had given in College Chapel. He stated that it was

“...a dry detail of some chemical facts with reference to atoms & molecules, which none but those who had studied chemistry could understand or appreciate.”

Another expression of dissatisfaction was on 15 February 1885 when Wylie wrote

“Col. Ch. Dr. Van Nüys on Budda—Dr. V. N. did Xtianity (Christianity) the justice to put it on a par with Buddism.—Such lectures have a bad influence. Sorry Dr. V.N. don’t see it (sic).”

Wylie’s general appraisal was that Van Nüys was excellent in his department, but at times he was inadequate in addressing the public.

There were several entries in Wylie’s diary during the 1880’s concerning different chapel lectures and thought on various timely topics including the views of Darwin on evolution. On 18 April 1886 he referred to a lecture by Professor John M. Coulter of Wabash College. Wylie wrote:

“An eloquent lecture which held the audience. Darwin presented as the leading man in the Science of Biology. Prof. C. took a correct
view of evolution, *me judice.* He did not ignore the Deity. It was God's mode of creating."

Such understanding views must have been expressed to the students from time to time thus contributing breadth to their education.

*Other Aspects of Progress on the New Campus:* In October 1885, a month after the move from the old campus to "Dunn Woods", the *Student* included a number of news items and comments relative to chemistry as well as in other academic departments. It declared that

"Our new chemical laboratory, as now established, is the largest in the United States, west of the Allegheny mountains, with the exception of Ann Arbor. There will be an abundance of room for the accommodation of 68 students."

In the next issue there was noted

"...an awful steaming and sizzling and smoking and smelling in the chemical laboratory, now-a-days and Professor Van Nüys and Wylie are happy."

The December issue obviously underscored the difficulty of students in understanding chemistry lectures by writing

"You all understand this. No trouble about it at all—Professor Van Nüys."

The salaries in this first year on the new campus are of interest. The new president Jordan received annually $3000. Wylie and Kirkwood were each at $2000. Van Nüys and Atwater were each paid $1800. Changes in salary occurred in small increments and, of course, the differences reflected primarily the trustee's perception of worth to the University. President Jordan's description of worth, as he expressed in June 1885 was:

"...a vigorous man to represent before the students and before the state, advanced culture and original work in the field."

The appeal of chemistry to the students is reflected in a news item in the December 1885 issue of the *Student* stating the anticipation:

"...that there will be some 80 students who will desire to take laboratory work in chemistry next term. The working rooms are only fitted up with accommodations of 68—so speak early for a high stool.—"
The January 1886 issue showed that enrollments in the university were indeed increasing. There were 20 seniors, 25 juniors, 53 sophomores and 82 freshmen. In addition there were 3 postgraduate students. The preparatory department had an enrollment of 74. (This department was established in 1830 and continued until 1890. Apparently none of the preparatory students were allowed to enroll in chemistry.)

The October 1886 issue of the Indiana Student reported the student enrollment in 1886 of several institutions in the State. They were:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Enrollment</th>
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<tbody>
<tr>
<td>DePauw</td>
<td>210</td>
</tr>
<tr>
<td>Indiana</td>
<td>202</td>
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<tr>
<td>Purdue</td>
<td>143</td>
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<td>Earlham</td>
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<td>Hanover</td>
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<td>Wabash</td>
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<td>Franklin</td>
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<td>Rose Polytechnic</td>
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<td>98</td>
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<td>92</td>
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<td>69</td>
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<td>67</td>
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</table>

Apparently there was an increase of approximately 20 students at Indiana between 1885 and 1886. However, as shown in Wylie's listing of graduates of I.U. during that period, probably not more than 50 percent graduated.

MORE DESCRIPTIONS OF CHEMISTRY IN THE UNIVERSITY CATALOGS

The catalog of 1885-86 listed for the first time the courses (programs) of study adopted at the time Jordan became president. They are in the order given: Ancient Classics, Modern Classics, English Literature, History and Political Science, Philosophy, Mathematics and Physics, Biology and Geology, and Chemistry. It is stated that “These eight courses are the same in extent and value.” It is further stated that

“It is intended that every graduate of the University shall have a thorough drill in some department of knowledge, while breadth of culture is encouraged by means of a wide range of elective studies in the Junior and Senior years.”

For each of the eight courses of study separate space is given for the identification of faculty, courses, and special departmental features. For chemistry the courses described are elementary chemistry, qualitative analysis and quantitative analysis; gravimetric and volumetric methods. The elementary course (first) is stated to “embrace both inorganic and organic chemistry.” Also, “By this course it is intended to qualify students to enter the laboratory and to impart a general knowledge of the science of chemistry.”

The relatively detailed account of “The Chemical Laboratories,” like other reports since the coming of Van Nüys, gives emphasis to the high place of qualitative and quantitative analysis in teaching chemistry.
at that time. No other aspect of laboratory chemistry is mentioned. The account states that in the new Wylie Hall there are sixty-eight places, forty-four in the qualitative laboratory and twenty-four in the quantitative laboratory. It points out that

"Each place is provided with about forty bottles of reagents, two drawers, two closets, gas and a Bunsen's burner,"

and

"Besides the general laboratories, there are two small laboratories for carrying on gas analysis and other special work."

Following further description of the facilities and arrangements for focusing on analytical work, and the source of apparatus and chemicals all from Germany, the account is concluded with the reminder

"Students who contemplate taking a special course in chemistry will find the facilities in these laboratories unsurpassed in any institution in the West."

However, like other departments, the staffing was surely minimal. The only staff listed for chemistry (in 1885-86) were: Thomas C. Van Nüys, Professor, and S. Brown Wylie, Assistant.

This, the first catalog after moving to the new campus, boasts that

"The new campus or 'University Park' comprises twenty acres of elevated ground, on the eastern edge of the city, covered with a heavy growth of maple and beech timber."

It further states:

"Of the new buildings (three) the largest, known as 'Wylie Hall', is 113 feet long by 84 feet deep. This is devoted to the departments of Chemistry, Physics, and Mathematics. For the present, the library is placed in this building."

Also the catalog for 1885-86 lists "The Scientific Memoirs and Reviews which have been published by members of the University." The listing gives four contributions by D. Kirkwood and twenty five by D. S. Jordan and other biologists. There are no publications cited in chemistry, physics, geology, mathematics, or other disciplines. That reflects reasonably well the status of research and other creative activity in the university when it moved to the present campus.
The first publication listed for chemistry was in the catalog of 1882-83. As stated earlier it was by Van Nüys in 1883 on the “Analysis of water from the deep wells in Indianapolis.” This appears to be the first catalog of this university in which a listing of scientific publications is given. Like the catalog published in 1885-86, aside from three papers by Kirkwood on astronomy, and the single paper by Van Nüys, virtually all the publications were by Jordan and a few other persons on fishes. In 1886-87 the departments of Physics and of Chemistry were included through an article by Wylie. It was on “The Connection of the Mind with the Material World.” At no time did this faculty member publish anything on chemistry or physics, his principal areas of teaching.

The catalog for 1887-88 was about the same as the one for 1885-86 except that quantitative analysis was expanded to three courses, including one on water analysis and a course on special work in chemistry. This latter course was intended to cover a variety of subjects including “the chemistry of food, water, sewage, polluted air; urinary analysis; and preparation of thesis.”

It is stated with some pride that “Facilities are now afforded for laboratory practice in physiological chemistry...” Also, that

“Geissler’s air pump, with receivers for evaporating in vacuum, Laurent’s polariscope for estimating sugar, peptone and hemialbumose, and a spectroscope for studying the spectra of haemoglobin and its derivatives, have lately been imported.”

The continuing attention to the acquisition of new laboratory equipment was also reflected in the Indiana Journal (IDS). On 7 April 1891 it reported:

“The Chemical Laboratory has had added to its apparatus (sic) recently a new automatic balance, made by Reuprecht in Vienna, an instrument for very fine weighting. It is one of the very few like instruments in America, and cost, duty free, $210.”

The section on chemistry in the catalog for 1890-91 listed books that were “especially recommended.” These were Shepard’s “Elements of Chemistry” and Remsen and Williams’ “Introduction to Chemical Science.” In 1891-92, as in other years, Fresenius’ “Qualitative Analysis” and Van Nüys’ “Analysis of Urine” were used in the appropriate courses. Occasionally in that period other references were made to textbooks and laboratory manuals.

In the catalog for 1891-92 and for 1894-95 the emphasis on qualitative and quantitative analysis was continued scarcely without change except for the following: The term general chemistry was substituted for
elementary chemistry, but only in the Medical Preparatory Course. In this program the lectures and experiments were the same as in the elementary chemistry course; also in the second and third terms qualitative analysis was provided. In the second course for such students organic chemistry was introduced, but apparently in name only because it was almost exclusively analytical with the emphasis on urine analysis. Also "Van Nüys' Analysis of Urine" was used as the text-book.

In the catalog for 1890-91 the name of Robert E. Lyons appeared. Along with T. C. Van Nüys, Professor, he was listed as Associate Professor. It is notable that he was on leave of absence for three years, from 1892 to 1895, to study and conduct research primarily in Germany. His name was to be listed in all succeeding catalogs as a member of the faculty until he resigned in 1938. Concerning Lyons, on 7 March 1889 Van Nüys wrote to the president and trustees:

"It seems desirable that the Professor of Chemistry should have a permanent assistant, who shall be a graduate of that department, rather than as at present, an undergraduate who has work to perform under other professors. I believe that Mr. Robert E. Lyons of the present Senior Class is a man suitable for such a position. He is the best trained student who has yet graduated from the Department of Chemistry, and he bids fair to make a careful and conscientious teacher."

The salary suggested was $400 to $500.

In the catalog for 1891-92 the "Plan of the Chemical Laboratories" was given for the first time, but all the laboratory space continued to be devoted exclusively to qualitative and quantitative analysis. Concerning chemistry the catalog for 1894-95 was virtually the same as those in the previous decade except that this year it was changed to include the analysis of foods. It and previous catalogs were notable in that the principles of chemistry and particularly the basics of organic chemistry and physical chemistry were not even mentioned.

Some expansion of the staff for 1894-95 was reported. Besides Professor Van Nüys and Associate Professor Lyons (absent on leave) in the listing the additions were: "Louis Sherman Davis, Instructor (absent on leave), Peter A. Yoder, Instructor, and Harvey A. Bordner, Laboratory Assistant." In effect the only available staff members that year were Van Nüys, Yoder, and Bordner. A note in the catalog reported that "Professor Lyons will return to the University in time for the fall term of 1895, and will offer courses in Organic Chemistry and Bacteriology." This was to be the first time anything resembling organic chemistry as known in the academic world at that time was included in the curriculum. Although physical chemistry had been developing for several decades the depart-
ment was even slower in making this key to progress available and a part of the thinking in chemistry.

**Breadth of Dr. Van Nüys' Requests for Chemistry**

The recurring expressions of need for the department occurred in different ways. A letter (handwritten as usual) to the president in June 1891 showed how closely informed the president was kept on the operations in chemistry and elsewhere in the university. Van Nüys wrote:

"...The special janitor for the laboratories should be required to keep the rooms, stands...cleaner than he has been doing. It seems that the duties of Mr. Stewart and the special janitor are not well defined and as a result the glassware of the laboratories was seldom cleaned."

In addition to the problems of equipping and maintaining good laboratories there was continuing concern about library resources. This is reflected poignantly in Van Nüys' letter to the president probably in 1888. He wrote:

"...as to books for this department I have not been able to secure the purchase of but one book, a single volume for two years. Although chemistry is an experimental science yet of this science there is a literature which is increasing in volumes every day and no teacher of this science can afford to ignore the literature or not encourage his pupils to study it. As a matter of fact for every hour a student devotes to laboratory practice one hour should be given to the study of chemical literature. With the salary I receive I cannot with any consistency purchase all of the work required. I therefore request the Board to make a sufficient appropriation for chemical books. Works of lasting value are periodicals containing only the results of original research and while it may not be practical to purchase this class of books exclusively yet, it should be borne in mind that works containing results of original research do not become antiquated as special work do. $150 would be of great benefit."

The *Indiana Student* kept the university community pretty well informed even in matters of library acquisitions. It noted on 30 October 1894 that

"The University Library has received a copy of the thesis, presented by Prof. R. E. Lyons, for his doctor's degree at the University of Heidelberg ... He will return to accept a full professorship .... at the beginning of the next college year."
A Feeling of Pride in Chemistry: In the 1886 report the president concluded regarding chemistry that “This department is now in position to do excellent work.” In 1887 he wrote:

“It seems to me that the Professor (Van Nüys) will soon need help in the management of the laboratories and I call attention to any requests he may make in that line.”

The favorable attention to Van Nüys and the program in the chemistry laboratories was based only on unprofessional appraisals but it was helpful in attracting local support. News items in the Indiana Student reflected progress. For example in the issue of December 1887 it was reported:

“J. F. Benham of the Senior class, in his specialty of ‘Chemistry’, is doing some analytical work for the owner of the artesian well of Martinsville. They want him to find if ‘There’s millions in it.’”

This encouraged an image of utilitarianism for chemistry. In the same issue the Student reported:

“An analysis of the water from Crown Point springs has recently been made in the chemical laboratory. The water from the North spring was analyzed by Dr. Van Nüys and Robert Lyons, that from the South spring by Dr. Van Nüys and D. A. Cox. A circular has been issued by the owners of the springs giving the analysis.”

Such publicity read by the laity on campus and elsewhere was probably enhanced by the favorable review given to Van Nüys’ new book “Chemical Analysis of Healthy and Diseased Urine; Qualitative and Quantitative.”

The relative status of chemistry and various departments of the University in 1888 is reflected in the “Proceedings of the Board of Trustees” on 8 to 13 November:

The estimated income for current year is $44,598.71 to be expended according to the following appropriations:

<table>
<thead>
<tr>
<th>Appropriation</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors’ Salaries</td>
<td>$32,000</td>
</tr>
<tr>
<td>Officers’ Salaries</td>
<td>2,250</td>
</tr>
<tr>
<td>Trustees’ Salaries</td>
<td>1,600</td>
</tr>
<tr>
<td>Contingent Expenses</td>
<td>2,800</td>
</tr>
<tr>
<td>Library for books, papers</td>
<td>2,200</td>
</tr>
<tr>
<td>Buildings and Grounds</td>
<td>1,500</td>
</tr>
<tr>
<td>Botanical Department</td>
<td>300</td>
</tr>
<tr>
<td>Chemical Department</td>
<td>800</td>
</tr>
<tr>
<td>Biological Department</td>
<td>300</td>
</tr>
<tr>
<td>Greek Department</td>
<td>25</td>
</tr>
</tbody>
</table>
Notably the allowance for chemistry was nearly three times greater than for any other department. The record also shows that

"...a new steam generator, for distilled water, and a drying oven have been placed in the Chemical laboratory at a cost of $145.00."

However the overall financial situation for the Department of Chemistry and the entire university was no better than in 1875, the first year after Dr. Van Nüys joined the faculty.

**Wylie's Retirement**

In his book (p. 107) Wylie recorded succinctly concerning himself that

"With various changes from Professor of Natural Philosophy and Chemistry to Professor of Languages, and in three years after, transferred to the chair of Natural Philosophy, he continued in the active service of the University till 1886, when he received the honorary title of 'Emeritus.'"

This important recognition was presented to the trustees by President Jordan in his annual report on 5 June 1886:

"I recommend that Professor Wylie be made Professor Emeritus of Physics, with a compensation as liberal as the finances of the University may permit."

In 1887 it was indicated in the president's listing of salaries the retirement stipend for Wylie was $1000.

**Threats of Professor Van Nüys to Resign**

As already indicated, Van Nüys for many years had tuberculosis. This must have incapacitated him continuously but in varying degree. Whether this was a factor in his premature attempt to withdraw from the university is not known. However, he was greatly irritated by the failure to receive a salary increase in 1890. This was heightened by the action of the trustees in raising the salary of some of his colleagues. Also, he believed that the trustees favored one political party over another and that perhaps they were misled by President Jordan. At any rate on 30 October 1890 he wrote to the trustees in long hand and asked them to "Please accept my resignation of professor of chemistry to take place July 31, 1891."
The reasons given were that in their June 1890 session

"...the salary of each of two of my colleagues (obviously in other departments) was increased to $2,000 while my salary remains the same $1,700."

He also charged with elaboration that

"Politics has been a factor in your proceedings for several years."

He charged that the trustees

"...are victims of misplaced confidence, that you are given an...ear to the Republican fanatics of Bloomington, and have made no efforts to ascertain the facts..."

He concluded his letter with the assertion that his relationship with the trustees "was very pleasant until I learned of your proceedings in June." Also he concluded that he would

"always give due credit for the aid you gave me in the building up of the chemistry department."

In the December 1890 issue of the Indiana Student the resignation was duly reported,

"...an event which is to be regretted by all the students who know him, and especially those working in his department."

The April 1891 issue reported that

"Dr. Van Nüys, happily for the University, withdrew his resignation, and will continue at the head of the Department of Chemistry."

There is no known reason for the withdrawal of the resignation. A handwritten note in the president's files shows that he was giving attention to a replacement "If this chair becomes vacant." The note stated that there were about twenty candidates that could be considered. The president felt that the most promising was a man at Lehigh and one at Cornell University.

It is not known how contented Dr. Van Nüys became after his outburst, and reconsideration, but his health further deteriorated and his final resignation was effective at the end of 1894-95.
Van Nüys' Resignation and Subsequent Death

The action of resigning was taken 27 May 1895 in a handwritten letter to the President (Swain). It included pertinent comments on the good qualities of his associates, the damaging effect of appointing inexperienced teachers, and the deteriorative effect of the elective system on student performance. Declining health was given as the primary reason for leaving. His single recommendation was the appointment of Robert E. Lyons as his successor.

It is of particular interest that the person selected to succeed Van Nüys resigned 43 years later, under different circumstances, and he recommended a person he wished to have as his successor, H. T. Briscoe. A part of the long letter by Van Nüys follows:

"Both Mr.s (sic) Yoder and Bordner have rendered good service in the department. Mr. Yoder is not popular with some of his students, yet I assure you he exacts good work and that this is the cause of his unpopularity. It is a lamentable fact that in this university the majority of students have become so accustomed to inexperienced and inefficient teachers, that when solid work is required, they become dissatisfied. I attribute this condition of affairs to have arisen from two causes: (1) the employment of inexperienced teachers (2) to the elective system, by which students in very many classes cast around for easy courses."

He later wrote in regard to the expenses of the chemistry department,

"In fact, I am sure, the chemical department is the cheapest school of chemistry in the world. Why should this be?"

He continued:

"I hereby tender my resignation of the Chair of Chemistry to take place July 31, 1895.

"The condition of my health is the primary cause of my resignation.

"For two or three years I have labored under great physical debilities, and I deem it best to retire from active life and live in a more favorable climate. As to the appointment of my successor, I recommend as a man fully prepared to fill the place, Dr. Robert E. Lyons. Prof. Lyons began the study of chemistry in my classes and continued until graduation, he then became assistant and later associate professor and he has also studied three years in Germany, having been granted the degree of Doctor of Philosophy a year ago by the Heidelberg University. Professor Lyons is an honorable man,
and if he should receive the appointment, he will strive, not only to keep up the department in its present condition but will endeavor to increase its effectiveness.

"Prof. Lyons has been giving special attention to researches in Bacteriology in addition to Chemistry and I suggest that $400 be appropriated so that he can purchase some apparatus with which to continue his special work but more especially to serve as a nucleus of a department of Hygiene or Sanitary Science.

"Allow me to express my gratitude to the Board (both present and exmembers) for their willingness to cooperate with me in building up and maintaining a creditable chemical department for 21 years.

Very respectfully yours,
Thomas C. Van Nüys"

Clearly Van Nüys had high regard for the young Lyons. One illustration of the respect for him is Van Nüys’ action in giving Lyons a large number of his books before he returned to Virginia. This was reported to H. G. Day by F. C. Mathers shortly before the latter’s death in 1973.

As reported in the Indiana Student of 4 June 1895, Van Nüys moved to Charlottesville, Virginia where, as Professor Emeritus, he died on 1 August 1898. He was only 54. His widow moved to Seattle, Washington.

DEATH OF WYLIE AND KIRKWOOD

About the time the Van Nüys family moved from Indiana two almost simultaneous deaths occurred that indeed shook the community. Wylie died in Bloomington 9 June 1895 and on the day of his funeral, 11 June, Kirkwood died at Riverside, California. Both had been closely associated colleagues since Kirkwood became Professor of Mathematics here in 1856. Both retired in the same year, 1886. Both were survived by their widows. Mrs. Wylie continued to live in the historic Wylie House until she died in 1913, at age 101.

The newspaper accounts of Wylie’s life, the extended tributes, and the funeral are illuminating regarding the feeling for him in Bloomington. The next day following his death the Bloomington Telephone in an unusually long and sincerely praiseworthy article wrote in part:

"The death of Dr. Wylie removes from our city, from Indiana University, in fact, from the State, a remarkable man. For half a century he has been an active, earnest worker for the cause of humanity. His was a life of conscientious effort to do good through his profession as a teacher ... Nor was his work confined to the University, for he always found time also to take the part of a citizen. He kept
posted in affairs generally, and it is safe to say that up to within ten years ago he knew almost every resident of the place ... His life was devoted to make the world better, and now that he is gone, hundreds will pause to speak a kind word of the dead and to remember the wife and help mate of his life—such a woman as he was a man ."

Also, the next day the Evening's Daily reported on the funeral services held in the afternoon of that day. The services were at the Walnut Street Presbyterian Church (then opposite the Courthouse). The esteem in which Wylie was held is reflected in the naming of the

"...active and honorary pall bearers. The active pall bearers were S. C. Dodds, Nat U. Hill, Walter Woodburn, William T. Blair, Theodore J. Louden and Howard Maxwell. The honorary were John H. Louden, Joseph G. McPheeters, Dr. Joseph Swain, Dr. Samuel K. Rhorer, Judge Robert W. Miers and Judge D. D. Banta."

The news article also reported that on the day of the funeral

"Out of respect to Dr. Wylie there was no session at the University today."

At 9 a.m. a meeting of the faculty was held

"...at which appropriate action was taken in reference to the venerable professor."

In addition to the remarks made by various persons "a committee on resolutions was appointed." Most probably at that meeting a fund of money was raised for presentation to Mrs. Wylie. In reporting on the funeral the news article stated that "A beautiful offering was also made by the faculty." It was clear from comments Wylie had made from time to time in his diary that following his retirement nine years before the family income had become alarmingly meager. There was no significant group or university retirement programs at that time.

The starkness of the family's financial resources is contrasted in various ways including the size and prominence of the Wylie home on Lincoln and Second streets, the noted Wylie Hall on campus, and the honorary degrees that had been conferred on Dr. Wylie. As stated by the Bloomington Telephone in reporting so fully at the time of his death:

"He received from Miami University the degree D.D., and a year later from Monmouth College, and the following year from Princeton College, N.J., the same honorary title, and shortly after LL.D. from his Alma Mater." (University of Pennsylvania).
At the time of Wylie’s death the *Bloomington Telephone* published “A Worthy Tribute” by his colleague in the Law School, Professor (Judge) D. D. Banta:

“...For nearly fifty years he was its (I.U.) faithful and pains taking professor. No other man in the State ever had so long in one place a teaching service as he, and few in this or any other State, found so warm a place in this students’ heart...I think from first to last he taught in every chair from the president’s down in this institution. He was an old-fashioned, scholarly man....”

The *Indiana Student* on 18 June, in extended comments wrote:

“...Seldom do the events of commencement week present such an epitome of the ideal scholars’ life as did those of the week just past. New launched and buoyant graduates, alumni returning to renew their inspiration at the fount of their Alma Mater, professors and men of high educational place, rejoicing in the consciousness of their strength, and the peaceful close of two lives intimately interwoven with the past of Indiana University.

“Dr. Wylie and Dr. Kirkwood were both over eighty years of age, both served for a long period in the faculty of Indiana University, were close personal friends, each died within a few days of each other and each lies at rest in Rose Hill cemetery, mourned by the University and the people of the town of which they were such honored citizens.

“The one the broad-minded scholar of perfect culture, the other, the self-made specialist of world-wide reputation, theirs are indeed helpful examples, and their memory we will ever delight to honor. ...

A large proportion of the entries in the Wylie diaries refer to books and journals he was currently reading. He paid close attention to his personal library as well as the university’s library. As reported in the *Alumni Quarterly* 4 October 1914, following his death in 1895 and that of his wife in 1913 “his children and grandchildren made a collection of what they termed his working library.” This was presented to the university “as an example of a scholar’s library in the middle of the nineteenth century.” About 1,000 volumes were in the collection. The diverse coverage of scholarly subjects included Greek and Latin classics, a wide variety of lexicons and a notable number of important books in theology. The chemistry and physics books included those authored by “Graham, Turner, Brande, Faraday, Cutbush, Goodman, Ure, and M. Brisson’s *Dictionaire raisonne de physique* (Paris 1871).” There was a larger num-
ber of books on mathematics and astronomy. The anonymous author of the report on Wylie's library concluded:

"It would be difficult at this time to find a private library of the midnineteenth century so well-rounded or showing the evidence of such constant use."

RETROSPECTION

In spite of his poor health during the declining years Van Nüys devoted much time to the Department of Chemistry, but he apparently gave minimal attention to most of the events and activities on campus and in the community. Wylie commented in his diary that Van Nüys rarely attended the Chapel Services on campus, but he spoke at the Services a number of times.

Van Nüys wanted qualitative and quantitative analysis to prosper and he desired large enrollments in elementary chemistry, but apparently he had pretty limited understanding of the meaning of then current breakthroughs and developments in atomic and molecular chemistry, organic structure and synthesis, and various aspects of inorganic and physical chemistry in his time. The basic changes were not focused on the department to broaden it and apparently did not excite his perceptions of future needs. He wanted the continuance of good teaching of chemistry as he understood it. This would require increasing amounts of certain kinds of supplies and equipment and it would surely require increasing amounts of space, but there seemed to be no envisioning of exceptional changes occurring in the structure of chemistry.

Perhaps for the first time the space desire was expressed to the president and trustees. This was in a handwritten budget request on 29 October 1894. He wrote

"I believe this department should have reserved for its growth all of the rooms in Wylie Hall, now occupied by other departments."

Thus less than ten years after the building was first occupied he made clear that all of it would soon be needed for chemistry.

In this report Van Nüys summed up in effect the current size and scope of the department in stating that 62 students were enrolled in elementary chemistry, 14 in qualitative analysis, and 19 in quantitative analysis. He wrote that this "represents the work now being done in the department."

It is not known whether Van Nüys joined the American Chemical Society, which was organized in 1876. Regrettably he was not a charter
member of the Indiana Academy of Science which was formed in the last of December 1885 (Daily and Daily). His two elder predecessors in the department, Owen and Wylie, were charter members. In an extensive report to the Indiana General Assembly, made by the Academy in 1895, Van Nüys and 28 other well recognized scientists were reported to be Fellows of the Academy. Thus he had joined within the first ten years of its existence, but there is no indication that he gave much encouragement to its development.

As Lyons succinctly wrote in his brief History of Chemistry at Indiana University,

"The appointment of Dr. Van Nüys marks the beginning of development of chemistry at Indiana University."

He wrote with some exaggeration that Van Nüys

"Brought to Indiana University the best of German scientific method and the best of German chemistry of his day."

In partial recognition of Van Nüys' contributions to the university a portrait of this "first professional chemist here" was presented at the dedication of the Chemistry Building on 2 April 1931. The portrait was made from a photograph taken in 1883 when he was 39 years old. The widow and two sons gave it to the University. The artist was M. D. Hardin of Ithaca, New York. Later it was hung in the auditorium of the new chemistry building where it remained until the auditorium was so remodeled that pictures could not be appropriately displayed. Then it was moved to the main lounge of the Union building.

In his remarks about the portrait and Van Nüys, Lyons stated at the dedication (History, p. 4)

"He was recognized by his faculty colleagues as a modest man of high ideals, great integrity, and sound judgment, and possessed of courage to defend his convictions forcefully. His students and co-workers in chemistry found him a widely read scholar, an inspiring teacher, a skillful experimenter and director of research in the field of analytical chemistry, and a sympathetic and competent advisor of university youth."

For the first time here Van Nüys focused on both teaching and research in chemistry, but the concept he presented was entirely too narrow for a university. Also, he needed more help. Progress was marred by his chronic illness, but his years here did give favorable attention to the importance of specialization and the value of research.
His successor, Robert E. Lyons, had broader understanding, but he also lacked resources. Moreover he did not have a zeal for basic investigations and he was not imbued with the spirit that stimulates students and attracts participation by superior colleagues within and outside the university.

A considerable number of the graduates in chemistry who were taught and influenced by Van Nüys and other faculty during his time here became productive in various pursuits. The greatest proportion became physicians. A few took up industrial chemistry. Some became high school teachers and a few made their way into university teaching. Also a few were attracted to business, law, and engineering; and at least one became a farmer.

Probably the most notable were Earl Blough, '99 and Leo F. Retterger, '96. The former became a great executive in industry and the latter was widely known for his contributions in bacteriology and public health as a major university professor. Both were given honorary degrees by Indiana University in 1931. Van Nüys left a good but not impressive imprint on Indiana University.

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Chapter III

The First Twenty Five Years Under
Robert E. Lyons:
1895 - 1920

Robert E. Lyons was not quite 17 when he enrolled at Indiana University. It was 1885 and David Starr Jordan became president that year. The next year, under Thomas C. Van Nüys, chemistry became the first discipline in science at IU to become a full-fledged department. The university was making a transition from the older campus to the new campus - “University Park” - and chemistry had relatively good physical facilities and space in the new building, Wylie Hall.

Among the many progressive actions of Jordan, who may be well compared with Herman B Wells half a century later, was his vigorous search for promising faculty members. Unlike Wells, the circumstances during Jordan’s brief tenure suggested to him that the most feasible and “most important move was to bring trained and loyal alumni into the faculty.” (Jordan The Days of a Man, Woodburn 1, p. 376). By 1889, when Lyons received his A.B. degree, it was apparent to Van Nüys and Jordan that Lyons was surely promising. A year later the young Lyons received his A.M. degree in chemistry. This was the first degree based significantly on research to be awarded at this university. Also, in that
year Robert Lyons, with T. C. Van Nüys, was a coauthor of a research article in the *American Chemical Journal*. Thus, as stated by Jordan,

"...among the recent graduates (who had)...remarkable ability; to them, therefore, I promised professorships when they had secured the requisite advanced training in the East or in Europe."

Lyons was encouraged by Van Nüys and Jordan to study chemistry in Germany.

From 1889 to 1895 the young chemist, born and raised in nearby Bloomfield, was instructor; then associate professor on leave of absence. During a part of this interim he worked in the famous Fresenius laboratory where Van Nüys had studied immediately before becoming Professor of Chemistry at Indiana University in 1874.

Even before Lyons left for advanced work abroad President Jordan had resigned and accepted the presidency of the new Stanford University. While still in Europe Lyons had been in communication with then president Joseph Swain, the second successor to President Jordan. The first had been John Coulter who served from 1891 to 1893. In Germany Lyons' interest in chemistry had been greatly broadened, and his primary interests had changed to organic chemistry and bacteriology. Thus he wrote to President Swain in May 1894,

"The two subjects Organic Chemistry and Bacteriology have opened up a world of work to me and I feel very small and incapable standing between them."

In the same letter his enthusiasm for publishing research was shown in the proud assertion, "Shall likely have two papers out by the first of September."

Lyons' new focus on organic chemistry and bacteriology, and his interest in changing it to a chair of this nature, is shown in an undated letter to the President and Board of Trustees. In the letter he expressed the hope that he would

"...be permitted to return to a department of a chair of Organic Chemistry and Bacteriology in the University of Indiana (sic)."

Lyons wrote to President Swain on 4 May 1895, near the time of Van Nüys' resignation. In the letter he acknowledged that he had been offered tentatively the headship of the Department of Chemistry, but he was very reluctant to accept the terms. He wanted to include bacteriology in the teaching and research program. Thus he wrote
"This is indeed a disappointment and discouragement to me, and only with reluctance can I see the work postponed, or give up the research work in Bacteriology which I have in progress."

Finally terms were agreed upon and at 26 years of age Lyons became the new head of the Department of Chemistry. Bacteriology courses were to be given, but these were moved to the newly established School of Medicine in 1905.

In addition to receiving a good start in the chemistry of the period while abroad Lyons became accustomed to the German language and various practices and mannerisms. As shown in his numerous handwritten reports and memoranda, during the first year or two after returning, this included the Germanic manner of writing the number 7. He always crossed the vertical segment of the number with a horizontal stroke.

The catalog for 1894-95 showed an enrollment of more than 700 students. Ten years before there were only 144 students. In 1895-96 there were 764 undergraduates and 62 resident graduate students. One student was from Belgium and one from Japan. The catalog for that year listed for the first time Lyons as Professor. It included Louis Sherman Davis as Associate Professor, Peter A. Yoder as Instructor, and Harvey A. Bordner, as Laboratory Assistant. Also, Van Nüys was shown at the top of the list as Professor Emeritus. Davis was on leave of absence at the University of Marburg to complete his Ph.D. in 1896. There were various salutatory changes concerning chemistry.

Stockroom and Breakage Fees: An obviously needed change was to consolidate and maintain under supervision the supply of chemicals, glassware, apparatus and other laboratory necessities in a stockroom. This was done in the fall of 1896. A letter by Lyons to President Swain in August that year stated:

"...The stock-room is operated as a store (open at 3 periods of one hour each during the day) and an account is opened with each student. In this manner it has been possible to look after the breakage in a very satisfactory manner..."

It may be that the first "laboratory boy and stock room keeper" was Homer Bowles. Lyons wrote that in the new operation the young man "has served, as laboratory servant, in a satisfactory manner for 3 years ..." Thus the operation of the stockroom apparently was started with a helper who had worked in the department long enough to have considerable experience. It was remarked that
"...this position as a stock-room keeper must be filled by one of experience and honesty...for the temptation to receive tips, etc...is very great..."

With the increase in responsibility and for the experience Bowles had acquired the salary was raised "from $20 to $25 per month during the college year." In addition he had the responsibility of "keeping the chemical laboratories in order."

Before Lyons assumed responsibilities for the department there were continuing problems concerning the assessment and collection of breakage charges and laboratory fees. This is illustrated in Lyons report covering the period 22 October 1896 to 1 June 1897. The income was $797.68 and the expenditures were the same. How unsatisfactory it was is shown in Lyons' (6 Aug. 1896) words:

"...To defray general necessary expenses and provide supplies for the increased number of students in the advanced courses during this spring term it has been necessary to expend $354.41 in excess of the actual receipts. This amount ($354.41) I have advanced and expect the collections during the spring and summer terms to reimburse me."

Such problems remained unresolved entirely too long. For example, in a financial report on 31 October 1903 to the new President Bryan, Lyons stated that during the period of 15 June to 31 October the total expenditures for supplies was $400.37, but the total receipts from breakage fees was $217.45. He had personally advanced the difference of $182.92. He wrote

"I do not see any prospect of making up this amount from breakage fees during this year and respectfully ask to be reimbursed to the amount of $182.92."

Thus the promising head of the department, after eight years away from stimulating training abroad, had of necessity become, in part, a banker and bookkeeper for the department instead of a leader in research and teaching.

Ventilation of the Laboratories: A vexing problem in Wylie Hall continued to be the need for better ventilation of the laboratories. The level of odorous and harmful emanations, especially from the work in (macro) qualitative analysis, must have been far greater than has been known in chemistry during the second half of this century. Laboratory design, hoods, ventilating conduits, and motors to meet such needs were not well developed. For the operation of the latter the department was dependent on the use of gasoline engines—such as were available. On at
least two occasions in 1897 ventilation problems were presented in Lyons’ reports to the president and trustees. In March of that year he wrote:

“There is also one item about the ventilation and the gasoline engines (sic) ... the two newspaper offices have similar ones but I.U. could not get a permit to use the one they bought and the insurance agent refused to insure it.”

Finally some progress apparently was made. In November Lyons wrote:

“Motors for the departments of Chemistry and Physics ... ordered two 5 horsepower motors, one each for the departments of Chemistry and Physics. The one for chemistry is to furnish power for the ventilating arrangement.”

This problem remained in varying degrees as long as the department was in Wylie Hall, and it was not solved to the satisfaction of all even in the subsequent Chemistry Building of 1931 and the Addition of 1964.

ORGANIC CHEMISTRY AND BACTERIOLOGY: The major emphasis on qualitative and quantitative analysis was continued but organic chemistry was given appreciable standing, thus adding some balance to the program. This included Organic Practicum, a new course, in which

“The student makes, purifies, and verifies the constants of about seventy-five preparations selected from the fatty and aromatic series for the illustration of important synthetic reactions.”

Presently it is not understood how any student could carry out such studies on so many compounds, but at that time some catalogs were given to exaggerations.

Dr. Lyons’ desire to make organic chemistry significant in the curriculum was almost matched by his persistence in having bacteriology made an ongoing feature of research and instruction in the department. During his first year as head of the department he published a paper on “The effect of grape sugar upon the composition of certain fat-producing bacteria” (Proc. Ind. Acad. Sci., 5, 85-88, 1895). Bacteriology, on a very limited scale was taught in the department from 1895 to the time of establishing the department of pathology and bacteriology in the new School of Medicine in 1905. The course in the Department of Chemistry was taught at night using Lyons’ own apparatus and bacteriological books. This was without additional remuneration. Finally in 1899 he wrote to the president for some extra pay, but apparently this was not
granted. In the letter Lyons stated that there were only two places in the state that were teaching bacteriology.

After 1905 the persistence subsided in having bacteriology offered in chemistry. Because the library could not afford to buy an appropriate set of books for the work in bacteriology, Lyons then offered to sell the university his set of *Centralblatt fur Bakteriologie und Parasitkendud* for $314.80, which was a bargain. The purchase was approved. However, he never really gave up his idea that bacteriology should be directly associated with chemistry.

**ATTEMPTS TOWARD A BROADER PROGRAM IN CHEMISTRY**

Finally, to support the urging of the young departmental head for a stronger and broader program in chemistry he had only to point to the views of some of this country's most credible thinkers and molders of opinion. For example, he could have pointed to the following conclusion of the *North American Review* in March 1896:

"It is fair to hold that the country that has the best chemists will in the long run be the most prosperous and the most powerful. It will have at the lowest cost the best food, the best manufactured materials, the fewest wastes and unutilized forms of matter, the best guns and the strongest explosives, the most resistant armour. Its inhabitants will make the best use of the countries resources; they will be the most healthy; they will oppose the least resistance to favorable evolution; they will be the most thrifty and the least dependent on other nations."

For the first time in the catalog for 1884-95 the section on chemistry stated that

"Every encouragement is given to original research, but it is recognized that the student must first have a rich fund of knowledge of chemistry as a science and have attained a very high degree of accuracy in his work."

Also, for the first time since it was listed in 1891-92, the "Medical Preparatory Course" was presented in some detail and emphasized. The program was keyed to the students in the department who "eventually study medicine." Several courses were recommended as follows:

- **First year:** Mathematics, two courses in Physics, Language
- **Second year:** Inorganic Chemistry and Qualitative Analysis, Botany and Language
- **Third year:** Quantitative Analysis, Organic Chemistry lectures, Physiological Chemistry Lectures, Zoology, and Language
Fourth year: Physiological and Pathological Chemistry Practicum, Chemistry of Foods, Toxicology, a second course in Zoology, and one Elective.

Throughout the four pages describing the program in chemistry the words physical chemistry, or any equivalent words, did not appear. The first attention to this basic part of chemistry was in the catalog for 1900-01. Course number 22 was: "Selected Chapters in Theoretical Chemistry. For 1900: Atomic theory, the periodic law, and theory of solutions." This was one day per week in the spring term and Lyons was listed as the teacher.

By this time, 1900-01, the number of chemistry courses had grown to 30. The amount of work in qualitative and quantitative analysis had decreased appreciably, but bacteriology has been introduced and there were five courses. Toxicology had grown from two courses to four courses. There were two courses in foods and dietetics, and two courses in electrochemistry. Oliver W Brown had been added to the faculty the year before, as instructor. This new teacher, Lyons, and Davis were the chemistry faculty and there were two laboratory assistants, Harvey A. Bordner and Leo F. Rettger. The former left in 1902 and with his wife both became teachers in the Philippine Islands. The latter soon went to Yale University where he became prominent in bacteriology. He returned in 1931 to receive an honorary degree.

The responsibility for the amazing plethora of courses was distributed as follows:

Lyons. Inorganic (elementary)
General Theoretical and Experimental Chemistry (beginners' course)
Qualitative Analysis of Inorganic Bodies (with help of Davis and Bordner)
Quantitative Analysis (with help of Brown)
Organic Chemistry
Organic Chemistry Laboratory (with help of Rettger)
Physiological Chemistry
Physiological and Pathological Chemistry Laboratory (with help of Rettger)

Bacteriology
Bacteriology Laboratory (with help of Rettger)
Selected Chapters in Theoretical Chemistry
Bacteriology, selected topics
Bacteriology, Advanced Laboratory (with help of Rettger)
Bacteriological Chemistry
Research (with help of Davis)
Davis. Qualitative Analysis (with help of Bordner)
Chemistry of Foods
Toxicology Laboratory
Toxicology Lectures
Advanced Toxicology
Methods of Teaching Elementary Chemistry
Dietetics
History of Chemistry

Brown. Theory of Analysis (supplementary to quantitative analysis)
Electrochemistry
Electrochemistry Advanced Course

Bordner. Chemical German

The courses were numbered consecutively starting with number 1. This system was to continue until 1927-28 when a three digit system was adopted throughout the university, with the first digit indicating the academic level of the course.

The size of the academic departments and the number of faculty and courses in the first year of Lyon’s headship is indicated in an excerpt from the Indiana Student on 14 April 1896. It points out that chemistry had four faculty members and eleven courses. In five years the number of faculty members remained unchanged but the number of courses had practically tripled! The record in chemistry and the other sixteen departments was as follows:

1. Dept. Greek - 2 teachers and 16 courses
2. Dept. Latin - 4 teachers and 14 courses
3. Romance Languages - 3 teachers and 15 courses
4. Germanic Languages - 4 teachers and 14 courses
5. English - 8 teachers and 22 courses
6. European History - 2 teachers and 12 courses
7. American History - 2 teachers and 12 courses
8. Political Science - 2 teachers and 16 courses
9. Philosophy and Pedagogy - 4 teachers and 11 courses
10. Mathematics - 5 teachers and 18 courses
11. Mechanics and Astronomy - 1 teacher and 8 courses
12. Chemistry - 4 teachers and 11 courses
13. Geology - 2 teachers and 9 courses
14. Zoology - 2 teachers and 12 courses
15. Botany - 2 teachers and 6 courses
16. Physics - 2 teachers and 8 courses
17. Law - 3 teachers and 20 courses

The chemical library resources had remained exceedingly inadequate for productive research and teaching. The major German publi-
cation, *Berichte der deutschen Chemischen Gesellschaft*, was not available. Already Lyons, and his professor in Germany F. Krafft, had published three of his research papers in that journal. On 1 June 1899 Lyons asked President Bryan for permission and $175 to buy second hand from Leipzig a bound set of 90 volumes. Again five months later another request was made, but this time the price was now $170. However, he included a request for $22 to buy the four volume bound set of the treatise *Handbuch der anorganischen Chemie*. Over forty years were to pass before comprehensive strengthening of the chemistry library occurred.

In addition to all the teaching and needed research activity it was necessary for the head of the department to devote much time to administrative work, and with virtually no office assistance and scarcely any office equipment. But the stationery reflected gentility. At least as early as 1900 there was a printed letterhead:

**INDIANA UNIVERSITY**

*Bloomington, Indiana*

Department of Chemistry Robert Edward Lyons
Wylie Hall Louis Sherman Davis
Office: Room 344 Oliver W Brown

Harvey A. Bordner
Leo F. Rettger

Authorization of this may have occurred as early as 1896. In a report by President Swain to the trustees in November that year one of the questions was:

"Should stationery be furnished the departments for University correspondence?"

Secretaries, typewriters, and related resources did not become realities for more than two decades.

**Administrative Actions**

A variety of administrative actions was transacted using the imposing letterheads, but many reports and letters were written to "The President and Board of Trustees" on plain writing paper. For some time Lyons served as president of the University's Hygiene Committee and he was on other committees. This required considerable time on minor matters. For example, one of his handwritten letters to the president in 1900 sets forth the kind of soap to use in mopping, frequency of mopping, how to clean restrooms, etc. Some other topics reported to the president were equally mundane.
There are many letters which Lyons wrote about appointments, salaries, and various expenses in the Department of Chemistry. These were almost invariably to the President and Board of Trustees. An instance of this is the correspondence in summer 1900 concerning the appointment of Mr. Allee for non-skilled work in the department. This was for "the position vacated by Homer Bowles." The salary and hours, by present standards, are almost unbelievable:

"I wish to recommend his appointment ... at $25 per month: work to begin about one week before the opening of the fall term.

"His service during the regular terms will be required daily from 7:30 to 11 a.m. and from 12:30 to 5:30 p.m.; Saturdays about 6-7 hours."

Four years before in the president's November report to the trustees it is apparent that the same service was being given by Homer Bowles at the same salary "to give all his time to keeping the chemical laboratories in order."

That the departmental reports and requests to the president and board covered nearly every detail year after year is illustrated in Lyons' letter on 15 June 1901 in which the first of several items dealt with the appointment of a student "Store-room attendant." He wrote:

"I cannot at present recommend a person for this position. This service has been secured during the past year for $12.50 per month, together with exemption from chemical laboratory fees."

**Fire Damage to Wylie Hall:** While Lyons was beginning to make some progress toward the broadening and strengthening of the department, on 7 February 1900 the upper story of Wylie Hall caught fire, apparently from a laboratory accident. The damage was extensive, thus interfering considerably with work in chemistry and the other departments using that building. A temporary roof was soon installed to permit the continuation of classes. The rebuilding process involved the addition of another story. The losses were estimated at $19,404.40.

Perhaps the damage to the building would have been of no consequence had there been adequate telephone facilities and proper fire regulations. As reported by Dr. Myers (p. 764):

"...there was only one telephone on campus. That was in the office of the President (Maxwell Hall). It was necessary to reach this phone in order to notify the downtown fire department. President Bryan tells the story. His class was in the north end of Kirkwood. He noted the blaze in adjacent Wylie and with Professor Morton rushed to
the President's (Swain) office. But someone had notified the President of the fire, and he had locked his office and gone to investigate. So when Professors Bryan and Morton reached the President's office, they found it locked. But the transom was open. So Professor Morton stood on Bryan's shoulders and was boosted through the high transom and gave the alarm."

Much of the physical loss was covered by insurance. In Dr. Lyons' annual report and requests to the president and board on 4 June 1900 relatively little was included regarding the fire. He simply wrote:

"I have proposed a list of supplies necessary to replace the equipment lost in the fire and to meet the needs of the department for the coming year."

Of course only a moderate portion of the modest stock of chemical supplies and equipment had to be replaced since the fire was confined to the upper story.

Reflective of the manner in which university business was conducted, and the high dependence of this country on foreign sources of chemicals and other laboratory necessities, Lyons wrote:

"Copies of this list (referred to above) have been submitted to five reliable firms for bids to import these supplies, duty free F.O.B. New York."

The report did include the statement that

"...the preparation of the claims for insurance and the list of supplies to replace the loss have made this phase of my duties heavier than usual."

The trustees acted promptly in making corrections for the fire loss and in requesting the General Assembly to respond to the already severe shortage of instructional space. The request was for funding to construct a new science building. The legislative action began in January 1901. In 1902 Science Hall was completed, probably sooner than it would have been had the fire not occurred. Much later the building was named for Professor Ernest H. Lindley.

Owing to the fire and the expectation that the new science building would become a reality, in March 1901 a new plan was submitted by President Swain for distributing space among departments (Clark, p. 294):

Wylie Hall - chemistry, geology, and political science
Owen Hall - Zoology and botany
Kirkwood Hall - English, fine arts, languages, and history
Science - Physics, psychology, mathematics, pedagogy, philosophy,
and the administrative offices.

The plan was adopted, but except for chemistry, the occupancy of Wylie Hall underwent various changes until 1931 when the department acquired a new building which in that year was dedicated almost exclusively for its use. From 1913, when the Department of Home Economics was established, the new department occupied a small portion of Wylie Hall and most of the rest was used by chemistry until it was given new quarters.

PROFESSIONAL ORGANIZATIONS

One of the first organizational developments that linked the Department of Chemistry and other science departments with others nationally was the establishment of a chapter of Sigma Xi on this campus in 1904. As reported in detail in IDS 2 Dec. 1904, there were twelve charter members. The first was W. L. Bryan who had been president of the university two years. Two of the twelve faculty members were from chemistry, Lyons and Brown. The latter had been made a member at Cornell University shortly before and his membership was transferred to this chapter. During the following fifty years the following members of the chemistry faculty became its president: R. E. Lyons ('07), O. W. Brown ('24), F. C. Mathers ('28), H. T. Briscoe ('32), C. E. May ('35), R. J. Hartman ('39), H. G. Day ('46), E. E. Campagne ('52), and V. J. Shiner, Jr. ('82).

THE FIRST WOMAN ON THE CHEMISTRY FACULTY

Soon after the fire in Wylie Hall some effort was made to include physical chemistry in the curriculum. The resulting action included for the first time the appointment of a woman on the chemistry faculty, Mary Bidwell Breed, who also became the first Dean of Women. Notably, she had received all her training elsewhere. After considerable correspondence and at least one conference with her, President Swain appointed Miss Breed in July 1901, but without an academic title. He wrote

"I think it (academic title) will be assistant professor of Chemistry but as I always make it a point to consult the heads of departments in matters of this kind, I thought it best to leave this title until I had had a chance to talk with Dr. Lyons."

The title in chemistry became Assistant Professor.

The catalog for 1902-03 listed for chemistry Lyons, Davis, and Brown as continuing faculty members. The additions listed were Dean
Breed, and two new laboratory assistants, Frederick L. Shinn and S. Sterrett Smith. Peter A. Yoder and Harvey A. Bordner had left.

Three courses were listed for Dean Breed. The first was

“No. 2. ‘General Theoretical and Experimental Chemistry. A beginner's course, designed to acquaint the student with the fundamental principles of chemistry and to give practice in the execution of experiments in general chemistry. Lecture and laboratory work.’ Remsen's College Chemistry was given as the textbook. This course followed No. 1 course in which the same textbook was used. The first course was in the Fall term and No. 2 was in the Winter and Spring terms.”

In addition she had

“No. 23: Selected Chapters in Theoretical Chemistry. For 1902: Atomic theory, the periodic law, and theory of solutions. Lectures.”

The other course, No. 34, was:

“Physical Chemistry. Chemical equilibrium, rate of reaction, electrolytic dissociation. Lectures with collateral reading.”

Thus, like other chemistry faculty, Dean Breed had a heavy load. She graduated from the Pennsylvania College for Women in 1887; received an A.B. from Bryn Mawr in 1894, an A.M. in 1895, and a Ph.D. in 1901. During 1895-96 she held a Bryn Mawr European Fellowship at the University of Heidelberg. She published four research papers as reported by Harding (p. 203):

1. On phenolphthalein and methyl orange as indicators. Journal of Franklin Institute, April 1893.
4. The polybasic acids of mesitylene. Bryn Mawr Monographs, No. 1, 1901.”

There is no indication that after coming to Indiana University she published any other scientific work or that chemistry was more than a secondary interest. She remained a part-time assistant professor until she left. There was no enrollment in her course in physical chemistry when it was first offered.
In 1906 the University of Missouri offered her a much more attractive salary, which she accepted. After a few years there she became Director of Margaret Morrison College at the Carnegie Institute of Technology where she remained until 1929.

Concerning Dean Breed, Clark wrote (p. 320):

"She brought more than a doctor’s degree to the feminine contingent of Indiana University. Her sense of decorum was Eastern and she was strict enough to enforce her code of gentlewomanly behavior. Her first act (with the help of two Christian Associations and others) was to end the era of 'open housing,' that prevailed in some houses with rooms for rent) by decreeing that men and women could live only in separate houses a ruling that placed further strain on an already highly aggravated situation in Bloomington."

He further wrote that

"She broke the traditions of informality in the university and the community by reordering relationships between the sexes."

As shown in the catalog for 1905, Assistant Professor Breed was responsible only for "Selected Chapters in Theoretical Chemistry," and Assistant Professor Brown, for the first time, had responsibility for "Physical Chemistry. Lectures" and "Physical Chemistry. Laboratory Practice." No prerequisites were listed for these courses, or any other courses. This was the beginning of Professor Brown's many years of responsibility for instruction in physical chemistry and it was the last year that Dean Breed had any responsibility for work in chemistry.

Unfortunately for the department Professor Brown's interest was almost entirely in applied chemistry with special applications in electrochemistry, storage batteries, and catalysis in industry. This work and the contacts with the students were valuable, but for about three decades there was no other person to teach and exemplify the basics of physical chemistry.

O L I V E R  W  B R O W N

Professor Oliver W (no period, but inevitably it was used) Brown was born at Vermillion Grove, Illinois in 1873. Having lived longer than any other chemistry faculty member, he died in April 1967 at his home in Bloomington. His youth was spent in traditional Friends surroundings and this was continued at Earlham College where he received a B.S. degree in 1895. He came directly to Indiana University and received an A.M. degree in 1896. The thesis was "Concerning ammonium thiocyanate and its use in the precipitation of arsenic."
The young Brown was then 23 years old and apparently undecided about his future. He was for a short time in 1896-97 a "demonstrator of chemistry" at the Indiana Dental College and then he was a student at the School of Mines in Rolla, Missouri for two terms. Next, from 1897 to 1899, he was a graduate student at Cornell University. It is not known why he did not complete the Ph.D. degree.

On 10 August 1899 Lyons wrote to President Swain to request Brown's appointment as instructor in chemistry. He stated

"The past year he has been a tutor in chemistry at Cornell and has almost completed the work for degree Ph.D. at that institution."

It was stated also,

"He is the best fitted and most desirable man I can find."

Lyons proposed to pay Brown $500 the first year.

Later that year Lyons wrote to the president about Brown and the value that his interest in electrochemistry could have in the department. Lyons stated:

"The new branch of electrochemical analysis and study of electrolytic processes is being developed and encouraged in all prominent universities. I would like to add to our present course some elementary work in this line."

The summer terms of 1902 and 1903 were spent by Brown in electrochemical research at the University of Wisconsin.

At Indiana University he held the rank of instructor until 1904 when he became assistant professor. He was associate professor from 1906 to 1921 and then professor until 1943 when he retired and became Professor Emeritus. He received an honorary Sc.D. degree from Huntington College in 1941. The degree seemed to make little difference in his life, but for many years it was generally assumed that he had a doctoral degree.

While he was an instructor Prof. Brown initiated thinking and action that led to a few electrochemical patents. The first was a metallurgical process for smelting zinc. A student, William F. Oesterle, '03, came to the university with a background of experience in a zinc works partially owned by his father. Working with Prof. Brown the two developed an electrochemical method for the separation of zinc from suitable ore. It seemed to be decidedly superior to the roasting process commonly used at that time. The U.S. patent (742,830) was granted to Prof. Brown and Mr. Oesterle in 1903. After it was issued the Indiana
Daily Student (18 November 1903) in a major story elaborately reported that the process would "Revolutionize Zinc Industry," and in a sub-headline it stated that "By Invention of Labor-Saving Electric Furnace for Reduction of Zinc Ore, Indiana Men Solve Problem that has Baffled Metallurgists for Nearly Half a Century." The paper reported that the two were planning in the following year to establish a plant that would use the process. The predicted revolution did not occur and the plant was not built, but the invention moved the industry forward. This was the first patented invention in the department.

There were to be four additional patents issued to Prof. Brown, each with a student. The second, in 1913, was on the production of lead oxides (1,072,205). The student was A. R. Nees. The third, in 1923, was on the manufacture of azoxy and related compounds (1,451,489). The fourth, in 1925, was on battery separators (1,540,532). The student on these two was C. O. Henke. The last patent issued was in 1942 (2,233,281) and the student was J. H. Patterson. It was on the paste for negative plates in storage batteries.

At the time the first patent was issued Brown had temporarily left the university and was engaged in graduate work at the University of Wisconsin. On 25 January 1904 the IDS again had a major article on the patent. It announced that the Wisconsin student paper, the Daily Cardinal, had recently recognized the development. The Wisconsin newspaper was quoted as stating in part:

"It is gratifying to learn that once again an important contribution has been made to science by some one connected with the engineering department of our own university. Prof. O. W. Brown formerly of the Indiana state university now taking graduate work in the electrochemistry (sic) at this institution, has just taken out a patent on an improved process for extracting zinc from sulphite ores...."

While he was at Wisconsin Brown naturally became acquainted with various faculty members. These included L. A. Kahlenberg and C. F. Burgess, both of whom were to have links with Indiana University. His principal work at Wisconsin was done under the direction of Dr. Burgess, who was to direct the graduate work of Mr. Paul Isobe, a graduate at I.U. in 1909. Prof. Brown influenced Mr. Isobe to study under Dr. Burgess.

Nearly all the research and the publications of Brown were on various aspects of storage batteries, catalytic activity of various preparations in vapor-phase oxidation and reduction, and the electrolytic preparation of several aromatic compounds. Every publication except his first two, in 1895 and in 1897, was with one or two students. A large proportion were in the Journal of Physical Chemistry. Several were in the
Transactions of the American Chemical Society. Two were in the Proceedings of the Indiana Academy of Science. The last known publication was in 1952. Approximately 60 were in research journals. In addition to the patents, there were a few mimeographed laboratory manuals.

The first student to receive a Ph.D. degree in chemistry, L. L. Carrick, did his work under the direction of Brown. It was granted in 1921. The second, third, and fourth recipients of this degree were Clyde O. Henke (1922), Frederic O. Madenwald (1923), and Julius (John) C. Warner (1923). Brown also directed the work of these three.

In 1908 Brown married Alice Saveland. For many years they lived in a non-pretentious one-story house at 526 North Washington Street in Bloomington. Prof. Brown continued to live there after Mrs. Brown died in 1949. There were a daughter, Alice (Mrs. William J. Pawelec), and two sons. One of the sons, Oliver, was a minister. The other son, Edward, operated a highly reputable Shropshire sheep and Shorthorn cattle farm just west of Plainfield, Indiana. It was under the title “O. W. Brown & Son.” This son and the daughter received degrees in chemistry at this university.

His manner of living was beautifully simplistic and in accordance with the doctrines and practices of the Friends in which he believed and had been nurtured. He rarely took any meals away from home and his meals were simple and well balanced in accordance with his strong convictions on what he needed to maintain good health. He believed he was a borderline diabetic and that his regimen made it unnecessary to rely on the administration of insulin.

Prof. Brown’s continuing interests were both industrial and academic. For a brief time (1896-97) he was a chemist at the J. N. Hurty Laboratories in Indianapolis and later briefly an electrochemist at the Muncie Pulp Company in Indiana. Aside from his appointment as a faculty member at Indiana University, for a few years he was concurrently vice president and general manager of the small Brown-Smith Battery Company in Bloomington. From 1915 to 1917 he had a leave of absence and during the time he was Chief Storage Battery Engineer for the Prest-O-Lite Company in Indianapolis. As reported in the Indiana Alumni Quarterly in 1916 under the heading for the class of 1896, “He has engineering and chemical control of a new storage battery plant in Indianapolis.” In a report in 1926 the Quarterly stated that the patented process by Brown and C. O. Henke in 1923 for the manufacture of azo compounds was being developed by the Newport Company of Milwaukee. It included the information that Henke, then on the chemistry faculty, had taken a leave of absence for 1925-26 and was employed by the company to work on the process.
Even after his retirement Brown was a consultant for the Calco Chemical Division of the American Cyanamid Company, from 1943 to 1951.

Prof. Brown had at least ten research publications and three patents on batteries. The early phases of the industrial aspects were reported in the *Indiana Daily Student* on 17 May 1907:

“At 415 East Seventh Street, Dr. O. W. Brown .... and Mr. Hanson are equipping an experimental laboratory for research work in practical industrial problems. The plant was previously located in Milwaukee, but was moved here to be under the direct supervision of Prof. Brown, one of the foremost electrochemists in America.”

Over a year later the operation had become Brown & Smith’s Storage Battery Factory. As stated at length in the IDS on 16 November 1908:

“The article pointed out that Brown had arranged for students to have opportunity to carry out experiments in the factory as well as in “the excellent facilities offered in the University.”

Prof. Brown was probably better known professionally for his research, teaching, and industrial contributions in storage batteries than anything else. His interests and attitudes ranged from the rather open academic pursuits to the strongly competitive behavior of an inventor. When the latter prevailed he tended to exhibit some of the elements of a sharp but ethical Yankee trader. His last student assistant shortly before he died, Bliss S. Phillips, wrote knowingly about this and other features of Prof. Brown’s life and work. Concerning the Brown-Smith Battery Company and its eventual sale, Phillips stated:

“...A competing company requested permission to tour Dr. Brown’s company but was actually spying to learn how he made his battery plates. Dr. Brown became aware of this along with the fact that the man coming was also promoting the theory that Brown’s secret of excellent plate formation involved talcum powder. Therefore, on the day of the visit, Dr. Brown instructed his men to spread talcum powder around the plate formation room in great abundance. Subsequently the plate formation room was left to the end of the tour and upon entering this area, the visitor let out a shout of triumph. Some months later, Dr. Brown learned that the visiting company had spent the intervening time trying to relate talcum powder to
plate formation. They ended up buying his company primarily for this and other technology that Dr. Brown pioneered."

Another anecdote concerns the competition between Brown and his younger colleague Mathers for graduate students. Phillips recorded that Brown did not seem to take offense at Mathers’ actions to keep desired students. The line was that Brown used so much lead in different ways in the storage battery work the students working with him could become victims of lead poisoning. It is not known that any students were dissuaded by this action. In retrospect both professors and their students handled some laboratory equipment and chemicals so casually it is remarkable that serious injuries apparently never occurred in either group over the years.

Through Brown’s planning and with Lyons’ support the old power house, on a site now occupied by the South East portion of the Memorial Union, was made available to the Department of Chemistry after the new power house had been finished. (That structure has now been removed.) This was to provide more opportunity for work on storage batteries as well as various other aspects of electrochemistry and related studies. The IDS on 20 November 1907 wrote in part:

“New electric and gas engines, rock breakers, grinders, and various other machines known only to chemists, physicists, and engineers, are rapidly being installed in the new ‘Electro-Metallurgical’ laboratory, which is located in the old power house. The present equipment includes coke and gasoline furnaces, and other apparatus, which are used for the quantitative determination of gold and silver in ores.”

Nineteen years later, in 1926, the IDS wrote about an arc furnace on the site which could reach 3000C. A purpose was the “fusing of magnesium oxide for crucible linings and to develop abrasive compounds with the idea of using them in alloys.” At that time the university generated the electricity used on campus. When the furnace was being operated the voltage on campus was seriously affected. Such instability continued until the late 1940s when a change was made to the public source of electric power. At least as early as 1929 serious consideration was given to the use of this far more dependable source. The change was precipitated by a fire in the power house that caused serious damage (IDS 8 Oct. 1929).

Some of these facilities were to be used by Lyons and Mathers until the Chemistry building became available in 1931.
OUTSIDE LECTURERS IN CHEMISTRY

The need to bring stimulating authorities to the campus for interaction with students and faculty was felt for several decades in the nineteenth century, but the lecturing was largely in the college chapel program. This was referred to frequently in Wylie's diaries. Note of the importance of special lectures was included in President Swain's recommendations to the trustees in November 1896. He wanted authorization of money to bring "a man of highest standing in his line to give a series of lectures to the students." It was to be nine years before this would directly affect chemistry.

The year 1905 marks the first time that the Department of Chemistry had lectures by visiting specialists in chemistry. They were C. F. Burgess and Lewis Kahlenberg, both professors of chemistry at the University of Wisconsin. It is notable that both were here in the same week. Burgess returned for a lecture two years later. Brown was clearly influential in getting both to come here. He had studied under Burgess and they kept in touch with each other for many years.

On 17 April 1905 the IDS reported that

"The Chemistry department was honored this morning by a visit of Professor Burgess, professor of Applied Electro Chemistry, at the University of Wisconsin. His topic was 'Electrolitic Iron.'"

Dr. Kahlenberg had returned from Germany in 1895, the same year that Lyons returned. He was one year younger and he had that year received the Ph.D. degree summa cum laude at Leipzig, his principal professor being W. Ostwald. He was enthusiastic for the new physical chemistry he had studied. Probably his feelings were analogous to those of Lyons who was enthusiastic about the rapid developments in organic chemistry and bacteriology. Dr. Kahlenberg was promoted to professor in 1900; Lyons, at a less developed institution, became the head of his department. Kahlenberg was to have this role at Wisconsin from 1907 to 1919. His primary research was on solutions. This soon led him to doubt the Arrhenius theory of ionization. Quickly he became noted for his vigorous opposition and his failure to recognize the importance of new developments on the interpretation of the theory. Gradually he became separated from the main stream of chemistry. In addition when World War I occurred he was so critical of his country's position that this factor and his loss of standing in physical chemistry caused him to be separated from positions of significant responsibility in his department. However he was definitely a pioneer in American physical chemistry. When he visited here in 1905 he was a dramatic lecturer and he had scientific esteem. In contrast with the extensive public attention given to
Kahlenberg that year there was little attention given to the substance of
lectures by visiting scientists in the latter part of the twentieth century.
When Burgess and Kahlenberg spoke early the IDS gave extended and
exaggerated coverage of their addresses. For example, on 18 April 1905
the IDS reported that the next day Prof. Kahlenberg

"...will deliver the chapel address Thursday on the subject 'The
importance of original investigation in State Universities.' Prof. Kah­
lenberg is one of the best known workers and teachers in this line
of Chemistry in this country or in Europe, and besides this is a very
interesting lecturer."

The evening of that day, as reported by the IDS, the lecture would
be "of interest to scientific students." The subject was "The Objects and
Aims of Modern Physical Chemistry." This was to be followed the next
morning with a lecture on "The Present Status of the Theory of Solu­
tions."

On 20 April in the IDS extensive coverage was given to the chapel
lecture stating:

"Prof. Kahlenberg .... delivered one of the most interesting and sound
lectures of the year in the chapel this morning. He was given a hearty
reception by the student body who recognized in him one of the
great scientists of the country."

The coverage provided direct quotes from Prof. Kahlenberg, in­
cluding:

"One of the great principals (sic) of America is that the necessity of
public education is the fundamental essential to the welfare of our
government. The middle west and the northwest portions of the
United States contain the typical State Universities. Twenty years
ago the schools were necessarily in an elementary condition, but
they have sufficiently broadened since, to enable us to lend ourselves
to personal investigation in matters of education. One time, the
student simply completed four years of prescribed study, and then,
with his diploma, went out into the world. Now, however, the course
is not merely prescribed, but largely through original investigation
it has become elective.

"What is original investigation? The essence of original investiga­
tion, was always creative effort. I do not speak merely from the
natural scientist's side; we may have personal investigation in any
line, the fine arts, language and literature.

"You may ask, Is it right to use the State's money for such purposes?
The state is not interested in the education of Mr. A merely for the
personal benefit to Mr. A. It does not educate doctors, lawyers, engineers, etc. for the sole benefit of those particular individuals; the State is benefited as a whole by those people. The advancement of any one science, literature and fine arts, is a help to the State as a whole."

The extensive coverage of Dr. Kahlenberg by the IDS continued for the third time in the same week. On 21 April it reported in some detail on his address concerning "The Theory of Solutions." It stated, with novice-like elaboration that

"...his lecture last evening consisted mainly of drawings to illustrate and explain his views of solutions and chemical compounds."

The article lavishly concluded that

"Prof. Kahlenberg's valuable contributions in this field of science place him in a position where few men stand today."

Two years later Dr. Burgess returned to lecture on "Some Electric Furnace Achievements." This time he was President of the American Electrochemical Society and head of the Department of Chemical Engineering at Wisconsin. F. C. Mathers was about to finish his doctoral degree at Cornell University and become a faculty member at IU. Thirty three years later he also was President of the American Electrochemical Society. The IDS, 23 May 1907, wrote concerning Burgess:

"The coming of Professor Burgess at this time is opportune inasmuch as a sum of money was set aside by the Board of Trustees at its last meeting, for the purchase and installation of additional electrochemical and metallurgic apparatus in the old power house."

Two days later the IDS reported that Burgess gave two lectures. One was on "Electric Furnace Achievements" and the other was on "Some Iron Corrosion Phenomena." They were under the auspices of the Indiana section of the American Chemical Society. This month the ACS section held its regular meeting on this campus. The IDS stated "Several out-of-State guests were present, among them the heads of the chemistry departments in different state schools." These included P. N. Evans, Purdue; R. B. Moore, Butler; H. B. Blanchard, DePauw; John White, Rose Polytechnic; and J. F. Garner, Wabash.

Such activities and the attention given to them on campus are evidence that chemistry was attracting the interests of many. The concepts, although much focused on applied chemistry, were broadening.
CHEMISTRY AT I.U. AS REFLECTED IN THE CATALOGS

The catalogs and bulletins in the first years of the new century reflected the focus of the chemistry faculty and the efforts to attract the favorable attention of students. The Bulletin on May 1904 listed the faculty as follows: Robert E. Lyons, Professor; Louis S. Davis, Associate Professor; Mary B. Breed, Assistant Professor; Oliver W Brown, Assistant Professor (on leave until August 1904), and Frank C. Mathers, Instructor. In 1903-04 the assistants were: B. E. Curry, F. C. Krauskopp, C. F. Bicknell, C. E. May, G. A. Roush, and H. Ratcliff. For 1905 there were no changes in the faculty except that O. W Brown had ended his leave. Even seven years later the faculty members were the same except that Dean Breed had left, and F. C. Mathers and C. E. May had become regular faculty members. Davis had become Professor and Brown, Mathers, and May had each become Associate Professor.

In 1904 there was still a great excess of courses as measured against the needs of students, but the number had decreased by 1912. The courses that had been eliminated included all the offerings in Bacteriology and in Toxicology, and the individual courses in Dietetics, Chemistry of Foods, Methods of Teaching Elementary Chemistry, History of Chemistry, Selected Chapters in Theoretical Chemistry, and Elementary Sanitation. The added courses in 1912 were Chemical Engineering, Storage Batteries, Gas and Fuel Analysis, and Spectrum Analysis and Sugar Analysis.

The catalog for 1905, for the first time, displayed ten figures illustrating various features of equipment and laboratory facilities including a “Rotating Cathode, for rapid Quantitative Analysis by Electrolysis” and “Iodoform From Acetone by Electrolysis, using Two Cathodes and a Rotating Anode.” There were two figures on bacteriology. The emphasis was on electrochemistry. By the time the 1912 catalog had appeared there were no references to bacteriology.

The 1905 catalog was issued ten years after Dr. Lyons had been made head of the department. The purposes of the department were reviewed more extensively than in any previous issue. By this time much more attention was being given to organic, inorganic, and physical chemistry. It was stated that

“Special attention has been given, in the past nine years to organic, physiological, bacteriological, electro- and technical-analytical chemistry, and toxicology; arrangements have now been completed for the expansion of the courses in physical and advanced inorganic chemistry.”

Also for the first time, in the catalog there was significant encouragement of research work, with the meritorious and well-developed stud-
ies being "published in various chemical journals, as contributions from the Chemical Department of Indiana University." It was stated that 14 such articles had been published and one patent had been issued. The latter was granted to O. W Brown and W. F. Oesterle as described earlier.

During the ten year period 97 A.B. degrees in chemistry had been conferred. Only three were to women. Forty-four "have pursued or are pursuing the study of medicine. At least 27 of the others had gone on for graduate work in chemistry. Thirteen of the 27 had remained at I.U. for the AM degree in Chemistry."

By present standards virtually all the latter should have broadened their preparation by going elsewhere.

Between 1904 and 1912 not much change was evident in many of the courses as indicated by the descriptions in the catalogs, but physical chemistry and "Advanced Inorganic Chemistry" were exceptions. In 1904 the descriptions were very brief and without much meaning. However in 1912 for physical chemistry it was stated to be:

"A general course, including a critical study of the atomic and molecular hypotheses, the theories of solution, the phase rule, the mass laws, thermal chemistry, the relations between the properties of compounds and their chemical constitution, etc. Lectures and recitations."

The course was given two days per week in the Fall and Winter terms and in the first half of the Summer term. It was open to students who had completed one year of chemistry and the first course in physics. Prof. Brown was responsible for it and several other courses.

The course "Advanced Inorganic Chemistry" had become fairly stabilized under Mathers, who returned to the university in 1907. It was stated to be

"Lectures, recitations, and reports. The aim of this course is to cover thoroughly the field in Inorganic Chemistry. Special attention is given to the rare and uncommon elements and to the relation of the properties of the elements within the different groups of the periodic system."

It was offered two days per week during the three terms and it was repeated in the second half of the Summer term.

The catalog for 1912 also listed a large number of graduate courses in chemistry. The Graduate School had been organized and adopted in 1904. The Department of Chemistry was neither staffed nor equipped for such work but it was necessary to make a beginning. It was to be
seventeen years (1921) before the first doctorate in chemistry would be awarded, but as early as 1912 the catalog referred to "The graduate work of the Department, leading to the degree A.M. and Ph.D."

RECORDED STUDENT GRADES AND FACULTY COMMENTS

The bound grade record books and other files concerning the examination of students in chemistry courses during the first few decades in this century reveal a considerable amount about the teaching of chemistry and the attitudes of the faculty concerning the students and the courses. The records are hand-written in fine, clear penmanship. Teaching fellows had responsibility for assigning grades in the courses for which they were responsible; thus some of the entries were made by such teachers. Most of the reports are by faculty members.

Not until 1908 were letter grades used. Prior to that time the University's symbols for performance were: "X" - passed; "=" - conditioned; "-" - failed; "Inc" - incomplete; and "def" - deferred. Besides the symbols, in many cases there were written comments such as "very good" or "excellent" and a few were marked "fair" or "poor." In some cases the comment was "just passable."

The following are some of the unusual comments included in the reports between 1908 and 1915:

- Industrious but not successful
- Hot weather too much for him (Grade D+)
- Night clerk at Tourner Hotel and sleepy all day
- Disappeared about Oct. 29. Reappeared for final examination Jan. 25
- Small pox
- Does not try
- Bolted final exam; thoroughly dishonest
- Looking for a chataqua(sic) course
- Does not try
- Capable - too much outside work
- Too old
- Sick, died Typh (sic) April 1914
- Credit for 4 1/2 hours only (on a 5 hr. course)
- Grade withheld Deferred because in opinion of the department requirement in Ch 27 has not been completed. Point not sustained by Dr. M. & Dr. E. Nov. 15, 1915 (Five persons were in the course and this was applicable to all.)

There were some predictable differences between faculty members in the nature of the comments but the variance between faculty members in the distribution of grades seemed to be small.
The effects of World War I on enrollments, dislocation of students, and relationships between the students and faculty are notable in the grade records of all courses in chemistry.

The university changed from the trimester plan to a semester plan in 1915-16. In 1917-18, because of the war, a third semester was added.

In the report for the last semester of 1916-17, which ended approximately two months after this country entered the war, it was noted that many students had withdrawn for military reasons. In general they were given reduced credit, such as 4 credits for a 5 credit course. The reports for all of 1917-18 showed the marked effects of the war. This is illustrated by the record for Mathers' section of General Inorganic Chemistry in the first semester. The enrollment was 69, but 14 withdrew, 17 "disappeared," and 13 failed the course.

On the grade report for May's course in Elementary Organic given in the first semester of 1918-19 there were many withdrawals. He wrote on the report,

"All withdrawals were on account of the desire of the student (sic) to go to an officer's Training Camp."

Within the second decade of the century, including the war years, grading was pretty rigorous, but apparently leniency occurred before that time. For example, in none of the three terms in 1903-04 were there any recorded failures. Nine students received "Conditioned" and the decision on 53 was "Deferred." The total enrollment in the three terms was 464 (164, 103, 197). In the first year, 1908, that letter grades were given "def" was used extensively. The reports show that the beginning chemistry course was repeated in many cases a second and even a third time before passing. The number of "D" grades was large, as much as 25 percent of those enrolled.

**APPOINTMENT OF OTHER CHEMISTRY FACULTY MEMBERS**

During the first 20 years of this century the only chemistry faculty members appointed with full time responsibilities for more than a year were Mathers and May. L. S. Davis and O. W Brown were appointed by Lyons late in the last century. The only other faculty member with a doctorate degree appointed in this portion of the century was Mary B. Breed. She shared her time between chemistry and in serving as Dean of Women. As recorded by Lyons in his brief *History of Chemistry at Indiana University*, during the first 25 years of this century there were 12 graduate students who also taught as follows:

Frederick L. Shinn, A.B., 1901; A.M., 1902; Assistant Professor, February to June, 1906
Clyde O. Henke, A.B., 1919; A.M., 1920; Ph.D., 1922; Instructor, 1920-1923; Assistant Professor, 1923-1926.
Herman T. Briscoe, A.B., 1917; A.M., 1923; Ph.D., 1924; Instructor, 1922-1924; Assistant Professor, 1924-1926; Associate Professor, 1926-1928; Professor from 1928-; Faculty Advisor of Pre-dental students from 1928-. (See a subsequent chapter on Briscoe.)
Lee T. Smith, A.B., 1918; A.M., 1919; Ph.D., 1925; Part-time Instructor, 1923-1925.
June Ossenberg, A.B., 1922; Part-time Instructor, February to June, 1923.
Lionel E. Fox, A.B., 1917 (Ohio); A.M., 1924; Part-time Instructor, 1924-1925.

Thus, for a long time there was extremely little turnover in the regular chemistry faculty and all were graduates of this department. By far the most important were Brown, Mathers, May, and Briscoe. Davis had far less positive influence on chemistry, which will be discussed later. He left the department in 1927.

FRANK C. MATHERS

Dr. Mathers, like most of the other chemistry faculty members before the 1940s, was a native Hoosier. Indeed his birthplace was four miles south of Bloomington and it was in a one-room log house. A biography of this unusual man was prepared by Harry G. Day in 1984.

The young Mathers enrolled in the university as a freshman in 1899, the year that Earl Blough graduated. Mathers was to follow Blough’s ascending career in industry with increasing admiration. While he was a student at Bloomington High School the young student had bought a used copy of Remsen’s widely studied book on general chemistry. This probably influenced him to make chemistry his life’s work. He received his A.B. degree in 1903 and the A.M. in 1905. In the catalog for 1904 he was listed as an instructor. Six students, including Clarence E. May, were identified as assistants. Amazingly that year Mathers had full responsibility for

“Electro-Chemistry. Lectures and laboratory”
“Assaying. Lectures and laboratory work”
“Electro-Chemistry, Advanced course. Laboratory work.”
“Physical Chemistry. Laboratory work”
“General Physical Chemistry. Lectures and recitations”
“Seminary in Electro-Chemistry and Applied Physical Chemistry”
Besides all of this he helped Lyons give courses numbers 4, 5, 12, and 15. These were first and second terms of quantitative analysis, a course of quantitative analysis for medical students, and a quantitative analysis course providing “Advanced laboratory practice in technical and engineering analysis.” During 1903-04 Brown was on leave at the University of Wisconsin, thus accounting for the extraordinary level of instructor Mathers’ responsibility while he was working toward the master’s degree.
A leave of absence was granted to Instructor Mathers to work toward his Ph.D. degree at Cornell University. Even during the time required, 1905 to 1907, he taught at I.U. during a portion of the summer of 1906. Concerning the appointment of Mathers and Brown, Prof. Lyons wrote recommendations to the President in longhand on 1 April 1906:

1. Oliver W. Brown, now instructor in the department of chemical engineering, University of Wisconsin, be invited to return to Indiana University as associate professor of chemistry at a salary of $1500.
2. ...
3. That Frank C. Mathers, A.M. Instructor of Chemistry - on leave at Cornell University - be engaged to take charge of the chemical work during the second half of the summer at a salary of $150.

This appointment gave the young Mathers opportunity to spend a few weeks at home and earn a little money in the midst of his graduate program.
A fairly typical news item of the day was an article on 5 May 1906 reporting “Much Excitement Caused by Fire in Wylie Hall.” The story stated that:

“The blaze was found in Wylie at 1:30 this morning by the night watchman. He turned in the alarm, the firemen responded with their usual alertness, and in a few minutes the blaze was under control.”

The article made the incident even more familiar in stating:

“The fire started (not as was reported this morning, from an explosion) but from the burner of a fat-extracting apparatus in room 15, in the basement. It is often necessary to leave this apparatus running all night and it is thought the rubber tubing which carried the gas to the burner must have slipped from the connection, the gas becoming ignited from the burner. The tube then fell against a
pine chemical case which was in flames when the watchman appeared."

Fortunately Wylie Hall was insured for $7500 and the fixtures were insured for an equal amount. Rubber tubing connections, whether for gas or water, have never ceased to be sources of danger. Fortunately this fire in Wylie Hall was much less destructive than the one six years before.

**PLACEMENTS AND RECOGNITIONS OF CHEMISTRY GRADUATES**

Dr. Lyons tried to improve the well being of the individuals as well as the department. For example, on 8 June 1906 the IDS had an article entitled "Indiana’s graduate students pushing to the front." Under chemistry the following placements were listed:

- F. L. Shinn, '01, AM'02, spent half a year at Yale and was Scholar and instructor at the University of Wisconsin. Recently he received his Ph.D. in Physical Chemistry.
- J. T. Wilson, '03, has done graduate work at the University of Wisconsin.
- W. J. Huddle, AM'03, Assistant in Chemistry at the University of Wisconsin, '04, is now chief chemist of the Gas Department of Westinghouse Co., Pittsburg, PA.
- B. E. Curry, '04, assistant in Indiana, has been a graduate student since 1903 in Cornell.
- S. G. Engle, '04, graduate student in Electro Chemistry in the University of Wisconsin in 1907.
- F. C. Krauskopf, '04, has been assistant in Analytical Chemistry and advanced student in Cornell University.
- C. E. May, '04, AM'05, instructor in Organic and Physiological Chemistry at Indiana will go next year to Columbia to do graduate work.
- Heikichi Yoshisaka, '04, AM'05, is a graduate student in the University of Wisconsin.
- F. C. Mathers, '03, AM'04, who was instructor in Indiana since 1904 is now absent on leave to do graduate work in Physical Chemistry at Cornell where he holds a Fellowship.
- Fred Shetterly, '06, Assistant in Qualitative Analysis, has a teaching scholarship in Chemistry at Cornell 1907.

It is also revealing that on 17 May 1906 the IDS reported the listing of Prof. Lyons in the first issue of a biographical directory of *American Men of Science* (now Men and Women) published by J. McKeen Cattell. About 4000 names were listed.
Placement and recognition of chemistry graduates became a tradition and it has prevailed throughout the years. Reflecting the early days of the tradition and the concept of the working tools of chemists at that time, the report of the IDS was followed on 23 February 1907 by a more extensive report on the placement of graduates between 1895 and 1905. It was boldly headed "Indiana's Many Chemists Wield Mortar and Pestle Everywhere." The full article follows:

"In perhaps no other department of the University, do the practical results show so well, as in that of Chemistry. This course was started about 1870, and though its graduates were at first few in number, as time passed they increased, and today no department is prouder of the successful men and women it has given to the country. It is a noticeable fact that over one-half of the Chemistry graduates have gone into the practice of medicine, but those who stayed with the profession, rank high in merit.

"This course opens a wide field to its graduates, and from the list of positions now held by former Indiana students, it can be seen how they rank in the profession.

F. D. Simons, '95, is the assistant chemist of the United States Treasury Department.
L. F. Rettger, AB'96, AM'97, is the acting head of the Department of Bacteriology and Hygiene of the Sheffield Scientific School of Yale.
P. A. Yoder, AB'94, AM'96, is chief chemist in the Federal Agriculture Experiment Station at Logan, Utah.
H. G. Reddick, AB'97, AM'98, is the chemist of the Illinois Steel Company in Milwaukee.
O. F. Schultz, after graduating in '97, went to Johns Hopkins University. He is now assistant professor of Pathology in the Western Reserve Medical, Cleveland.
G. C. Bush, AB'98, AM'99, is professor of Chemistry at the State Normal College, Los Angeles.
B. F. Zimmerman, AB'98, is professor of Theory and Practice of Medicine in the Louisville Medical College.
J. W. Sheppard, AB'97, AM'98, is Professor of Chemistry in the Chicago Normal School.
Earl Blough, '99, is alloy chemist of the Pittsburg Reduction Co.
O. Curtis Martin, '99, is assistant superintendent of the Globe Smelting Works, Denver, Colo.
E. M. Bruce, '99, is Professor of Chemistry at the State Normal at Terre Haute.
A. A. Charles, 1900, is the examiner of the Electro-Chemical Division, United States Patent Office, Washington, D.C.
F. N. Duncan, AB 1900, AM'01, is Professor of Chemistry at Emory College, Oxford, Georgia.
W. J. Huddle, AB'01, AM'03, was chemist of the Weston Gas Company of Fort Wayne, but is now Instructor of Chemistry of the Oregon State University, Eugene, Oregon.

F. L. Shinn, AB'01, AM'02, is instructor of Physical Chemistry in the University of Wisconsin.

W. C. Sparks, '01, is assistant Chief Engineer of the Union Traction Co.

H. P. Holman, '03, is the chemist of the Consolidated Gas Co., St. Louis, Mo.

W. F. Oesterle, '03, is the chemist of the Mineral Point Zinc Co., Mineral Point, Wisconsin.

B. E. Curry, '04, is research chemist of the W. O. Atwater Food Laboratory, Durham, N.H.

G. A. Roush, '05, is chemist for the National Carbon Company of Cleveland, Ohio.

H. B. Wilson, Jr., '05, is chemist for the Copper Cliff Copper Co., of Ontario.

F. F. Shetterley is a scholarship graduate student and assistant in analytical chemistry at Cornell.

F. C. Mathers, AM'05, is an instructor in Chemistry and holds the Fellowship in Chemistry at Cornell for this year.

C. E. May, AM'05, is an instructor in Chemistry and is doing graduate work in organic and physiological chemistry at Columbia.

E. S. Shepard, ex-'02, is Research Chemist of the U.S. Geological Survey, Washington, D. C.

Notably the list of 25 graduates "who stayed with the profession" included three of the six who would receive honorary doctoral degrees from the university when the Chemistry building was dedicated in 1931. These were L. F. Rettger, E. Blough, and O. C. Martin. Each merited high acclaim. Two others, Mathers and May, were to be members of the chemistry faculty all of their professional lives. It is noteworthy that during these years and for another decade or so two of the most desired universities for graduate work in chemistry, by I.U. graduates, were Cornell and Wisconsin. But characteristically for the department the chemistry faculty and assistants were all graduates of this university.

Periodically placement reports appeared in the IDS. The issue of 29 January 1909 stated:

"Earl Hamilton '10, leaves today for Buffalo, N.Y. where he has accepted a position in the control laboratory of the National Battery Company. C. C. Carpenter, '05, has been the head chemist with this firm for several years. J. W. Meader, '10, has accepted a position as Assistant Chemist with the Eli Lily Drug Co. (sic) at Indianapolis."
Three years later the nearly annual IDS listing of placements included an article on 26 April 1912 headlining appointments at Cornell University. It noted that

"Ira Lee, who took his A.M. here last year, has received an appointment as assistant chemist at Cornell."

The IDS then added

"Students chosen for the position are considered extremely fortunate for they invariably receive fine positions later. For the last few years Cornell has been selecting most of her assistants in this department from Indiana."

Perhaps to document this assertion, the IDS listed I.U. graduates who had "completed the work at Cornell" and had received other positions. They were:

B. E. Curry, '04, chief chemist at New Hampshire Experiment Station
F. C. Krauskoff, '04, professor of analytical chemistry at University of Wisconsin
F. C. Mathers, '03, assistant professor of chemistry at Indiana University
F. F. Shetterly, '06, chemist for a mining company in Mexico
Major Holmes, '08, research chemist at the National Carbon Company, Cleveland, Ohio

The article (26 April 1912) named F. E. Rice, '09, and O. R. Overman, '10, who were then assistants at Cornell.

Eighteen days later the IDS listed 12 seniors who were to receive A.M. degrees in chemistry at I.U. in 1912 and it named five and their placement positions.

L. S. Davis: A CASE STUDY OF ONE FACULTY MEMBER

Of course the strength of the department depended on the faculty. Throughout the long tenure of Dr. Lyons the number of faculty members was always too small and the quality varied from very good to marginal if not inadequate. The most doubtful member as determined from a review of records, was Louis Sherman Davis. It must be concluded that Davis' contributions in sound teaching and research were insignificant and the nature of his extensive participation in community level lecturing on various popular topics neither enhanced the image of the department
nor contributed much to sound education of the public. A review of the record is instructive.

Davis, like Mathers and May, was born in Monroe County, Indiana (in 1865) and, like both, he graduated from Bloomington High School. His A.B. and A.M. degrees were from Indiana University in 1891 and 1892 respectively. From 1892 to 1895 he was listed as Instructor of Chemistry, but during most of that time he was absent on leave. He earned his Ph.D. degree in 1896 at the University of Marburg, Germany. From 1895 to 1905 he was Associate Professor, then from 1905 to 1908 he was designated Junior Professor. From 1908 to 1927 he was Professor. He then was transferred to the new School of Dentistry and was designated “Director of Nutritional Research.” Under serious questioning regarding his value to the School and the University, he resigned in 1930. For a short time he was professor of chemistry at Georgetown University but he retired owing to ill health. He died in Indianapolis in 1940.

Much of the time Davis had responsibility for teaching qualitative analysis and occasionally for general chemistry. There was scarcely any reference to responsibility for advanced work. The catalog for 1912 listed graduate courses in chemistry. Much responsibility was given to Lyons, Brown, Mathers, and May, but the only reference to Davis was “Research: Chemistry of the Alkaloids.” Generally he did not teach in the summer terms. Until he was transferred to the School of Dentistry he was assigned to chemistry courses for students in Home Economics and the prenursing courses. During his earlier years in the department he was scheduled for several elective courses including Toxicology and Advanced Toxicology, Dietetics, Chemistry of Foods, Methods of Teaching Elementary Chemistry, and History of Chemistry. When the Department of Home Economics was started in 1913 most of these courses were discontinued in Chemistry.

The record is unclear regarding the quality of Dr. Davis’ teaching. Because he was promoted to Professor, in 1908, that must be regarded as convincing evidence to the university administration that his reputation in teaching was good since there was no significant productivity in research. A measure of his performance is shown in the report of an interview with him and reported in the IDS on 1 April 1915.

“The best class in twenty-five years, said Dr. L. S. Davis in speaking of his freshman chemistry class in qualitative analysis for the last term. According to Dr. Davis the class made a remarkable record both as to the small number of failures and the large number of high grades on the final examinations. Of the 168 students taking the course there were about twenty percent who received conditions or failures. The proportion of “flunks” usually runs much higher.”
The proportion of conditions or failures in the class, by the standards in other courses at that time, does not suggest that he was an "easy grader."

For some time Davis had responsibility for teaching the evening course in Hygiene, which was required of all students in the university. This assignment and the frequency of his lecturing to organizations and other groups, especially in Indiana, suggests that he was at least a satisfying speaker and his topics had widespread appeal. For example in the IDS on 21 April 1915 there was extensive coverage of the lecture he gave that week on "Nostrums and Patent Medicines." As reported, the lecture was comprehensive, sound, and timely. It must have made a favorable impression on many.

More than a year earlier the IDS (18 November 1913) reported in advance the topics he would cover in lecturing on "Nostrums." These included: cough remedies, complexion powders, blood purifiers, consumption cures, and prevalence of drug habit. It stated that "his lecture last year on the subject was one of the best."

In Harding’s listing of publications (1904) up to 1904 only one of the five articles by Davis was on research. It concerned alkaloids of certain seeds. The publication, from his Ph.D. dissertation, was in "Archiv. d. Pharm. pp. 85, 1897." The other four were privately published and they were manuals on general chemistry, qualitative analysis, and toxicological analysis. Three were jointly published with Lyons.

Like Lyons, Brown, and Mathers, Davis’ interests included the patenting of discoveries. However his action was largely limited to one patent. It was granted in 1908 for a process which, as stated in a long article by the IDS on 13 February 1908, "will no doubt revolutionize the domestic fuel problem." The report stated

"The object of his invention is to provide a burner, in which heavy hydrocarbon oils may be gradually heated, vaporized, and then mixed with air and burned."

In the long discussion the claim was made that "It can be attached to any coal stove or range without damaging it in the least." Davis was quoted in part as follows:

"In my burner the generating valve is first warmed up with about a thimble full of denatured alcohol which burns with neither smoke nor odor. This process requires about thirty seconds. When the alcohol is completely burned and the flame goes out, the kindling oil is allowed to run slowly into the hot valve where it is instantly vaporized and issues from the top of the burner in a completely gasified condition. This is ignited in the usual manner and burns
with a steady, perfectly blue flame. This flame very quickly (in 30 seconds or less) heats the whole burner sufficiently hot to vaporize the heavy oil used as the principle (sic) fuel. Therefore in about 30 seconds from the time the burner is first lighted, the fine oil is turned on and the valve controlling the kindling oil is shut off. The flame continues to burn steadily and with a perfectly blue color entirely free from any unburned carbon."

Rumors abounded on campus in 1908 as much as in many decades later. The article in the IDS stated that

"Although the Doctor is very modest about his work, it is rumored by his friends that he has been offered a hundred thousand dollars for his patent..."

Instead of selling the patent, as reported in the IDS nine months later (18 October 1909) a company was formed and incorporated, the Domestic Producer Gas Company, to manufacture the oil burner. Davis was president. As stated in the article other officers were: "Vice president, G. Barrett Moxley, who is also vice-president of the A. Keifer Drug Company of Indianapolis; treasurer, John W. O'Harrow of Bloomington." It is not apparent that the manufacturing enterprise was successful, or that other uses of the discovery were implemented.

Another revealing action was Davis' request for a leave of more than six months in 1914, and the purpose of the leave. As reported in the IDS (8 December 1913) this was to permit him and his family to go to southern California,

"where he will become chemist for a large mining concern, the Great Gold Belt Mining Company, in which he and other Bloomington people are interested."

Indeed Davis left Bloomington in December, without his family and with the president of the company. Some exploratory studies of the mining region were made. This was followed by Davis' visit to the area in the following summer. The IDS stated that

"Dr. Davis has worked out here a plan for extracting the gold, which, if it proves out as the tests made here show will be he believes one of the greatest inventions in metallurgy of the age."

In such ventures he was preceded by Lyons who began in summer 1911 near Dawson, Canada (IDS, 9 January 1912). Such interests were pursued for several years.
This reflects the feelings imparted to students in the department about what was felt locally to be important in chemistry. The thought and action for ways to apply chemistry seemed to be uppermost not only with Davis, but with Lyons, Brown, and Mathers. It is not known that Davis or the others gained much if anything in such ventures, but his urge to make the big strike never seemed to dim.

A notable feature of Davis’ stay in the department was his proclivity for extracurricular lecturing and extension work on various subjects of which apparently none closely pertained to chemistry. Much of this was interspersed with regular teaching on campus, but occasionally he took leaves of absence from such activities. For example in an undated letter from Lyons to President Bryan (apparently in November 1917) it was written:

“On November 9, Prof. L. S. Davis gave up work in the department for the remainder of this semester to engage in some phase of extension work under the direction of Mr. Pettijohn. Associate Professor Mathers has consented to undertake the direction of the courses which Dr. Davis had charge, until the end of the semester.”

Of course, as stated in a letter on 14 June 1918, Lyons suggested that Mathers should receive some compensation for the extra service. The amount of time required for the service was unclear.

There is no indication that Davis ever taught advanced work in chemistry or engaged seriously in productive basic research. His relationships to the department in the 1920s will be reviewed in the subsequent chapter.

Clarence E. May

The youngest of the small faculty during this period was Clarence E. May, who was primarily known for his toughness in teaching organic chemistry. Nearly all the premedical students at I.U. from about 1908 to 1943 took one or more of his courses and many who did not make a satisfactory grade either failed to be admitted to medical school or did not apply for admission. For many he was either unnecessarily demanding or he did not teach in the manner they desired. Some appreciated his system and thought well of the professor. He was memorable for his mannerisms, extensive reliance on chemical formula, reaction equations, and his “road maps” used in teaching organic chemistry. All who passed his courses learned much empirically, but many of the details were soon forgotten. He made lasting impressions.

Like F. C. Mathers, Clarence May was born south of Bloomington, in the Clear Creek community. His birth was on 3 March 1884 and he
died at his son's home at LaGrange, Illinois 22 July 1972. His wife, Frederica (Bonnie) Kirby, one of his former students, died the year before. They had two daughters and one son. When he was 16 he graduated from Bloomington High school. At the turn of the century he enrolled at the university and received his A.B. in chemistry in 1904. A year later he received an A.M. degree. During 1904-05 he and two other graduate students, Gar A. Roush and George R. Leonard, were listed in the catalog as Laboratory Assistants. In six laboratory courses he shared the teaching responsibility with Lyons. They were Organic Chemistry, Physiological Chemistry, Physiological and Pathological Chemistry, Urinanalysis (sic), Blood Analysis, and Bacteriology.

In 1905 the young chemist was given an instructorship at Indiana University and a leave of absence to continue his graduate studies at Columbia University. At Columbia his doctoral work was directed by Marston T. Bogert, who in 1904 became the first professor of organic chemistry at that long established institution. It was a salutary relationship between student and teacher. He also had close connections with W. J. Gies at Columbia with whom some research was done on the "Determination of Mucoid in Urine, Blood, and Tissue Extracts." This was published as an Abstract in 1907. The dissertation was "On Certain Quinazoline Oxygen Ethers." In 1909 a paper on the work was published with Prof. Bogert in the JACS (31, 507-13, 1909). The Ph.D. degree was granted in 1908. Significantly in that year the rapidly rising Prof. Bogert was in his second year as president of the American Chemical Society, and president of the Chemists Club in New York.

In a letter to President Bryan on 16 March 1908 Lyons, among other things, stated that

"Prof. Bogart (sic), of Columbia, reports that Mr. May is to be placed in charge of their organic laboratory during the summer school.

The letter stated that before going to Columbia Mr. May had "given three years of active service in our department as assistant or instructor." As instructor he was paid $450 for two semesters. Lyons recommended

"...that he be appointed assistant professor of organic and physiological chemistry at a salary of $1000—beginning August 1, 1908."

On 4 February, soon after May had become a member of the chemistry faculty, the Indiana Daily Student ran a feature news story on the front page concerning his research on the detection of corn oil "as an adulterant for table and salad oils, butter and lubricating oils." Not until several decades later were the virtues of this and related oils rec-
ognized as desirable components of food. The research was never published.

May's publications of research during the first five years after his return from Columbia were on the decomposition of uric acid by means of different alkaline agents, the use of phosphotungstic acid in urine analysis, the sugar content of watermelons, the properties of watered milk, and the determination of tryptophan in proteins. These appeared in the *Journal of the American Chemical Society*, *Journal of Biological Chemistry*, *Journal of Industrial and Engineering Chemistry*, and the *Biochemical Bulletin*. No other research was published before 1921. Only six or seven other research publications were made after 1913. He published a number of issues of his mimeographed Laboratory Manual of Organic Chemistry, which was always used in his laboratory classes. The first issue was in 1915.

During his last decade of teaching organic chemistry, in 1942, May published (Edwards Bros., Inc.) "A System of Organic Chemistry" which was designed to be used in the course. A second edition appeared two years later. He wrote in the preface

"In years of experience in teaching Organic Chemistry there was recognized a need for a better arrangement and classification of the material for presentation to classes of pre-medical students and others with a real desire to know something beyond the shortest possible way through the subject."

The book and his teaching gave extraordinary emphasis to laboratory methods of synthesis and isolation of products.

In the laboratories, which were always supervised by one or more assistants, students could be sure that May would give individual attention to each before the end of a session. There would always be some questions and comments on the progress of the work. It was always important to have yields of product that were commensurate with expectations from good work. The key starting materials were always dispensed in strictly regulated amounts. Students indeed learned from experience.

Over a period of many years probably the partial synthesis of mercurochrome was the most memorable experience in May's laboratory.

**SALARIES AND EXPENSES**

Concerning the maintenance of good relationships in the department and the payment of appropriate salaries, it is noted that in 1907, on returning from Cornell University with a doctoral degree, Mathers was given an appointment as assistant professor and the salary was
The next year Lyons wrote that Mathers “has been active in research in inorganic chemistry.” Because he was doing well in instruction and research Lyons recommended “that his salary be made $1100 from August 1, 1908.”

Salaries for faculty and other expenses in chemistry were frequently the subject of correspondence between Lyons and President Bryan. Many of the letters are illuminating. On 1 December 1913 Lyons listed the salary of his faculty as follows:

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Davis</td>
<td>$2200</td>
</tr>
<tr>
<td>Assoc. Prof. Brown</td>
<td>$2000</td>
</tr>
<tr>
<td>Assoc. Prof. Mathers</td>
<td>$1700</td>
</tr>
<tr>
<td>Assoc. Prof. May</td>
<td>$1700</td>
</tr>
</tbody>
</table>

The budget for supplies and expenses was $1600 and for the Chemistry Library it was $200.

On 27 January 1914 the handwritten letter to the president requested an increase from $867 to $1128 for “teaching fellows and assistants.” Lyons stated that the assignment of Mathers to substitute for Davis during the latter’s absence — to explore gold mining opportunities in California — “merits additional remuneration.”

By 1915-16 the salaries of Mathers and May had become for each $1800. Brown was receiving $2200, and Davis was getting $2400. The only apparent justification for the latter’s higher rate was his longer number of years on the faculty. The salary for Lyons was $3300.

The available records revealed how little the few non-academic personnel were paid. In the January 1914 letter Lyons recorded that J. L. Lowden, “in service as storeroom keeper about 9 years is paid $40 per month.” He suggested “that he be paid $12 per week in keeping with the present arrangement for janitor service.” Three years before, 9 July 1911, Lyons asked the bursar, U. H. Smith, to look into the salary arrangements for Lowden. The latter had received a letter stating that his salary “had been cut from $520 to $480.” Lyons obviously did not want him to have a cut. He hoped that the letter reflected “a mistake in the record.” On several occasions prior to this time he had expressed concern that the salary was too low. Finally, in January 1916 Lyons wrote that Lowden had resigned and that S. W. Worley was being hired at $12 per week to be “keeper of the Chemistry Department Storeroom.”

Besides salaries other problems in the department included thievery of platinumware. On 3 February 1916 Lyons wrote to the president that seven platinum crucibles with lids had been withdrawn from the stockroom for use in the routine analysis of coal samples for the university. Three of the crucibles and lids, valued at $180 disappeared, apparently while they were being used in the laboratory. On top of the skyrocketing
prices for chemicals and apparatus owing to the war at that time, this was of much concern to the department.

**Research Publications and Perceptions of the Department**

During the first decade under Lyons the only research publications were his and those of Brown. In 1907 a pattern of almost yearly publication started which was to continue with increasing quality and quantity.

Earlier in 1908, on 18 February, the IDS used considerable space in reporting a publication by Mathers on "A method for the separation of iron from indium." It appeared in the then current issue of the *Journal of the American Chemical Society* (29, 486-96, 1907). Characteristically in describing it to the IDS emphasis was placed on the possible practical uses of indium. The article stated

"...as yet no commercial use has been discovered, but its melting point is only 135 degrees, (thus) it could be used in making low-melting alloys."

Three months later, and only a short time before the young Dr. May was to return, the IDS on 1 May 1908 had a special laudatory article extravagantly headlined with "Organic Chemistry Department Now Best in State." The article proclaimed that organic chemistry occupied a room on the second floor of Wylie Hall that had been recently vacated by the Pathology Department. The room was 60 x 30 and "It can easily take care of ninety-two students working at one time." By present day standards it was alarmingly unsafe and exceedingly overcrowded when it was at the rated capacity. Some of the descriptive language illustrates the concepts and status of laboratory practices at that time:

"The laboratory is fitted up with the latest equipment for both the collegiate and medical courses. A Caldwell desk, for chemical experiments, has been installed in the east end, as has also a furnace from the Medical College in Indianapolis. The walls are lined with storage cases and in the center of the room in two rows, are five heavy laboratory desks. In them are distilleries, gas furnaces, thermometers, air and Liebig thermometers, air and what what (sic) condensers, crucibles, and other chemical equipment. Throughout the room there is a network of electric wires and watermains."

**Organizations Important to Chemistry Students**

Another development in 1908 was the establishment of the new professional chemical fraternity, Epsilon chapter of Alpha Chi Sigma. This was described in the IDS of 24 February 1908. The students who
became charter members were: W. B. Jadden, '08; N. O. Pittinger, '09; C. O. Gamble, '08; Don G. Irions, '09; G. E. Beavers, '10; R. Bridges, P.G.; A. E. Stickels, '09; and James Currie, '07, P.G. All four of the regular faculty members (R. E. Lyons, O. W Brown, L. S. Davis, and F. C. Mathers) became honorary members. Soon after he joined the faculty, May was inducted. There were two other professional fraternities on campus: Phi Delta Phi for law and Phi Beta Pi for medicine.

The new chemistry fraternity soon acquired lounging and social rooms for its members and was quickly acknowledged by the IDS as a resource for job placement as well as comradeship for chemistry majors. In a writeup on 11 June 1908 it bragged that in its first few months “the little bunch of chemists is (already) recognized as one of the live articles of the University.” The article continued:

“Though it boasts a handsome suite of rooms in the Allen block (presumably east side of the southeast corner of the courthouse square), where its members may lounge and read scientific magazines, it has some things more to offer than mere social pleasures. It is essentially practical. Through its efforts, and the ability of which every member is master ... remunerative positions have been secured for a number of its members for next year. ...”

After two years the fraternity acquired a house on Lincoln street. In 1917 the house was given up because the world war caused many members to leave the university for military service or industrial or military operations requiring training in chemistry.

One of the early members was John R. Kuebler, AB’12, MA’15. He was eventually to become the national executive director (Grand Master Alchemist). Following his death in 1967 the fraternity established the John R. Kuebler Award, the highest honor it can bestow on one of its members. It is presented annually for service to the fraternity and chemical profession. In 1983 Harold J. Wesselman, AB’40, was the second I.U. alumnus to become the national president. The organization did not authorize the admission of women until 1971.

One year after the organization of a chapter of Alpha Chi Sigma here, the IDS reported the organization of the University Chemical Society. As reported in the issue of 3 October 1912 the purpose was

“to foster a social spirit among the students in the department of chemistry, as well as to promote a study of chemistry along scientific lines.”

It also stated that
"While the organization is primarily for the Chemistry majors, the meetings are open to all who wish to attend."

There was no apparent affiliation with any controlling organization. Presumably a reason for its formation was to offer an alternative to the secretive nature of Alpha Chi Sigma and its exclusion of women. The membership included women and some of the men were also members of Alpha Chi Sigma. For example, John Kuebler was Corresponding Secretary in 1912. The society sponsored occasional lectures. On 8 January 1912, as reported in the IDS, Lyons "gave an illustrated lecture on the Alaskan gold fields which he visited last summer." The meetings were monthly and apparently almost exclusively devoted to talks by advanced students or faculty on practical aspects of chemistry. Occasionally there were social activities. In February 1913 the Club met in the Commons of the Student Building for games, singing, and performance by a brass quartet. The IDS stated that "The male quartet failed to present their part on account of the inability of two of the members to attend." The Club became inactive within a few years. The strength of Alpha Chi Sigma varied from strong to very weak, but it never ceased to function.

The founding of Gamma chapter of Phi Beta Kappa at Indiana University in 1910 was prized by all concerned, but in some there were felt distinctions between excellence in liberal education and scientific education, and that the former characterized Phi Beta Kappa standards. A problem was the misconception in such persons that liberal education could be achieved without scientific knowledge. Gradually this ceased to be a significant concern and all areas of science were accepted in meeting the criteria for membership.

From the beginning persons selected for membership in Phi Beta Kappa were limited to a small proportion with upper class standing in a liberal arts curriculum. For many years this was automatically limited to candidates for an AB degree. Finally selections were made from all categories of baccalaureate degree candidates who, regardless of the degree, were basically meeting all the course requirements for an AB degree. The feeling persisted for many decades as stated by the IDS in 1904 (2 Dec. 1904) when the Sigma Xi chapter was established here: the purpose of Sigma Xi stands

"...in somewhat the same relation to scientific work that the Phi Beta Kappa gives to classical and literary scholarship."

Following the first half of this century the AB and BS degrees in the College of Arts and Sciences became broader than when the Phi Beta Kappa and Sigma Xi charters were established. In the selection of courses to earn a BS degree in chemistry it is possible for a student with high
grades to qualify for election to Phi Beta Kappa. An impressive proportion of such electees presently, regardless of the degree, are majors in chemistry or biochemistry.

Strangely, an early opportunity for election of a chemistry faculty member to Phi Beta Kappa was rejected. When the Gamma Chapter was founded and a few faculty charter memberships were authorized, the first selection in science went to Professor Carl Eigenmann. Two years before he had been made the first dean of the Graduate school, and he was worthy for scholarly reasons. In Gamma's second year Lyons was selected, but the election letter to him bears a handwritten note by him stating, "declined the invitation to membership because I was not asked in 1910 when Dr. Eigenmann was elected from the Science Faculty." Clearly chemistry was the loser in this petty and totally arrogant action. Dr. H. T. Briscoe and Frances C. Rothers, MD, both in the 1917 class, had the distinction of being among the first chemistry majors to be elected.

A REMARKABLE STUDENT: FUSANOBE (PAUL) ISOBE

One of the department's most remarkable undergraduates received an AB in 1909. He was Fusanobe (Paul) Isobe who was destined to receive an honorary ScD degree from the university in 1931. Several months after he had received an MS degree in chemical engineering at the University of Wisconsin the already promising entrepreneur in business and applied chemistry returned to his native Japan. Indiana University, especially through Mathers and Lyons, was to maintain gratifying contacts with him for many years.

The record of the three years that Paul Isobe spent on campus and in the community, from 1906 to 1909, is as impressive as any story ever written by Horatio Alger. The integrity, dedication, and resourcefulness of the student, and soon the rising industrial chemist, are touchingly portrayed in the autobiography he published sometime after 1925. The book, in Japanese, is a memorial to his young musically gifted first wife who died (29 October 1925) eight years after their son (Kiyoshi) was born. It was intended primarily for the son so that when he was old enough he would know intimately about the mother, the marriage with the second wife, and the life of the father as an enterprising youth and then a student at two different American universities. Through the persuasive entreaties of Dr. Mathers, Dr. Isobe later translated the portion of greatest interest to the Indiana and Wisconsin communities. A copy of the book, "Last Will of Love," is in the Library of the Institute for Study of Humanities, Doshisha University, at Kyoto. The translated portion amounts to 60 typewritten pages. Copies are in the Archives of the Department of Chemistry and in the Archives of Indiana University.
The young Isobe came from a Christian family in Japan with no resources for his education but with strong unity and moral support. Many friends, his elder brother, and his mother borrowed $100 to enable him to pay for passage to America in early 1902 at age 26. He arrived in San Francisco and was met by a few Japanese friends who had preceded him to this country. Through such friends, supportive Americans, and the YMCA he was employed on a vegetable farm and at a cannery until fall. Again with help he entered Salinas High School where he was the first student from Japan. As a houseboy for Dr. and Mrs. Parker he earned enough to meet his basic requirements. It was at this time he acquired the name “Paul” because it was simple and St. Paul was the man he admired most.

After three years, for health reasons, he was advised to seek a warmer climate. He found a job at Anaheim, California distributing newspapers, which could be done while he finished his last year of high school. His Latin teacher, whose name he did not remember, was a graduate of Indiana University. The teacher sent the necessary records and a recommendation for his admission to this institution.

In preparing to earn his way while in the university he was advised by a high school friend to learn the barber trade. To do this he entered a barber college in Los Angeles after high school graduation and through continuing church and YMCA friends he lived at the YMCA. Through exceptional enterprise he obtained railway transportation to Bloomington, including some riding on a freight train. En route he earned a little money as a waiter and as a barber.

The autobiography vividly records his first experience and action upon arrival at Bloomington:

“When I arrived at Bloomington with one suitcase I had only five cents left. Immediately after my arrival I applied for a job in a barber shop near the Monon Railway Depot. George, a colored man, proprietor of this barber shop accepted me very kindly and gave me one chair in the front.”

The new student secured a room for himself at 75 cents per week. Later he paid 50 cents per month for an unheated room. Initially, as he wrote, he

“...got a job one hour each before and after breakfast and dinner at a small hotel on Kirkwood Ave. (between Walnut and Washington Streets), for this service I am given three meals free. On Saturday, the University is holiday so I work at the barber shop from six in the morning till eleven at night. Thus, I make two dollars per day, deducting seventy five cents for room rent, one dollar and quarter
was my net income which to be used for university expenses and remittance to Japan."

His faithfulness in sending some of his hard earned livelihood to his fiancee and elderly stepfather in Japan was remarkable.

From the beginning the student planned to complete his degree requirements in three years by attending summer school each year.

The poignant descriptions of professors, courses of study, and other aspects of campus life make the autobiography a vivid record of the university during the first decade of this century. The first person mentioned who was connected with the university was Grover C. Hutcherson, AB'10, AM'12, in chemistry, who became his lifelong friend and, following World War II, his benefactor. He wrote pleasingly of Lyons, Davis, Mathers, Brown, President Bryan, and others.

In spite of all his work in college classes, the extensive laboratory work in chemistry, and many hours in earning money, the young Isobe gave some time to attendance at football games and other university events. Concerning some of this he wrote:

"Three months in autumn are known as football season. Every Saturday afternoon an inter-college game was played by American college. Indeed this is an energetic manifestation of devotional sentiment.... I often mingled with rooters and went to see football game."

After one year here, the extraordinary student could not live longer in Dr. Carl Eigenmann's unused "footman's cottage" which he had been renting at 50 cents per month! Isobe was attempting to get along without buying fuel, which he could not afford. Consequently he caught a severe cold and developed a high fever. The minister of the First Christian Church, Rev. Thomas Clark, kindly made arrangements for him to sleep in and make considerable use of the preacher's study behind the pipe organ room in the church, at Fifth Street and Washington Street. Also, Isobe was made janitor of the church at ten dollars per month. He wrote that the minister's wife "took care of me like I was her own son." He liked the duties in the church so much that finally he gave up the barbersing work entirely. He felt that the janitorial duties scarcely interfered with his laboratory work and studies in chemistry. He wrote,

"I was very fortunate ... not only materially speaking but spiritually speaking also as it was a great help in character building, due to the fact that I had opportunity to meet and become acquainted with many good pious Christian people."
Shortly before the man of 33 years graduated the church congregation gave him a new black suit and a pair of bed sheets. This was overwhelming. It was the only new suit he had received in America during his more than seven years here. The only other suit was a used one given to him by Dr. Parker while he was a high school student in California. Some of the members of the congregation, who presumably participated in making the gift, were: Dr. Amzi Atwater, elder in the church; Mr. and Mrs. S. Bray; James N. Currie and his brother George, the organist, Miss Frances Bray and her sister; Vermont Finley, Sunday School teacher, and a few more, including some college students.

Mr. Isobe’s description of the 1909 graduation events and some of the persons involved are fascinating and informative. This was started with an account of the traditional “peace pipe” ceremonies in which the seniors (400), wearing cap and gown, marched through the campus and smoked the pipe with the juniors. Isobe referred to this as “a most beautiful manifestation of college spirit.” He stated that the third day of the program was Sunday and the baccalaureate service was attended by all the graduating students. The following Monday was Senior day. A major event was a baseball game between graduating students and the faculty. The seniors won 23 to 9. The fifth day was Alumni day, and the sixth and last day was Graduation Day.

The account stated that David Starr Jordan had returned from Stanford University to deliver the Commencement address and to receive an honorary degree. He spoke over one hour on “War and Character.” Following this President Bryan handed diplomas to the graduating students. Isobe wrote that when he received his diploma “there was cheering hand clapping heard.” Soon after the conclusion of the events many of the students made preparation to leave Bloomington on the afternoon train. The autobiography contains a striking paragraph on Isobe’s pleasing encounter with President Jordan:

“I noticed one aged tall gentleman with a big Boston bag on arm walking down Kirkwood Avenue toward Monon Depot. He was the most esteemed Dr. Jordan. I bowed most politely. He took his hat off and made a return bow and said ‘Are you the Japanese student just graduated college this morning?’ I replied ‘Yes, sir, I am the Japanese student.’ He continued his question. ‘What are you going to do? If you have not decided yet, come to Stanford Graduate School in Palo-Alto. We have many Japanese students in Stanford’. I replied to him ‘Thank you, sir, for your invitation. I almost decided to take a Graduate School in Wisconsin University’. I accompanied him to Monon Depot and sent him off with warm shake hands.”

After this exciting week of fulfillment, the campus quickly became very quiet. Isobe had the universal reaction experienced by countless
persons following commencement. He wrote, “I felt extremely loneliness.”

Soon the urge for action was revived. After talking with Prof. Brown, he was warmly encouraged to write to Prof. C. F. Burgess at the University of Wisconsin and apply for admission to graduate work in Chemical Engineering. Both Brown and Isobe wrote immediately. Soon acceptance was granted but with the understanding that Isobe would have to earn most of the money this program required.

At Wisconsin and under Burgess he continued some of the work he had done under Brown on the electrolytic caustic soda process. He earned his necessary funding as a helper in the Burgess household. After earning a master’s degree, and spending a summer as an analytical chemist in a steel mill in South Chicago, he returned to Madison to earn a doctoral degree. However several factors had a precipitous effect on his plans. The prolonged absence from his fiancee in Japan was having a telling effect. Also, while working in the steel mill and the following first semester in the university he became extraordinarily successful in selling Japanese pictures. By Christmas 1910 he had made $6000. Dr. Burgess and Dr. Lenher were so strongly impressed by his ability and other qualities they advised him to return to Japan to be “a practical chemist” in business. The trip was made early in 1911. Remarkably the comfortable return was on the same ship in which he had traveled here in third class a decade earlier. During the next few years he progressed rapidly in the chemical industrialization of Japan, including Manchuria. He became one of the department’s most honored industrialists. His continuing connections but infrequent visits at Indiana University will be presented in some of the following chapters as they relate to other events.

DR. LYONS AND HIS PATENTS

During the first few decades of the 20th century the students in chemistry must have recognized in some of the faculty considerable interest in making discoveries that might be patented and hopefully used to make money. Professors Lyons, Mathers, and Brown were consistently involved.

One of Lyons’ early and continuing interests from about 1910 to 1920 was in the recovery of gold, platinum, and certain other precious metals. During the summer of 1911 he was a special metallurgist for the Guggenheim Exploration Company in Alaska but most of his time was spent in the vicinity of Dawson, Canada. He was paid $500 per month. That year his salary at the university was $3400. From 1914 to 1919 at least four U.S. and Canadian patents were issued to him on a new process for the recovery of gold and platinum. This involved the use of mercury. None of this research and other work he patented was published in
scientific journals. As reported in the *Indiana Daily Student* in January 1912 he gave an illustrated lecture on the Alaskan gold fields. He spent the summer of 1913 in California investigating gold recovery processes. As the IDS reported in May 1913,

"Just exactly what is the purpose of his journey is not known as Dr. Lyons talked very little about it before leaving."

Essentially at the same time Lyons was actively interested in the leavening process in baking powders. In 1914 he was an expert witness for the Calumet Baking Powder Company in a U.S. District Court in Idaho. This concerned the effect of dried egg albumin on the volume of the baked product, the use of a "water glass test" applied to baking powders, and his simple method for measuring the volume of small baked products, such as biscuits. Apparently no patents were issued to him or on his behalf regarding baking processes or baking powders. Probably any money he made was limited to consulting fees and in compensation for serving as an expert witness.

Other interests in inventions, patents, and other applications of chemistry continued at least until 1927.

**Placement of Graduating Students and Advancements of Alumni**

Dr. Lyons and the few other chemistry faculty members continued to give attention to the placement of graduating students in graduate schools, professional schools or employment in industrial or governmental positions. In the second decade of the century the sugar industry was attractive to some. In the IDS of 22 January 1915 it was reported that H. F. Willkie, '11, brother of the noted W. L. Willkie, had been made chief chemist of the Fijardo Sugar Company in Puerto Rico. His brother Wynn Willkie, '12, was working in the same refinery. The same report referred to others - including Elmer H. Stuart, AB'14, AM'15 - stating

"Mr. Stuart is the latest graduate of the Chemistry Department to obtain a good position in Puerto Rico, many others having gone from here ... in the past few years."

Near the end of 1915 the IDS reported on other students joining the developing enclave. They included C. N. Graham, '17, J. E. Powell '17, and M. Walker, '13. The article added, obviously through Mathers as a source, that "Positions with the company are especially desirable, as transportation and all expenses are paid." Transportation was by steamship from New York City.
Concerning these chemistry alumni who took advantage of the opportunity to travel, several gained prominence. These included H. Fred Willkie, who became a major executive in the Seagram Company, and E. H. Stuart who for many years was a scientist in the Eli Lilly Company.

In the IDS of 22 November 1915 it was reported that Ira Lee, '11, and Ralph Overman, '10, had received PhD degrees in chemistry at Cornell that year. It added that Lee was then an instructor at the University of Rochester and Overman was professor at Huron College.

The continuing headlining of news was illustrated in a 1916 issue of the Indiana Alumni Quarterly. Among 13 mentioned it was noted that Carl P. Sherwin, AM'12, received a PhD degree in Tubingen; John R. Kuebler, AB'13 and AM'15, was teaching chemistry at Shortridge high school in Indianapolis; and Edgar B. Carter, AB'11, had joined the Swan-Myers Company in Indianapolis to be in charge of the work in bacteriology. It also noted that Gar Roush, AB'05, Assistant Professor of metallurgy at Lehigh University, had read a paper “at one of the meetings of the Second PanAmerican Scientific Congress held in Washington during the holidays.”

Also, on 4 May 1916 the IDS reported that Harvey A. Bordner, AB'96, had become superintendent of the Philippine Normal School in Manila, P.I. For at least three years he had been a laboratory assistant in the department of chemistry, beginning in 1894. Thus he was an assistant when Lyons began his long tenure. Some time after 1916 he became Superintendent of City Schools in Manila.

Later in 1916 the IDS ran a major article entitled “Manufacturers want Chemistry Students.” A subheading proclaimed “Indiana Men Successful.” Again the emphasis was on sugar chemistry and opportunities in Puerto Rico, but it was stated that

“Every year the research departments of the large manufacturing concerns in the United States are growing in relative importance.”

At that time World War I was markedly increasing the need for chemists in this country. The price of many commodities, including sugar, was continuing to increase. The IDS article proclaimed that in Puerto Rico “They pay all traveling expenses to and from Porto Rico (sic) and board, room and $75.00 per month ...”

**Effects of World War I and Some Local Problems**

World War I was affecting the department in various ways besides employment opportunities for chemistry graduates. Of course this included the enlistment of many students in the military services when this country declared war in April 1917.
From the beginning of the war in August 1914 difficulties were encountered in receiving chemicals, glassware, and equipment from Germany. This is graphically illustrated in various articles that appeared in the IDS. On 29 July 1915 the IDS reported in some detail that an order for glassware placed in June had been finally received. The article reflected the understanding of IDS writers and the extent of the international conflicts on the seas. Regarding shipments from Germany, it stated in part:

"The boxes were sent to Chicago since even the British knew that that is a good neutral city. Had it been marked Milwaukee the Chemistry Department would have been short on glassware for some time to come. The boxes arrived dry and in good condition and bear no evidence of having been rammed by the British fleet. They were sent via Rotterdam. It is well, indeed, for His Majesty's ships that they allowed the shipment to pass unharmed, as Mr. Lauder (Stockroom attendant) of the Chemistry Department, was very anxious to get it."

Concerns for the procurement of chemicals and equipment and the myriad problems of the raging war were accompanied by vexing local problems. These included overcrowding in the laboratories, inadequate supplies and operational funding, and even frustrations with the type of telephonic connections.

**Contending with vexing telephonic service:** On 2 October 1915 Lyons wrote (longhand) to President Bryan:

"The automatic telephone in my office is very unsatisfactory and makes certain parts of my executive work very burdensome or impossible. A direct line telephone would greatly facilitate my departmental work and service as chairman of the Committee on Student Health."

Even seven years later the situation had not materially improved. In a letter (longhand) to President Bryan in December 1921 Lyons wrote:

"Some months ago I made a requisit(sic) for a city telephone because of the harassingly inoperative instrument in Wylie Hall and because of the annoyance to Mrs. Lyons and myself with calls from various university offices during lunch and dinner."

The telephone in Wylie Hall was not connected to any off campus system! Even in case of fire or other emergencies a call on the single telephone would have to be relayed to one of the few offices on campus with a telephone and the person responding — if any — would have to
relay the call. Finally some relief occurred when the Chemistry Building
was finished in 1931.

Dissatisfactions were to continue until at least the end of World
War II. The lack of any kind of telephone in Wylie Hall when the de­
structive fire occurred in 1900 surely impaired the summoning of the
Bloomington Fire Department.

COMMENDATIONS, AUSTERITY, AND SOCIAL STANDING

From time to time, Lyons was given consoling sentiments if not
the desired substantive responses to his various requests. These occurred
from the beginning of his headship of the department. In 1915 Dr. Bryan
wrote to Lyons:

“You have conducted a great undergraduate department with
marked ability, both in its business side and its educational side.
You have given invaluable technical service to the University outside
your department ... In addition to all of these things you have shown
yourself to be a productive scholar of high quality. For all these
reasons, the University values you far beyond its power to compen­
sate you in money.”

At that time Lyons had a salary of $3400. In the same letter praising
him it was stated that the allotment for the Chemistry Library was $215,
and $150 for research. The allowance for supplies and operating expenses
was $1840. Even so, as stated in Lyons’ letter to Bryan on 2 October,

“235 students are enrolled in the beginning lecture course, Chemistry
1. The class is divided into three sections because of the limited
capacity (104 seats) of our largest lecture room.”

He also wrote,

“Our capacity is also reached in laboratory space for freshman,
sophomore premedic students in organic chemistry, and medical
students in physiological chemistry.”

Within two years, as reported by President Bryan to Lyons, the
board approved for 1917-18, the same amount for research ($150), but
the supplies and operating expense allowance was more than tripled, to
$5,600. The amount for the Library was raised to $250. The salary of
one instructor was $700, and for each of the other two instructors it was
$500.

In spite of his heavy responsibilities in the department and the
nagging lack of desired funding Lyons spent some time playing golf. In
1917 his fee as a member of the Golf Association was $2.50. This was probably his major recreation.

Another reflection on the recreational activity and social standing of the Lyons family could be interpreted from a news item in the IDS on 20 December 1920. It stated that

"...a Ford sedan driven by Dr. J. P. Turner collided with an electric driven by Professor R. E. Lyons at the corner of Kirkwood Avenue and Walnut Street Monday night."

Both cars were damaged although the electric suffered the least. Only a few other families in Bloomington had such prestigious conveyances.

Dr. Lyons' colleague in the Department of Physics, Dr. A. L. Foley, was the first owner and operator of a factory-made automobile in Bloomington. That was in 1898. The IDS in May 1924 quoted Foley as stating that

"It always was an attraction wherever I went. The total population of towns would turn out and gape in wonder at my marvelous little car. It would average 10-12 miles an hour, but when pressed would respond with 30 ..."

For the benefit of increasingly mobile faculty such as Lyons and Foley, the first electric light traffic signals were authorized by the City Council on 16 December 1924, and presumably erected soon thereafter. There was to be one at each corner of the square (IDS 17 Dec. '24).

Dr. Lyons was a member of Rotary International and he participated actively in the Bloomington club. Occasionally he was the speaker at some other local community organizations.

**Dr. Mathers and Dr. Bancroft**

By the time of World War I Dr. Mathers had become the most active in the department in attracting nationally known chemists and other scientists to lecture on campus. At least in part through him Dr. Wilder Bancroft was invited. At Cornell Bancroft had been Mathers' research director. Thus it is natural that he should include Indiana University in his Sigma Xi lecture tour of several major institutions during the spring of 1917, and that Mathers should be one of his hosts.

The special Sigma Xi lecture here was on Saturday, 10 March 1917. The evening before Bancroft had addressed the Indiana section of the American Chemical Society at Indianapolis. Again, in keeping with the policies of the IDS until approximately the second half of this century, there was considerable coverage of the lecture. On 8 March 1917 the
article announcing the lecture gave Bancroft’s background and much space to a discussion of colloidal chemistry, the subject of the lecture. During the summer of 1918 Bancroft was to be the general director of research by Mathers and others working for the Chemical Warfare Service at Catholic University in Washington, D.C.

CHEMISTRY STUDENTS DURING WORLD WAR I

The declaration of war by the United States in 1917 quickly affected virtually every person and activity in the university. Dislocation of students and faculty had a domino effect. For example, it was reported in the IDS 6 November 1917, that:

“Michael J. Blew, ’15, has received leave of absence from duty as instructor in chemistry to accept a position in the army ‘Y’ at Fort Sill, Okla. He will work under T. A. Rymer, former general secretary here.”

When the change from instructor in chemistry to Army “Y” work was being contemplated it was concluded that Mr. Blew’s special service in the campus Student Friendship War Fund was virtually indispensable. Therefore, a telegram was sent to Mr. Rymer asking him to release Blew until the War Fund campaign had been completed on campus. Presumably his services in teaching chemistry were at least equally important. The telegram was typically brief and direct: “Send Mike immediately. Handicapped. Need too great. Abide your decision.” The response was immediate and Blew left the next day. The IDS article stated

“Blew was president of the Indiana Union in 1915-16. He took an A.M. degree in chemistry in 1916. He is a member of Alpha Chi Sigma, the honorary chemistry fraternity, and he has been active in college throughout his undergraduate days. Mr. Blew’s greatest work on the Y.M. cabinet was the making of a trip twice a week through an entire winter four miles into the country where he taught English to a group of Greek quarrymen in a box car.”

Michael Blew had a long career in the army from which he retired with the rank of Colonel.

Among the various chemistry graduates in 1917 was Frances C. Rothert, ’17, (MD, Columbia). Two other classmates were Herman T. Briscoe and Paul B. Weiland who also had a military career and retired as a Colonel. After receiving training in medicine, an internship in medicine and field work in public health service, Dr. Rothert was Assistant University Physician on campus in 1926-27. During the year, as reported by the I.U. Alumni Quarterly for 1927, she gave particular attention to
undernourished women in physical fitness classes. Following this she went on to research and administration in public health, especially through the Catholic Church, the U.S. Children’s Bureau, the University of Arkansas School of Medicine, and after her retirement in 1963, in the Catholic Relief Services in Mexico, Central America, and the Caribbean countries. In 1975 she wrote to H. G. Day from Guatemala:

“Although I have not been a chemist, my major gave me a feel for precision and for a consideration of the elements that make up things that are useful in any field — and I thank the I.U. Department of Chemistry and especially Dr. Lyons and Dr. Mathers. And I am very proud of the distinguished work of my fellow alumni.”

She had various honors and was well known for her accomplishments.

Much should be recorded concerning H. T. Briscoe, who in addition to high scholastic achievements, became prominent for his contributions to debate. The IDS on 20 April 1916 stated that

“Kenyon Stevenson and Herman T. Briscoe were declared winners of the Sophomore Discussion held last night in Kirkwood 23 on the subject 'Should Congress Further Restrict Immigration before the Close of the War?'”

Later that spring Stevenson won in the final contest, but in the next year Briscoe attained high recognition. In 1916-17 he was president of the Indiana Debating League, a campus organization to promote interest in debating and public speaking. Also, he belonged to the Public Discussions group sponsored by the Extension Division and through it discussions were held in various places throughout the State. A picture of the group of 20 men, including Wendell Willkie, appears in the 1916 Arbutus, the students' annual yearbook.

The war continued to affect the lives of students and the operations of the department of chemistry. On 7 January 1918 the IDS reported on actions “to Secure Continuation of Chemical Students in School:”

“A movement is on foot under the direction of the American Chemical Society to obtain from the Secretary of War some ruling regarding the continuation of junior and senior chemical students in their college work up to the time of graduation, as has been done with doctors and, to a certain extent, with engineers. There is already a great scarcity of chemists and the situation promises to be more serious later. In filling out a report for the American Chemical Society, Professor Lyons found a decrease of about thirty per cent in
the number of students enrolled in chemical courses this year over that of last year."

The fervor for war action, including employment in war-related industries, was apparent almost everywhere. In the announcements column of the IDS on 21 May 1918 the I.U. placement officer William A. Rawles published an item entitled "Notice to Chemists and Others," as follows:

"The Air Nitrates Corporation will soon require the service of a large number of operating employees, including chemists, skilled and semi skilled mechanics, as well as intelligent men without special training. The range of salaries per year at beginning will be approximately:

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<th>Role</th>
<th>Salary</th>
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<tbody>
<tr>
<td>Operators</td>
<td>$1,000 up</td>
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<tr>
<td>Sub-foreman and chief operators</td>
<td>1,800 up</td>
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<tr>
<td>Foreman</td>
<td>2,100 up</td>
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<tr>
<td>Asst. superintendents</td>
<td>2,700 up</td>
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<td>Superintendents</td>
<td>3,000 up</td>
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"I have notification also of openings in a dozen or more other factories."

The Registrar J. W. Cravens also called attention, through the IDS, of placement opportunities. On 23 May a notice stated that a large copper company had places for ten men with degrees in chemistry. It specified that "The salary at first will be $125 per month with opportunities for advancement." That month it was expected that about 146 AB degrees would be granted in June. Out of this number 11 were expected to be majors in chemistry.

CHEMISTRY FACULTY AND WORLD WAR I

Of course the faculty had various responsibilities, some of which were induced by the excitement and stress of the war. For Lyons a letter by President Bryan to him on 28 May 1918 indicated that he had appointments on the following committees:

- Graduate Council
- National Defense
- Promotion of University Interests
- Schedule
- Student Health
- Written and Spoken English

The great flu epidemic in fall 1918 severely affected the campus including the Student Army Training Corps and the Department of Chem-
chemistry. As chairman of the Committee on Student Health, Lyons had considerable responsibility. He signed the quarantine that banned all students from “going into the city for any purpose except for the prompt execution of necessary business.” It specified that “On the campus, dances, movies and large social gatherings are prohibited.”

During the war years, the decade preceding, and for approximately two decades thereafter Mathers was the most productive member of the department in research and in professional recognition for his work. Of course it was widely understood that his success was in applied research. Even by 1917 he and students working with him had published more than 45 research articles. The first article, which was coauthored with O. W Brown, appeared in 1906. Nearly all his research in this active period of more than 40 years dealt with electrodeposition of metals, perchlorates, selenium, tellurium, isolation of fluorine, and lime and limestone. His greatest pride was in his unexpected isolation of fluorine in the development of a practical method for the production of the element. His was the first isolation of fluorine following the original work more than thirty years earlier by Moissan in France. This was accomplished during the summer of 1918 as a part of the war effort while he was working for the Chemical Warfare Service in Washington, DC. The basic equipment in these experiments was brought to Indiana University and from time to time it is displayed.

The fluorine research was indeed original but the method was related to that used by Moissan. Patents on the process were granted to Mathers in 1919 and 1924. Also in 1924 a patent was awarded to Mathers and B. Humiston, one of his associates, when he did research on fluorine in Washington. The latter was concerned with methods and apparatus for isolating fluorine. From 1919 to 1924 the work was also published in the *Transactions of the American Electrochemical Society* and elsewhere.

From at least the time that Mathers became a full time member of the faculty in 1907 until he died in 1973 apparatus and baths for the study of electrodeposition of metals were in place and frequently in operation in his laboratory. His extensively filled research notebooks dating from that time are in the Archives of the Department of Chemistry. A unique six-foot high cupboard with glass doors was in his laboratory apparently from the early days of his teaching and research. The glass panes in the doors became extensively etched from HF in the atmosphere of his laboratory. Also, they were largely covered with clippings he had taken from newspapers and magazines that were of national and international interest. Such items were also frequently circulated in his classroom to help the students become aware of events that he believed were timely and important. He read extensively and he wanted the students
to be avid and thoughtful readers. The notable cupboard was transferred to the William Hammond Mathers Museum of the University in 1986.

More than any other colleague in chemistry during his active years, Mathers took every opportunity to attend professional meetings and to be involved in the appropriate professional societies. In 1904 he attended the first meeting of the Electrochemical Society and in 1909 he became a member. In 1917 he was made a member of the Technical Committee on Electroplating. He rarely failed to attend national meetings of the Electrochemical Society. He also took an active part in the meetings of the Indiana Academy of Science. At least 12 of his papers were published in the Proceedings of the Academy. The first of these was in 1908.

Dr. Mathers occasionally addressed local and state groups concerning his research and observations on timely matters. For example, as reported in the IDS 16 December 1916, he spoke on nitrogen and nitrates at the monthly Sigma Xi meeting. World War I was raging and among other problems thoughtful people were concerned about the availability of nitrates. The commercial fixation of nitrogen was in its infancy in this country and world shipping was greatly disrupted by the war. Concern for the discovery and application of knowledge in the utilization of natural resources through good chemistry was obviously the focus of Mathers' attention outside the department as well as in his laboratory and classroom.

**POST WAR ADJUSTMENTS**

It could be assumed that soon after the end of the War significant revisions would occur in the chemistry course offerings, but the developments were slow and not impressive, at least for several years. There were no substantive changes the first summer. For the first time Brown taught in the summer session. His offerings were unbelievably heavy, including Gravimetric Analysis, Volumetric Analysis, Physical Chemistry, Advanced Electro-Chemistry, Technical Analytical Chemistry, and Research. May taught Physiological Chemistry and Lyons taught Organic Chemistry, one course for premedical students and one for Home Economics students. Davis taught General Chemistry, one course for chemistry students and one for students in Home Economics. Mathers taught summer school classes nearly every year through 1935. In 1936 he and his family, went to California and spent eight weeks away from Bloomington.

The adjustments of the department to new challenges and opportunities following the end of the War were focused on the development and greater formalization of graduate study including the provision of work leading to a PhD degree. The national surge in chemistry was in this direction and the university was beginning to be in step with serious
higher education. Also, this must have occurred in part because some of
the undergraduates and candidates for masters’ degrees were unusually
promising. The university had a responsibility to the State to advance in
graduate work. Unfortunately several years elapsed before there were
significant changes in the strength of faculty in chemistry and related
disciplines.

SOME OUTSTANDING STUDENTS

Clara B. McMillen: One of the remarkable students was Clara
Bracken McMillen, AB’21, who later married Alfred C. Kinsey. She gradu­
ated with High Distinction, but did not become a professional chemist.
In 1919 she competed in a national written chemistry examination spon­
sored by Alpha Chi Sigma. Of course, being a woman, she was not a
member. Junior level students from 31 universities, including Illinois,
Minnesota, and Wisconsin, competed. She won first place. As reported
by the Alumni Quarterly in 1920, she had the distinction of being the
“All American junior chemist” and also being the first and apparently
only woman to receive the medal. Moreover, she came to I.U. with the
highest record ever attained in a Fort Wayne high school. The relationship
of this achievement and her continuing superiority in college is reflected
by the comment of the IDS on 25 November 1919 that

“She exhibits splendid ability in chemical research and is now mak­
ing interesting studies of the production of colloidal silver prepara­
rations for medical uses.”

In the immediate post War years a good proportion of the students
were stimulated by the fast increases in chemical knowledge and the
opportunities to become professional chemists in industry or in academic
institutions. They were encouraged by each other and by the small faculty
even though a number of universities had much greater depth in chemistry
and the research was more basic. Alpha Chi Sigma continued to be the
means for some enrichment in thinking and learning about chemistry
even though most of the speakers were the same faculty they saw every
day or a few of the advanced students. For example, at the first general
meeting of AXE 15 October in 1919-20, as reported in the IDS, about
75 students and a few faculty members attended. Mathers spoke on the
National Chemical Exposition in Chicago the month before. He described
new chemical equipment and rapid changes that were occurring in the
chemical industry. At the December meeting Kenneth Ray, ’21, talked
about “future possibilities of the oil shale industry.” In the last quarter
of the 20th century much governmental and industrial attention was
devoted to the development of suitable methods for the utilization of this
resource.

Of the students listed, J. C. Warner became the most noted. For example in 1920 he was Master Alchemist (President) of Alpha Chi Sigma. During that year he addressed the organization on his experiences during the war period in the government ordnance department of the Barrett Company in Philadelphia. He later became President of the Carnegie Institute of Technology and served in many positions of high responsibility.

Faculty and Student Productivity and the Future

As a measure of chemistry faculty and student productivity in research during 1917 to 1921, Mathers had 14 research publications and two patents, Brown had four publications and no patents. May had one publication and no patents, and Lyons had no publications and one patent. However during 1922 Brown had seven publications. Mathers and Lyons were the most prominent in speaking on chemical subjects at meetings of scientific groups. Virtually all of their work was done with the participation of promising students.

Through the 1920s and the first two thirds of the 1930s Lyons was to give special attention to the beginning of doctoral work in chemistry, the design and construction of an excellent chemistry building as measured by prevailing standards, and the continuation of the placement of chemistry graduates. However, the most important development in this long interval was the emergence of Dr. H. T. Briscoe as a great teacher and wise administrator.

References

The sources of information include the following:
Letters and some other documents in the Indiana University Archives and in the Archives of the Department of Chemistry
Many filed issues of the Indiana Student, Indiana Daily Student, and Indiana Alumni Quarterly
Catalogs of Indiana University
Day, H. G. Fusanobu (Paul) Isobe (1884-1964: An Early Japanese Graduate of Indiana University.) 1987 (Unpublished). This is a biographical sketch and Dr. Isobe’s English translation of parts of his autobiography: The Last Will of Love. Copies are in the Archives of the Department of Chemistry and in the Indiana University Archives.


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Chapter IV

The Last Seventeen Years Under Lyons: 1921 - 1938

The most notable changes during the latter half of Lyons’ headship were the beginning of doctoral graduate work in chemistry soon after the end of the World War and the planning and construction of the Chemistry Building which was dedicated in 1931. Besides these changes one of the most significant developments was the maturation of H. T. Briscoe. He received a Ph.D. degree in the department in 1924 and by the time of Lyons’ resignation in 1938 he had quietly demonstrated to the university that his administrative wisdom and awareness of the pressing needs in the Department of Chemistry should be trusted. This was recognized by Lyons. Also, he had attained favorable national attention as an up-to-date and accomplished teacher and textbook writer.

GRADUATE SCHOOL AND ADVANCED DEGREES

The formal organization of a graduate school did not occur until 1904. In this development Indiana University was first in this State. However the catalog for 1881-1882 included an “Outline for postgraduate degrees.” The graduate school at Purdue was established in 1929 and at the University of Notre Dame the time was slightly later. However, at Purdue the first Ph.D. degree was actually conferred in 1928. Even at
the University of Michigan, one of the preeminent institutions in the
middle west to promote advanced work in chemistry, the graduate school
was not established until 1912. Even so the first A.M. degree was con­
firmed in 1849 and the first Ph.D. degree in 1876 (A Guide to Graduate
Study, 1957). In the same year Johns Hopkins University came into being
with strong emphasis from the beginning on advanced work. It was the
pace setter. Under Ira Remsen (1846-1927) in the new university at
Baltimore, and particularly in chemistry, the emphasis was on discovery
and not just the transmission of knowledge. Earned doctoral degrees
were awarded beginning soon after 1876. Indeed by the turn of this
century, as pointed out by Remsen's biographer (Miles, 463), "more than
half the first-rank academic chemists in the country had trained at Johns
Hopkins." Dr. Remsen eventually became president of the university.
His widely used textbook on general chemistry was adopted in the
department at I.U. around the turn of the century. Also, it was studied
by Dr. Mathers before he enrolled at I.U. in 1899.

The high quality of the faculty and their achievements at Michigan,
Johns Hopkins, Cornell, and several other places could stimulate and
guide the developments at Indiana; but the effect was to remain minimal
throughout the Lyons years and the presidency of W. L. Bryan.

In 1908, the year that C. Eigenmann became the first dean of the
graduate school, thirty Master's degrees were awarded by the university
and in 1912 the first earned Ph.D. degree was conferred. But the number
was not a good measure of quality. Writing about the beginning Clark
(III, 354) stated that

"...the university did not take the second step of keeping pace with
expanding American graduate schools during the next three decades."

In a discerning analysis Clark concluded:

"Too little progress was made in Bloomington during the decades,
1908-38, in giving graduate work in Indiana University, other than
according it a subsidiary status to the central undergraduate tradi­
tion. Neither the Board of Trustees nor the Indiana General Assem­
bly gave the necessary attention to this phase of university expansion.
The Bryan administration had given devoted attention to under­
graduate instruction, and in a highly restricted fashion had encour­
eged some professorial research. No effort, in the modern sense,
however, was made to develop a functioning graduate faculty ca­
pable of broadening the horizons of knowledge in various fields of
intellectual interests. The Indiana graduate program in essence grew
like an untended volunteer in the garden of instruction, each de­
partment designing its program, setting its standards, and certifying its students.”

First Earned Ph.D. The first Ph.D. degree in chemistry was awarded to Leo L. Carrick in 1921. Prof. Brown directed the work. It was published under Carrick’s name only in the *Journal of Physical Chemistry* 25, 628-659 (1921). The title was “Solubility and Cooling Curves of the Mononitrophenols.” The thesis format was good and comparable in style and content to those accepted throughout several following decades. The introduction began with the theoretical work of van’t Hoff. The fundamental thermodynamic equation was used to establish the basis of Carrick’s work. One of the five conclusions was:

“The law used to calculate the cooling curves for the binary mixtures is shown to be equally suited for calculating the cooling curves of the ternary mixtures.”

The modesty of the resources both in facilities and faculty is in sharp contrast with the identifying statement on the last page:

Laboratory of Physical Chemistry
Indiana University
Bloomington

Carrick’s first publication with Brown was in 1919, in the *Journal of the American Chemical Society* (41, 437-440), and entitled “Catalytic preparation of the amido-phenols and phenylenediamines.” During the next four years there were eight other publications by Brown and two other students, C. O. Henke and J. C. Warner, on the preparation of such compounds.

Carrick was born in Wisconsin. He received a B.S. degree at Valparaiso University in 1908, an A.B. and A.M. at Indiana University in 1909 and 1915 respectively. For five years he was a high school teacher and for a few years he was a commercial storage battery engineer in association with Brown. After receiving his doctoral degree he joined the faculty of the Agricultural College, State College Station, at Fargo, N.D. where he eventually became Dean of the School of Chemistry and Technology. At that institution he focused on paints, varnishes, and lacquers. In these areas the North Dakota school became nationally recognized.

Other Early Ph.D.’s. During the first five years, from 1921 through 1925, six other students received Ph.D. degrees in chemistry. The recipients, all with A.B. and A.M. degrees at this university, their thesis research directors, employment in 1930, and thesis titles were:
Clyde O. Henke, A.B.'19, with High Distinction, A.M. '20, Ph.D.'22. Brown. Director of research in catalysis, Newport Chemical Company, South Milwaukee, Wisconsin.
  I. Catalytic preparation of aniline. II. Catalytic preparation of azobenzene.
  The catalytic activity of lead.
  Electrolytic preparation of the amidophenols.
  The Properties of Dolomitic Lime as Related to the Properties of the Stones, the Conditions of Burning, and Subsequent Treatments.
  The Nitration of Hexamethylenetetramine
  I. The Reduction of Nitrocompounds with Iron and Soluble Chlorides. II. Side Chain Oxidations by Means of Nitro Compounds.
  The Warner thesis, like Carrick's in 1921, was a bound reprint of research already published (J. Physical Chemistry). O. W Brown was a coauthor. A brief dedication expresses "Appreciation of his (Brown's) Interest in Problems of Theoretical and Applied Science." Two related publications were bound with the "thesis" and Prof. Brown was a senior author with him.
  The thesis by Briscoe, like Warner's, was well written and substantive. It obviously represented much systematic, well planned, and well executed work. It compares favorably in every way with the best theses during all the years under Lyons' headship. One thesis, by G. C. Hale, is so deficient in basic information, and style it must be rated very low. However, the resulting publication in the J. Am. Chem Soc. in 1925 constituted the basis for the mass production of the powerful explosive RDX in winning the Battle of the Atlantic against German submarines during World War II.
  Based on the meagerness of resources, the heavy time constraints on the faculty, and the relative isolation of both students and faculty from intense and basic research stimulation, it can be concluded that the doctoral program made a better start than could be expected.
Expansion and Developments Elsewhere. Other changes favorable to chemistry were going on at this university. For example, in the same year that the first doctoral degree in chemistry was granted, the Department of Music became the School of Music, with Prof. Winfred Merrill the new dean. He had joined the faculty two years before. As concluded by Myers in his history of the university (p. 243) there were few developments during Bryan’s tenure as president that were “more remarkable than that which has occurred in music.” Of course music was to flourish and become more impressive over the years. This was of importance to the development of chemistry because, in part, excellence in music pleases and attracts good chemists. Shortly after he came to the university, Prof. Merrill stated that when President Wylie died in 1851 “there were but fourteen people listed as musicians in the whole state of Indiana.” As reported by Myers, in 1920 Prof. Merrill asked a convocation audience of faculty and students for a show of hands of those who had ever heard a symphony orchestra. Only seven responded out of an audience of more than a thousand. In that year there were slightly less than 4000 students in the university. Within the next half century both the School of Music and the Department of Chemistry became internationally known and respected.

Although in the 1920s chemical research at Indiana University was not creating new breakthroughs much was happening elsewhere that would influence developments. In 1921 Frederick Soddy received the Nobel Prize for discoveries that as we now know established radiochemistry as a major discipline for research and societal applications and debates. Two years later Fritz Pregl was similarly recognized for his breakthrough developments in microanalysis. In 1921 insulin was identified by Banting and Best and various basic biochemical advances were occurring. In 1923 duPont began to make Cellophane commercially. Such developments were occurring in many areas and many countries. The American Chemical Society began the publication of the News Edition of Industrial and Engineering Chemistry. This stimulated greater attention to the importance of chemistry as a source of “better things for better living.”

At Indiana University this was indirectly advanced in various ways besides the beginning of a Ph.D. program in chemistry. This included the creation of a School of Commerce and Finance (now School of Business) in 1926 and the erection of a building for it (now Rawles Hall) in 1922. The developments in that school, equal to music but in a different way, complemented chemistry and the related sciences. Eventually many chemistry majors were to take courses in business.

Also in this decade the American Chemical Society became energized both in beginning the emphasis on educational standards for chem-
istry as well as the applications of chemistry through industry. As reported in *A Century of Chemistry* by Skolnik and Reese in 1976 (p. 21),

"In the years 1917-27 the ACS formed nine new divisions, more than in any similar period before or since."

Through the increasing encouragement of students and faculty in chemistry to think and act professionally the ACS became a potent force for the development of academic chemistry here and elsewhere.

**Chemistry Library Developments**

Teaching and research without basic library resources available to students and faculty is unthinkable. This was continuously recognized by Lyons, but throughout all his more than 50 years at Indiana University the library resources in chemistry were always starkly inadequate. However through great care in using the meager allowance for chemical books and journals, in 1931, when the Chemistry building was dedicated, Lyons was able to list in his brief history of the department 36 important chemical journals and reference works which were at that time in the chemistry library. In addition, several general scientific journals in the university library were named. The resources in physics, mathematics, and other related areas were equally very limited.

Indeed Lyons wrote in his history (p. 30)

"From 1886 until 1900 the private library of the head of the department surpassed that of the University in the special field of chemistry."

Although he possessed valuable books, the holding did not constitute a library in any real sense. Also, the lack of resources reflects adversely on the university and the predecessor Dr. T. C. Van Nüys. Dr. Lyons correctly concluded that the Chemistry Library resources were "inadequate because of limited library budgets."

In 1954 Mildred Hawksworth Lowell interviewed Dr. Briscoe and others about the library resources. Briscoe had been increasingly identified with the department since he enrolled at I.U. as a freshman in 1912. He informed Ms Lowell that the Chemistry Library was initiated by Lyons in the 1890's. While Lyons was a doctoral student in Europe before returning to the department in 1895 as head, he was authorized by the trustees to procure some books and laboratory equipment. In the catalog for 1895-96 (p. 82) a chemistry library is first mentioned: "The departmental library is open daily from 8:00 A.M. to 5:00 P.M." Until that time virtually everything about chemistry in the catalogs seemed to in-
volve the performance of exercises in chemical analysis. There was no indication that a chemical library was of much importance.

Dr. Briscoe remembered that the chemistry library was first in a room on the west side of Wylie Hall on the second floor. It must have been adjacent to Lyons’ office. By 1912 this library was at least nominally connected to the central library and one of several departmental libraries. The IDS reported 1 March 1922 that through the University Library more than 150 volumes of scientific works had been ordered from Germany and these were to become a part of the chemistry library.

When the department moved to the new Chemistry Building in 1931 the library occupied a room at the northwest corner of the first (now ground) floor. Adjacent to it was the office for the department and adjacent to that office was Lyons’ office. A door connected the library and chemistry office. The chemistry secretary served also as librarian. Some of the limited library supervision was handled eventually by some part-time student help.

Beginning in the 1940’s the chemistry library experienced rapid growth in acquisitions, size, and services. In 1940-41 offices for the chairman and department were moved to the east end of the second floor and the library was expanded to occupy all three rooms, with the original room serving for reading and current periodicals, reference works, and work space for the librarian. The other two rooms were stack rooms. This was necessary in part to meet the needs of the new Department of Bacteriology which was established in 1940-41 with occupancy of rooms at the west end of the third floor. The library resources of that department were quickly developed with increasing need for space and management.

During the transition in 1940-41 Mrs. Cleona Harvey was the last chemistry secretary-librarian. The first Chemistry-Bacteriology librarian was Mary Olive Ballou serving through 1941-42. During the next decade several other persons held this position. When the bacteriology collection was combined with the biology libraries to form the large library in the newly constructed Jordan Hall in 1955 the Chemistry Library soon expanded to fill all the available space. The developments following the end of the Lyons years will be presented elsewhere in this record of the Department of Chemistry.

CURRICULUM FOR GRADUATE WORK

At the beginning of doctoral level work in chemistry the only distinguishable difference between the undergraduate and graduate curricula were the provision of opportunity for independent research work under some faculty supervision for the graduate students. Initially there were no credit hours for such research. There were no courses limited to graduate students, or with such prerequisites that only graduate students
could qualify. There were no categorical distinctions between faculty with
the apparent capability of teaching or directing the work of graduate
students.

In the catalog of the “College of Liberal Arts” in 1921 the chemistry
faculty consisted of:

“Professors Lyons, Davis (absent on leave, 1920-21); Associate Pro-
fessors Brown, Mathers, May; Instructors Henke, Warner (resigned
March 5, 1921).”

The catalog of the Graduate School showed in 1919-20 that the
chemistry faculty consisted of exactly the same persons except that Hale
was listed, and he was the only “instructor.” It was stated that he was
“Absent on leave in the military service from December 1, 1917.” For
several years the only directors of graduate research were Lyons, Brown,
Mathers, and May.

The catalog for 1919-20 stated:

“The graduate work in the Department of Chemistry, leading to the
A.M. and Ph.D. degrees, comprises advanced laboratory, lecture,
library, and seminary(sic) work in the lines indicated above (inor-
ganic, organic, physiological and physical chemistry, and — elec-
trochemistry, technical analytical chemistry, and electrometallurgy),
and special graduate courses described above.”

There were four special graduate courses and each was listed as
Research starting with number 50 and ending with 53. The first was
organic or physiological chemistry under Lyons and May; the second
was chemistry of the alkaloids under Davis; the third was electrochem-
istry, electrometallurgy, and physical chemistry under Brown; and the
fourth was inorganic chemistry under Mathers. There is no indication
that Davis ever directed any work on alkaloids or that he published
anything on this subject since his doctoral work was published in 1897.

DR. DAVIS, UNFORTUNATE MISJUDGMENTS

In retrospect the prominent identification of Davis with the de-
partment, which was to continue until 1927, surely had a negative effect
on the perceptions of many productive scientists and others in positions
of academic responsibility. His neglect of chemistry and fascination with
ideas on health and social welfare in which he had little sound training
and knowledge, became an embarrassment. Thus it is important to review
his activities during much of his connection with the department.

Dr. Davis’ strong penchant for speaking on essentially non-chem-
ical topics and before non-scientific groups was so great that he appar-
ently devoted very little time to any area of chemistry and the advancement of knowledge. This is given meaning by reviewing some of his off-campus lecturing activity for a period of five years between 1922 and 1927, as seen by the public through reporting in the IDS during that time.

In October 1922 Davis addressed "the Women's Department Club at Marion, on 'The Economic Status of the Middle Class.'" The next day he addressed the Club at Hartford City, apparently on the same subject.

On 24 February 1923 Davis lectured at Aurora on "City Beautification" under the auspices of the Aurora Girls Volunteer City Welfare Club. Three days later he lectured at Salem on "Health." This was in connection with Salem's Better Health Week program. On 17 December he addressed the Rotary Club at Connersville on "Thrift." There were various similar presentations to non-scientific audiences that year and in earlier years.

By 1925 Mrs. Davis had joined her husband in delivering some popular lectures. On 20 October they were guests of the Culture Club of Columbus, Indiana, on "Indian and Negro Music." The next year, in February, they presented the same subject at Bedford under the sponsorship of the Parent Teacher Association. Then on 13 November 1926, they were joined by a Miss Hutchings in giving the program at Martinsville through the auspices of the Women's Department Club. As reported in the IDS this continued at least until 10 January 1927 when they presented the subject at the First Presbyterian Church of Kokomo.

There were many other public appearances of Davis alone. Always in reporting on the lectures the IDS referred to "Dr. Davis of the Chemistry Department." By 1925 he had begun to speak popularly and to dental groups on various aspects of food, nutrition, and health. At Lafayette in December he lectured before the Jewish Council of Women on "Four Fundamentals of Living." The next month, in Hammond he lectured before the local dental association. However this continued to be interspersed with other topics. For example, in March 1926 he addressed the Woman's Club of Rochester on "The subconscious mind of William Shakespeare." Six months later he was in Kokomo and he spoke to the Women's department Club on "The personal factor in Shakespeare's plays." During the same week he lectured in Indianapolis on "The growth of social personality." Within the same month he spoke at Elkhart on "Fundamentals and necessity of child welfare." This was sponsored by the Child Welfare Department of the League of Women Voters. During the following month he spoke at least two times on such subjects. One was at Rochester on "Four Fundamentals in Living." The next day he was at Bluffton under the auspices of the Country Club Women.
Toward the end of 1926 Davis' fascination with newer developments in nutrition led him to speak to different groups mostly on various aspects of nutrition and health. Soon he focused on diet and the prevention of dental caries and other dental problems.

This may have been stimulated in part by the widespread attention that was being given to scientific advances in the discovery of dietary essentials, and the urging of dietary reforms by esteemed and highly recognized national figures such as E. V. McCollum and H. C. Sherman. By 1925 McCollum had proposed that fluoride in the diet may be important for dental health. He had concluded from the evidence that a nutritionally adequate diet was important. He gave emphasis to calcium, phosphorus, vitamin D and vitamin A. For a long time he was to emphasize the importance of research in preventive dentistry and the advancement of sound knowledge regarding nutrition and dental health.

Unfortunately Davis quickly assumed the mantle of authority and soon he was espousing opinions that were at least misleading if not clearly wrong. Some of his topics and the groups he addressed suggest the extent of his misadventures in acting like an expert.

On 28 October 1926 he spoke on "deficiency diseases" before a joint meeting of Eastern Indiana and Western Ohio physicians at Brookville. In less than four weeks he addressed a group of physicians at Hamilton, Ohio on "the control of the development of the red corpuscles, the basis of nutrition." Three days later he lectured at Connersville on "Health." The hosts were the Rotary Club and Fayette County Medical Society. On 12 March 1927 he addressed the Henry County teachers on "Vitamin (sic) and their effect on the work of an individual." In less than a week he lectured at the Stevens Hotel in Chicago. The subject was "Dental Crises during Lactation," and the host was the Chicago Dental Society. There was scarcely anything in the sound research and clinical observations at that time to warrant such an alarm-filled topic. Two weeks later, on 29 March 1927, he was at Marion and he spoke to the Doctors' and Dentists' Association. Within 12 days he spoke before the Fortnightly Club in Vincennes and three days later he addressed the Ben Hur Dental Society in Crawfordsville. Then four weeks later, on 9 May 1927, he lectured to a convention of doctors and dentists held in Pittsburgh. The subject was "Malnutrition as a predisposing cause for mouth infection." The next day clinics were held where, as stated by the IDS on 6 May, "underweight and dental deficiencies will be dealt with by Dr. Davis." There seemed to be no bounds to the range of topics on which Professor Davis was willing to speak. On 14 October 1927 he and two faculty members from other departments addressed the annual meeting of the Lake County Teachers Association. He spoke on "The physical basis of premature senility."
During the years of such frequent and diverse speaking, and always "from the Chemistry Department," it is not known that Davis ever addressed a meeting of chemists on a chemical topic or on research he had conducted. None of the other few chemistry faculty members at I.U. were so glib in lecturing. In a report on "The Sherman L. Davis Preparations and Propaganda" in the *Journal of the American Medical Association* in 1930 (94, 1163) it was stated that

"Letters to the Journal from Physicians who have heard the lectures intimate that the professor's enthusiasm sometimes seems to exceed his judgment and his knowledge."

Although Davis had been a member of the chemistry faculty over thirty years, there is no indication that he ever published anything that was listed in *Chemical Abstracts*. He was neither a member of the American Chemical Society nor apparently of any other national scientific society.

During the height of Davis' lecturing off campus, and his involvement with the School of Dentistry and University Extension, Dr. Lyons on 7 May 1927 wrote to President Bryan and recommended

"...that his (Dr. Davis') professional appointment be transferred from the department of chemistry, as he may elect, to either or both divisions at Indianapolis."

Lyons added,

"Such an adjustment would give him increased opportunities in the Dental School, and, without increase in the chemistry budget, permit the engagement of two instructors to share the load of undergraduate instruction and also to add to our productiveness through research."

The School of Dentistry had been acquired by the University two years before through the purchase and reorganization of the Indiana Dental College. This had been urged by the Indiana State Dental Society and by others.

President Bryan quickly acted on Lyons' recommendation. Dean F. R. Henshaw of the School of Dentistry endorsed the transfer of Davis "as full time Professor of Chemistry and Director of Nutrition Research." A week later the president responded that the trustees had approved the transfer as requested.

Other related action was equally swift. On 25 May the bursar of the university informed the dean that $2000.00 had been received from the Guggenheim Foundation in support of research. One of Davis' actions
was the beginning of a Foundation for Nutritional Research at Indiana University School of Dentistry. Dean Henshaw wrote to President Bryan in December 1929 stating that an Advisory Council of the Foundation was being formed. Those accepting places on the Council were some “of the most prominent men in dentistry and medicine.” This was indeed true. The list of 28 persons included among others, the director of the dental section of the Mayo Clinic, editor of the Journal of the American Dental Association, dean of the Harvard Dental School, director of the Eastman Dental Dispensary, director of the Dental Division of the Metropolitan Life Insurance Company, Surgeon General of the U.S. Public Health Service, and various prominent professors in leading dental schools. However, none of the 28 were recognized for outstanding leadership in nutrition.

To the credit of President Bryan, questions were raised about the soundness of the glowing enterprise. On 26 November 1929 he wrote to Dean Henshaw about criticisms he had been receiving stating particularly

“... that he (Davis) lacks ... judicial moderation of statement, making extreme claims for the remedies which he has developed and fails to give due recognition to other medicines which are used in a similar way.”

He wrote also,

“I believe that if these criticisms are in any degree justified, Dr. Davis and the School of Dentistry and the University will lose rather than gain in the estimation of the men most competent to judge in such matters.”

Unfortunately Dean Henshaw did not agree that the criticisms were valid. He wrote to President Bryan within a week stating that “I feel better about the prospect of our work than at any time heretofore.”

On the same day that Dean Henshaw declared his faith in Davis, the IDS (3 December 1929) ran an article about the “Foundation for Nutrition Investigations Established in Indianapolis.” The article stated:

“For a number of years this department (directed by Davis) of the University has been making a study of the causes and sources of dental disease, pyorrhea, and erosion. Believing that all these problems are associated closely with nutrition and that studies in this field will inevitably result in the betterment of the human family, the University has determined upon the foundation as the best means of making these studies.”
The euphoric feelings of Davis concerning the alleviation of dental diseases must have been due to his lack of understanding of the basics. His optimism about solving dental health problems in the late 1920s did not seem to be different from his high but ephemeral expectations for great achievement twenty years earlier in his invention of what he believed was a fabulous oil burner, or his belief about 1913 that he had a very promising method for the extraction of gold from gold bearing ores.

As indicated earlier, on 12 April 1930 the Bureau of Investigation of the American Medical Association published its findings, in the JAMA, concerning "The Sherman L. Davis Preparations and Propaganda." The report gave facts that presented Davis quite unfavorably as respects his qualifications for the work in dental health and his judgment if not his ethics in recommending and promoting certain proprietary products which he had concocted. These four preparations were first manufactured by a company in Indianapolis and later in Rochester, Minnesota. The royalties were to be turned over to the University to support the Foundation for Nutritional Research (FNR). There is no indication that any money concerning this was deposited in the Foundation.

The Bureau of Investigation concluded that in due time the newly formed Council on Dental Therapeutics created by the American Dental Association would investigate and report on the actions of the FNR and Professor Davis. The Bureau concluded that

"The entire arrangement constitutes certainly an unusual scheme in its relationship to the practice of either medicine or dentistry."

On the same day that the JAMA reported the adverse findings, 21 April 1930, Dean Henshaw wrote a two-page letter to President Bryan. He acknowledged that "there has appeared a very critical attitude concerning the work we are doing..." Also, he stated

"that it has been difficult to keep Doctor Davis on the 'main track' but I believe that, in the main, all of his lectures and all of our clinical efforts and studies have been confined to the subject of dental caries, for the past year."

The Dean included the draft of a letter he had prepared for submission to Dean Emerson of the School of Medicine asking him to designate persons on the Medical Faculty to meet with him "and determine whether the program is valid or not." The response from President Bryan was only that he would "go into this matter further when a meeting can be arranged."

Dean Henshaw also stated in the letter that rather than subject the University to continuing criticism he would drop the entire program. Finally, he wrote:
"I have Doctor Davis' resignation locked up in my safe, to be effective at any time we may propose. He is willing to go on if we have support or to leave at any time."

There seemed to be only one appropriate solution and that was to accept the resignation. It was made effective 1 August 1930. This was approximately three years after Davis had transferred from the Department of Chemistry.

Following the retirement Davis continued his efforts to help alleviate dental diseases. For a short time he served as professor of chemistry at Georgetown University, but had to retire because of ill health. He died at Indianapolis in 1940. The widow and two sons were survivors.

**Support for Graduate Work**

It is important to focus on the constructive developments, starting with the creation of financial arrangements to support research, including fellowships. From the beginning of doctoral work in chemistry until the 1940s nearly all the limited financial support for graduate students was in the form of teaching assistantships. Until the middle 1920s such assistants generally were identified as instructors. The teaching responsibilities took much time from research.

Probably the first significant public reference to fellowships was in the bulletin of the Graduate School in February 1922. The references, in headlines, were to University Fellowships, the Lawrence Fellowship in Astronomy, Fellowships in Chemistry, and Special Fellowships. Under the chemistry heading the bulletin stated:

"The Grasselli Chemical Company of Cleveland, Ohio, maintains at the University two fellowships in chemistry, and the National Lime Association of Washington, D.C., one fellowship."

Chemistry and Astronomy were the only departments listed as having departmental fellowships. The first year of the Grasselli award was 1919. Apparently this was the first fellowship in chemistry at Indiana University.

Dr. Mathers was clearly the most successful in moving ahead on the establishment of fellowships and grants for other assistance in research. Professor Brown was not far behind in the 1920s. Campus-wide awareness of Mathers' increasing stature and effectiveness in research was created largely through the IDS. On 2 November 1921 it stated that

"As a result of research work done by Associate Professor F. C. Mathers in the Department of Chemistry concerning the effect of addition agents in the electroplating and deposition of metals, In-
Indiana University has been awarded a permanent fellowship in chemistry by the National Lime Association."

Of course the term permanent was an exaggeration but the support was intended to continue for considerable time and it did.

Reports in the IDS generally gave considerable information on recipients and the nature and purpose of problems investigated. The reports were essentially a window to the department and they expressed the pragmatism of Dr. Mathers and the students. For example, the Indiana University Quarterly in 1922 stated

"The (Lime Association) fellowship ... will be maintained for research work applying to development and utilization of Indiana limestones as well as limestones from without the state."

In general, graduate students in the 1920s preferred research fellowships over teaching assistantships, as they have for many decades. For example, when the Lime Association fellowship became available in 1922, Russel L. Hardy, AB’22, AM’23, resigned the teaching assistantship that had been offered to accept the fellowship. The IDS stated in November that:

"The major research now being carried on by the Association is to devise some method of producing a lime plaster which will set up quickly so as to make it possible for a plasterer to put on the finishing coat immediately after he had made the first. This is the problem which Hardy is attempting to solve."

Again on 15 May 1923 the IDS reported extensively on Hardy’s achievements in his research. Dr. Mathers was quoted as stating that Hardy’s

"...discovery is of great importance to the lime industry in that it will give the lime manufacturers a great increase in business."

Prominence was given to the research at that time in the first issue of the News Edition of Industrial and Engineering Chemistry. The headline stated “National Lime Association Research Bearing Fruit.” Mathers was reported to be making progress on quick setting lime. The other recipients of support for one fellowship each were MIT and Ohio State University. The same IDS article stated that Mathers had recently returned from Washington

"... where he conferred ... concerning two patents which have been made to cover the research work completed by Mr. Hardy."
The Grasselli award was less restrictive in its use. In 1921-22 the recipients were Paul Breitmeier, AB'21, AM'22, and Glen Hamiel, AB'22. The awards in 1922-23 were to Eugene Scudder, AB'21, AM'24, PhD'30, and Samuel Shirley AB'24, AM'24. From time to time a representative of the company visited the department to confer with the fellowship holders and their faculty directors. James L. Hogan, AB'21, AM'22, was one of the first two recipients of the award. The other was Kenneth W. Ray, AB'21, AM'22, and PhD'26. There were no publications of Hogan's work but Ray and Mathers published at least three papers on the effects of temperature and time of burning upon the properties of lime, the colloidal behavior of lime, and the plasticity of lime.

**Men Only:** There were continuing news items regarding research supported by fellowships in chemistry. The exclusionary reference to men only in such awards is striking to all when read many decades after the fact. On 19 February 1926 an announcement was made that two fellowships, by the Grasselli Corporation, and six scholarships "under the jurisdiction of the Graduate Council" would be available. Concerning the first, it was stated that "Preferences are given to men interested in industrial work." The awards (Graduate School fellowships) were "open to men students who have completed one year of graduate work." The industrial awards paid $350 each, with exemption from university fees, and the graduate School Awards paid $500.

The IDS of 18 February 1926 reported that

"...six graduate students in the inorganic chemistry laboratory class are doing research under the direction of Dr. Frank C. Mathers."

They were: Verling Votaw, AB'25, AM'26, studying the production of stucco from dolomite limestone; Worth Fletcher, AB'25, AM'26, PhD'27, studying how to make lime plaster harden quickly; Philip E. Stroup, AB'25, AM'26, searching for a continuous process in the production of fluorine; Harold G. McFarlin, AB'25, AM'26, searching for a better way to minimize the need to polish silver plated tableware; Kenneth W. Ray, who had returned to earn a PhD degree, was searching for better ways to produce "any kind of lime that is desired" from limestone; and Paul G. Snively who had just arrived from Indiana Central College to begin research. It is noteworthy that all were men and all but one had completed his baccalaureate work at Indiana University.

About this time, in 1926, it was finally specified that the Graduate School awards were fellowships and they were open to women as well as men. Also, the value was raised from $500 each to $600. Generally at least one of the six was given to a chemistry graduate student. Contrary to the policy several years later, holders of such awards could be required to give some service to the university.
The Grasselli fellowships continued, but the support from the National Lime Association apparently was discontinued before 1931. However the esteem of the department must have been elevated on campus, if not in the State, when it was announced in January 1930 that the duPont Company had established a $750 fellowship.

Another new, but distinctly less prestigious fellowship for chemistry was the Gulf Coal Saver company award. In 1930-31 it was held by George S. Stackhouse.

In 1930-31 Frank G. Uhler and Foster L. Pepper held the Grasselli fellowships. Robert C. Gore was one of the six holders of university fellowships.

Another advance in the development of research was in 1935 when the Sherwin-Williams Paint company granted a fellowship. The first recipient was Alvin Borders, AB'35 with Distinction, AM'36, PhD'37. He had worked in the company’s research department before receiving the award. After completing his doctoral degree he joined the research division of the Goodyear Rubber Company. Later he became a leader in the 3M Company.

One of the last advances in research by industrial fellowship holders while Lyons had responsibility in the department was by two students, Lyle I. Gilbertson and Aaron Johnson. The awards were sponsored by the American Silver Producers Association. Mathers directed the work. Both students received Ph.D. degrees in 1939. Dr. Mathers rightfully took considerable pride in the discovery of a way to electroplate silver directly upon iron and steel. In 1937 the finding was reported to the Associated Press by Howard W. Blakeslee, editor of the AP science staff. Sometime later, among other recognitions, Dr. Gilbertson became President of the American Electrochemical Society.

This era of rather limited but productive industrial sponsorship of research through fellowships was soon to change with the emphasis on synthetic organic chemistry. Also, within ten years federal support for graduate and postdoctoral research was to become dominant.

**The First Postdoctoral Fellowship**

Robert D. Blue, AB’30, PhD’32, was the first recipient of a postdoctoral fellowship in chemistry, and perhaps in the entire university. The award of $1000 was made by the American Electrochemical Society and designated the Weston Fellowship for work during 1933-34 under the direction of Mathers. A letter from Lyons to President Bryan illustrates the unpreparedness of the university in dealing with postdoctoral workers in research. He wrote:
“Previously we have not had an outside fellowship for post-PhD work, and it is desirable to have a ruling as to Mr. Blue's university status.”

His suggestion was to designate Mr. Blue as “Special Fellow of the American Electrochemical Society.” He believed Mr. Blue should be “listed as a graduate student exempt from fees except breakage and depreciation.” The president’s response, on 29 September 1932, did not indicate awareness that this appointment could make a major step forward for I.U. He simply wrote

“that the Board of Trustees has discontinued the practice of remitting fees for Fellows.”

The research, under this first postdoctoral fellowship, discovered, as stated by Blue, “a new method for electroplating upon other metals.” He dissolved aluminum in anhydrous ethyl formide and benzene. In this system, he stated, “Aluminum can be electrodeposited upon other metals — in the usual way.” Dr. Mathers wrote that this “... is one of the important research developments of recent years in chemistry.” At the conclusion of this research Dr. Blue joined the research staff of the Dow Chemical Company where he became prominent. In 1932 a U.S. patent was issued to Dr. Mathers and Dr. Blue on the electrodeposition of aluminum.

EVALUATION OF CHEMISTRY FACULTY

His level of research activity and teaching, and the productivity that had been occurring, justified Mathers’ promotion from Associate Professor to Professor in 1923. Brown’s longer tenure apparently was a major factor in gaining his promotion to professor in 1921. The evaluation of these men and May by Lyons is stated concisely in a letter from him to President Bryan on 21 May 1921. He wrote:

“O. W. Brown ... is thoroughly competent, a good personality, and is worthy of a professorship. In my judgment he should be one of the first three or four promotions.”

Concerning Lyons’ enlightening appraisal of Mathers he stated:

“Dr. Mathers is an aggressive and competent teacher and a productive investigator. His teaching schedule has at times favored his research activities. A list of publications is larger than that of any man his age in Indiana faculty. He is a valued man in graduate work.”
In his evaluation of May too much credit probably was given for his teaching and research. It was stated that “Further promotions of Drs. Mathers and May should be considered together.” This may have delayed the promotion of Mathers. The apparent recommendation to promote them at the same time was not followed; the promotion of May was delayed.

The catalog in 1926 listed the chemistry faculty as:

“Professor Lyons, Davis, Brown, Mathers; Associate Professor May; Assistant Professor Henke (absent on leave during 1925-26), Briscoe.”

RISE OF H. T. BRISCOE

The rise of Dr. Briscoe in the esteem of the entire campus and the alumni was special and unforgettable. After returning to the university from Colby College, where he was instructor in chemistry from 1920 to 1922, he served as instructor at Indiana while he completed AM and PhD degrees in two years. This was under the direction of Dr. Mathers. From 1924 to 1926 he was Assistant Professor. Then for the next two years he was Associate Professor. He held the rank of Professor of Chemistry from 1928 until his death in 1960.

The year 1928 was especially memorable for him personally and of immense interest to his friends. Up to that time he seemed to be almost totally preoccupied by work. But in May a graduate student in chemistry, Meredith Pleasant (Sparks), arranged for her roommate, Orah Cole, to have a blind date with the bachelor Briscoe. The ignited romance swept the couple along and on 15 September they were married. Perhaps this was aided by his promotion to Professor that summer.

One of the several good measures of Briscoe’s rising status was his inclusion in the second edition of *America’s Young Men*, as reported to all concerned in the IDS 23 April 1936:

“*The book contains biographies of 6,010 men (sic) of distinguished achievements in government, commerce, industry, economics, science, art, education, agriculture, and the professions.*”

It was the “Who’s Who” for persons 45 years of age or younger. Only six other younger generation persons at I.U. were included: W. G. Biddle, C. L. Christenson, B. C. Gavit, F. E. Horack, A. C. Kinsey, and H. B Wells. Only Briscoe and Kinsey were scientists. In 1934 *Who’s Who of America* listed Briscoe and Lyons. Fifty-eight other I.U. persons were listed. Also “starred scientists” in earlier editions of *American Men of Science* are noteworthy. The IDS on 4 October 1921 named seven members of the I.U. faculty so designated in the third edition. None were
connected with the department of chemistry. They were Drs. Bryan, B. D. Myers, W. J. Moenkaus, A. L. Foley, D. M. Mottier, C. H. Eigenmann, and F. Payne.

Another notable measure of Briscoe's high recognition on campus and in the state was the frequency of his invitations to address groups varying greatly in interests and purposes. The following represent the frequency and nature of the occasions:

12 May 1925 Bloomington High school Science Club. "The Structure of the Atom"
27 May 1925 Alpha Chi Sigma banquet. Topic not announced.
28 Feb 1928 Alpha Chi Sigma open meeting. "Petroleum from Coal."
11 Mar 1931 I.U. Physics Club "Atomic Theories"
22 Oct 1931 Alpha Chi Sigma open meeting. "Alchemy"
28 Oct 1933 I.U. Sigma Xi "Two Decades in History of Chemistry"
16 Nov 1934 I.U. Junior Home Economics Club. Topic not announced
22 Nov 1934 I.U. YWCA "Conflicts Between Science and Religion." He stated that "This conflict in the minds of people occurs when they have not become learned either in religion or in science."
28 Mar 1935 On behalf of the publicity department of I.U. he had shortly before spoken at high schools in Daviess, Martin, and Orange counties on opportunities for specialization by going to I.U.
2,3 Mar 1936 With three other faculty members (A. L. Kohlmeier, R. W. Holmstedt, and M. T. Eaton he talked with high school seniors in Petersburg, Otwell, Winslow, Oakland City, Loogootee, Plainville, Elnora, and Odon.
18 Apr 1936 Indiana State High School Chemistry Teachers' Association, at Purdue. "Causes of Students' Difficulties in Chemistry."
12 May 1936 In class on Life Views of Great Men of Science he spoke on "John Dalton and the Atomic Theory."
22 Oct 1938 Indiana section of ACS at meeting in Bloomington. “The Place of Chemistry in Indiana University.”

Briscoe’s most enduring contributions occurred in university administration. This was largely in close collaboration with H. B Wells during nearly all the years of Wells’ presidency of the university.

OUTSIDE SPEAKERS

The general thought, concerns, and actions on the campus in the latter half of Lyons’ headship of chemistry are reflected in the reporting of the IDS and in other news media. This was especially noticeable in the coverage of lecturers at I.U. On 24 March 1921 V. Stefansson, the noted Artic explorer, lecturer, writer, and consultant, gave a convocation address at the old Assembly Hall. Some prominence was given to his claims, amplified in the lecture, that he had “lived for years on meat alone and liked it better all the time.” Although some of Stefansson’s views were controversial — including his convictions on the nutritional adequacy of an exclusively meat diet — the lecture at least stimulated thought.

Nationally known speakers did not come to Bloomington very often, but as pointed out by Mathers in 1925 (IDS 4 March 1925), “The Science Departments of the University bring some of the most noted men (sic) of the world here.” This was in connection with his continuing urging “that more prominent speakers be brought to lecture in Bloomington to University audiences.” The illuminating article stated:

“ ‘Forest Ray Moulton, astronomer, who spoke at the convocation a few weeks ago was secured only through the Sigma Xi, honorary scientific fraternity,’ Dr. Mathers stated. ‘Other noted men who have been here include Lewis Agassiz Fuertes ... one of the leading of bird artists of the world; Dr. Asher, physiologist, Berne, Switzerland; Dr. Paul Kammerer, biologist, Vienna, Austria; E. V. McCollum of Johns Hopkins University, who has done the most important work in food chemistry, and was one of the men to discover vitamines (sic).’ ”

E. V. McCollum: At that time most of the special interdepartmental lectures were given in “the Physics Laboratory,” now Lindley Hall. When Dr. McCollum first lectured here in 1923 it was under the sponsorship of Sigma Xi. Dr. Lyons was invited to introduce the speaker. This part of the stimulating evening proved to be an embarrassment to Lyons and the host audience. As related to me years later by Professor Paul Harmon, then treasurer of Sigma Xi and a young member of the Department of Physiology, the head of the Chemistry Department bun-
gled the introduction. In his characteristic way of trying to prepare well he had consulted Who's Who or an equivalent source of biographical information. Unfortunately for him, he read the record of W. G. McCallum, the noted professor of pathology at Johns Hopkins University instead of the record of E. V. McCollum, the noted professor of biochemistry at the same institution. Consequently the glowing achievements related to the audience by Lyons did not fit the speaker he was presenting. Naturally Harmon and others in the audience recognized the error while it was occurring, but they could do nothing about it at the time. Graciously Professor McCollum passed it off as nothing important and proceeded to enthral the audience on the subject that had brought him to the campus. It would have been so easy for Lyons to consult one of his knowledgeable colleagues about the speaker in advance. This incident, of course, reflected his tendency to be a loner as head of the department.

During this period the exposure of Indiana's chemistry students to national figures in chemistry probably was as good as the contacts other majors had with persons of eminence in their fields.

**Otto Eisenschiml:** Dr. Eisenschiml was one of the most noted and colorful figures in chemistry who successfully strengthened the public's appreciation of the chemist and the importance of chemistry. He was a guest speaker at Bloomington and Indianapolis several times in the approximately three decades beginning in 1924. Much of his color and reputation came from his dynamic chairmanship of the Chicago section of the American Chemical Society and editorship of the publication of the section, the Chemical Bulletin. He was naturally appreciated by Mathers and many other academic chemists as well as industrial chemists.

In this connection apparently the first off-campus chemistry meeting of I.U. chemistry faculty and students with other comparable persons was at Indianapolis in April 1924. This was through a two-day gathering for chemistry students from colleges and universities in the State under the sponsorship of the Indiana section of the American Chemical Society. About 200 persons attended. Five chemistry faculty members, three teaching assistants, and about 30 students were from Bloomington. The extensive announcement of the lecture by the IDS on 16 April stated that

"A lecture, 'The Chemist and his job,' will be given before the students by Dr. Otto Eisenschiml, of Chicago, a widely known figure in the chemical world."

Two years later Dr. Eisenschiml was again the principal speaker at this convention of state chemists and students. It was attended by about 35 chemistry students and faculty from Bloomington.

**Other speakers:** Other nationally known chemists who returned to speak included Dr. W. D. Bancroft. His return, after nearly two decades
was on 10 May 1927. Sigma Xi sponsored the event which was reported extensively three times in the IDS. The first lecture, on rain making and cloud dispersion experiments was at a Sigma Xi meeting. The second was at a university convocation. He spoke on “The Conservation of the World,” in which he illustrated the problems of gaining the acceptance of promising new ideas.

Surely Dr. Bancroft was much appreciated on campus for his bold assertion that

“Graduate students in chemistry who come to Cornell from Indiana University average higher than students from any other schools, bar none.”

While in Bloomington the speaker was the guest of Dr. and Mrs. Mathers. At least 23 chemists from Indianapolis attended the lectures and a dinner. Unfortunately, shortly after that time Bancroft announced certain views, particularly on anesthesia and drug addiction, that were generally concluded to be fallacious, thus damaging his otherwise excellent reputation.

The next year, on 8 May 1928, Dr. R. D. Moore, Dean of the School of Sciences and Head of the Department of Chemistry at Purdue spoke in Bloomington at the Faculty Club. His topic was the rare gases. Apparently this meeting was not open to students. In October the Dean of the School of Chemistry and Physics of Pennsylvania State College, Dr. Gerald L. Wendt, gave a public lecture on “The Place of Research in Everyday Life and Education.” This also was under the sponsorship of the Indiana Section of the American Chemical Society. By this time the once per year meetings at Bloomington had become a fixed practice. The price of the customary dinner, which preceded the lecture, was $1.00. It was served at the University Commons, then in the Student Building. The IDS named 28 persons from Indianapolis who attended the lecture.

Another lecture given unusual prominence was by Dr. Paul Isobe, AB’09, on 30 March 1931. This was during the same week that the new Chemistry Building was dedicated. He spoke on “Synthetic Ammonia,” a topic of much local interest among industrial chemists and various members of the university community because Isobe introduced the commercial production of synthetic ammonia to Japan and he had made other major industrial applications of chemistry. In the extensive coverage of the visit and lecture the IDS quoted him as stating:

“I always am happy to see the department so nearly unchanged, and to find the faculty members I knew 25 years ago still in their positions.”
This pronouncement by an exceptionally loyal and successful alum­nus unwittingly recognized the problem of long standing: meager re­sources and minimal new strength in the faculty. This was his fourth visit to the university since his graduation in 1909.

The next outside speaker of some prominence was William H. Bell, AM'18, who, like many others, was hosted by Dr. Mathers. He spoke on 30 October 1931 under the auspices of Alpha Chi Sigma. By that time he had become secretary-treasurer of the Coleman-Bell Company. He spoke on the development of the well-known successful business he and Coleman had created within approximately the past ten years. Approximately 140 persons attended the lecture, one of the first by an outside speaker in the new Chemistry Auditorium.

A few weeks later two other prominent outside scientists spoke in the department. They were Dr. Marietta Eichelberger who was Director of Nutrition Service of the Evaporated Milk Association, and Dr. H. E. Barnard, Director of the Corn Industries Research Foundation. Dr. Ei­chelberger was invited by the newly organized Iota Sigma Pi national honorary sorority and Barnard was the guest of Alpha Chi Sigma. She spoke on “The Newer Knowledge of Evaporated Milk” in a public meet­ing on 9 December 1931. The meeting was in “Chemistry 200” and Esther Weber Adams, AB'30, was in charge. The next evening Barnard spoke in the Chemistry Auditorium. The subject was “Food and Health in General.” The focus was on food laws.

The next outside speaker was the noted W. D. Harkins who in 1932 probably gave the first definitive lecture in Bloomington concerning neutrons and radiochemistry. The lecture on Saturday 8 October was sponsored by the Indiana section of the ACS. As usual it was preceded by a dinner. This was “in room D of the Union building,” which was probably also a first for a chemistry dinner in this building because it was not completed until 1932. According to the IDS more than 60 persons attended. Fifty out-of-town chemists registered. President Bryan was pres­ent and, as usual, Dr. Lyons headed the chemistry faculty in making arrangements.

The topic was “The Neutron and the Photography of Alchemy.” In announcing it the IDS stated that

“Site (sic) seeing in Brown County State park, a trip to the art gallery in Nashville, and golf playing on Bloomington golf courses will precede the inspection of the Chemistry building by the visitors at 4:30 o’clock this afternoon.”

The awe of the public, and probably most students and faculty members in conceptualizing the content of the lecture is reflected in the report on it by the IDS:
“Like the mysterious alchemy of the Middle Ages which sought to change the base metals into gold, modern discoveries of 1932 concerning the transmutation or change of elements, one to another, have excited much popular interest, Dr. W. D. Harkins ... told members of the Indiana section ... in the Chemistry auditorium.”

He

“...mentioned three recent discoveries involving transmutation of elements. One is the neutron which seems to have been discovered in the rays emitted by beryllium when it is bombarded by alpha (helium) rays. The neutron represents an element with the atomic number zero...”

This reflects the kind of technical coverage of scientific matters by the IDS in the first third of the twentieth century.

The young member of the faculty, H. T. Briscoe, was uniquely attuned to such discoveries and their implications. Within three years he was to publish a trail blazer book, on “The Structure and Property of Matter.” He was then keeping his students aware of relevant breakthroughs in research through his sound teaching and wise counseling.

Generally graduate students and a few advanced undergraduates in chemistry accompanied chemistry faculty members to meetings of the Indiana section of the ACS in Indianapolis. This was almost equivalent to meetings at Bloomington because a very significant proportion were from Bloomington. An example is the meeting on 13 April 1934 which included Dr. H. H. Willard as the principal speaker. The timely and optimistic post luncheon address, following a tour of the Eli Lilly plant, was by Edgar B. Carter, AB’11, of the Abbott Laboratories on “Getting a Job after the Depression.” The next day, Saturday, Dr. Charles Allan Thomas spoke on “Chemicals Derived from the Pentanes.” This two-day gathering was the seventh biennial student meeting. Virtually all the chemistry faculty and 21 students from I.U. were named in the report by the IDS.

The first Nobel Laureate in chemistry to lecture at Bloomington was H. C. Urey. Sponsored by Sigma Xi, 15 April 1937, he spoke on “Methods for Separation of Isotopes.” Later, in 1953, he was given an honorary degree by I.U. Again he spoke to chemists and other scientists on his brilliant work. In the next several decades a few other lectures were given in the department by Nobel Laureates. At least this level of representation of chemistry was achieved before the end of Lyons’ tenure as Head of the Department.
ALUMNI VISITORS AS SPEAKERS

Occasionally chemistry alumni were invited to address the chemistry students. In nearly all instances the sponsorship was through Alpha Chi Sigma, Phi Lambda Upsilon, or Iota Sigma Pi. One of such early lectures, in 1921, included one by Harold Grey, AB'15, who addressed a meeting of Alpha Chi Sigma and the public on 8 November in Wylie 28. He spoke on his several years with the Goodyear Rubber Company.

In 1922, in October, the IDS gave extensive coverage of the views of Roger Holcomb, AB'18, on the need for an embargo on dyes and dye-stuffs to protect the young American dye industry from a resurgence of importations from Germany and other European countries. He was by that time manager and part owner of the Gary Chemical Company at Chesterton, Indiana. In December that year Stanley Sowder, AB'13, AM'15, spoke at an open meeting sponsored by Alpha Chi Sigma. The subject was “high speed steels.” He was a member of the firm American Twist Drill and Tool Company.

Probably the next chemistry alumnus to speak was not until March 1927 when Earl Blough, AB 1899, came to Bloomington and addressed the chemistry students at an 11 AM meeting. By that time he had become chemical director of the Aluminum Company of America.

A few weeks earlier the IDS gave considerable publicity to the participation of an older graduate student, Florence B. King, who was to earn the PhD in 1929. She was the speaker in the annual campuswide Health Week program. She spoke on “Careful Choosing of Diet.” As reported, she recommended for students: one generous serving of meat, one pint of milk, one egg, two leafy or green vegetables, one raw vegetable salad, fruit, and butter every day. She stated that

“Bread, potatoes, sugars, cereals, and jellies should be in proportion to your weight and whether one wants to gain or lose weight.”

The advice was also given that

“with this there must be a certain amount of ruffage (sic) to get full benefit from the necessary foods.”

This was almost precisely the same opinion and language used by E. V. McCollum, who had spoken on campus four years earlier and was a highly regarded nutrition scientist. He had originated these basic concepts about ten years before. They remained consistent with much additional research findings and experience almost without exception for many decades to follow. Dr. King was assistant professor in IU's Department of Home Economics at the time. Thus she was a graduate
student in chemistry while she served as a faculty member in another department, even in the same building. Soon she became Director of Food Investigation, U.S. Bureau of Home Economics.

During the last two decades of Lyons’ tenure many other chemistry alumni gave invited lectures on campus.

INDIANA ACADEMY OF SCIENCE

In addition to the contacts with chemistry elsewhere, such as provided through speakers from other places and attendance at meetings of the Indiana section of the ACS in Indianapolis, some chemistry students and faculty generally gave attention to the meetings of the Indiana Academy of Science. The IDS always reported on meetings of the Academy but for several years prior to 1922 there was no reference to any participation by chemistry students or faculty. In December that year eleven faculty members from I.U. participated, but Lyons was the only one from chemistry.

In 1924 the IAS met at Purdue. The IDS of 6 December reported that several faculty members from various departments at I.U. participated but none were from chemistry. It stated,

No chemistry professors are attending because they are members of two national chemistry associations that meet twice each year and in order to attend these meetings they do not attend the Indiana Academy of Science.

Two years later at the meeting of the Academy in Muncie, at the Ball State Teachers' College, 26 papers were given by students and faculty at I.U. Only two were from chemistry. One was by Lyons and his student J. T. Brundage and the other was with his student W. E. Bradt. In a follow-up report on 7 December the chemistry papers were not mentioned but news concerning other departments was given.

There was no participation in 1927, but in 1928, the meeting was at I.U. Mathers was on the state program committee. By this time Briscoe had become a promising member of the faculty. He, Mathers, and Lyons and some of their students gave papers. The students were respectively Francis Whitacre and Herschel Hunt (Briscoe), W. F. Eagleson and R. L. Hardy (Mathers), and Meredith E. Pleasant Sparks, and G. H. Stempel, Jr. (Lyons).

This pattern of limited or zero participation at Academy meetings on other campuses, but significant involvement when meeting at I.U., continued for many years. The only chemistry faculty members to serve as officers were H. G. Day as president in 1962, and E. Campagne in 1985.
The quality and distribution of publications from the department in the *Proceedings of the Indiana Academy of Science* illustrates well the nature of the limited reliance on the Academy as a medium for scientific publications. For example, from 1921 to 1923 there were 11 publications, all in association with students. There were six by Lyons, two by Mathers, and three by Briscoe. During the next decade and beyond there was a slightly decreasing level of participation.

However a few nationally recognized chemists came to Indiana to address the Academy. They included Martin H. Fisher from the University of Cincinnati in 1923 and in the same year Dr. H. W. Wiley then director of the *Good Housekeeping* Bureau of Foods. He spoke on "Sanitation and Health". In the next year the principal speaker was Dr. W. A. Noyes, one of the most noted chemists nationally and head of the Department of Chemistry at the University of Illinois.

**Attendance at National Meetings**

The professional visibility of a considerable proportion of chemistry faculty in national chemistry organizations and meetings was low until the latter half of the century. Representative attendance and the kind of meetings or function in which the faculty were involved during approximately 1922 to 1938 are illustrated as follows:

- Dr. Mathers in September 1922 presented a paper at the meeting of the Electrochemical Society in Montreal. This was the masters research of Jacob W. H. Aldred on the preparation of perchlorates. Mr. Aldred received his PhD degree in 1929 and joined the faculty of Antioch College.
- In December 1924 Lyons attended the meeting of the American Association for the Advancement of Science in Washington, D.C.
- In April 1926 Mathers was in Chicago from Thursday to Sunday attending the meeting of the American Electrochemistry Society.
- Drs. Lyons, Mathers, and Briscoe attended the ACS meeting at Columbus, Ohio in April 1929. The latter two presented research papers.
- In September 1929 Lyons represented IU at the dedication of the new Princeton University chemistry building. This included his attendance at a symposium there on catalysis and the mechanism of chemical reactions.
- Dr. Mathers and Philip Stroup, AB’25, AM’26, gave a paper at the American Electrochemical Society meeting in New York City in September 1934. This was on work done by Stroup in 1926.
- In April 1936 Profs. Brown and Mathers gave papers on research by some of their students at the meeting of the Electrochemical Society in Cincinnati. Those by Brown and students were on
storage batteries and by Mathers and R. D. Blue, Ph.D.'32, were on the electroplating of aluminum and aluminum alloys.

- Newer members of the chemistry faculty Robert J. Hartman and Eugene W. Kanning, and a graduate student Lee B. Storms made plans as early as April 1938 to attend the semiannual ACS meeting in September that year in Dallas, Texas.

**CHEMISTRY EXHIBITIONS FOR THE PUBLIC**

From the later years of Van Nüys headship of the Department of Chemistry until the late 1950s scarcely without exception the department participated nearly every year in providing an exhibition at the Indiana State Fair. Also, it participated occasionally in other public events. Perhaps the most memorable year was 1922 when the annual state fair activity in August was preceded in June by the special all-university exposition, which was the first of its kind. This became known as the "memorial commencement." Thirty four other departments participated in the two events.

As reported by the IDS on 25 May 1922 the memorial exhibit was to provide "one of the most extensive educational layouts ever attempted at Indiana University." The exposition was held in connection with "the Million Dollar Memorial Drive" to collect money to construct: the Memorial Union Building, the Tenth Street Stadium, and Memorial Hall Residence for Women.

Dr. B. D. Myers, then Assistant Dean of the School of Medicine, and Professor of Anatomy, was the chairman of the exposition committee. Most of the participating departments presented their displays in the University Library but a few, particularly chemistry and physics, used their own laboratories and lecture rooms. An exposition handbook was prepared and used. As reported by the IDS on 25 May concerning these two departments:

"Practically all the advanced students in these departments will be on hand to demonstrate laboratory experiments and various chemical and physical operations not familiar to the layman. The chemical section will utilize the laboratories in Wylie Hall and the metallurgical laboratories in the rear of the journalism building. The two departmental electric furnaces will be seen in operation."

The scope and nature of chemistry's exhibit in June was well illustrated by the IDS in its very extensive coverage of the exhibit at the State Fair in its issue of 6 September. It reflects vividly the nature and content of the displays, and it reveals the feelings of each of the chemistry faculty members and assistants about chemistry in 1922. The entire ar-
article, is reproduced herewith because it supremely illustrates the interests and priorities of the chemistry faculty and students in that decade:

"CHEMISTRY DEPT DISPLAYS INSTRUCTIVE EXHIBIT AT FAIR"

"Specimens of work by staff and students will feature large departmental display — 196 products and processes on exhibit"

"Showing 196 products and processes discovered or improved in a fundamental way by members of the staff or by its students the Department of Chemistry offers one of the most instructive exhibits being shown at the Indiana State Fair collection. Original patents on some of these processes are on display."

"The chemistry exhibit consists of 15 displays of the work of various divisions of the department. Inorganic, organic, physical and electrochemistry and in chemical engineering. The exhibit consists of specimens showing successful preparations by students in routine laboratory practice. There will be some specimens showing work of more unusual and advanced nature. A collection of 16 dyestuffs made by students in advanced organic chemistry under the supervision of Dr. C. E. May(sic). Samples of materials dyed will be shown. A case of precious metals including gold nuggets from the Klondike and native platinum will be exhibited."

PRODUCTS OF AIR

"In the chemistry booth is a chart showing how many of the most useful household products can be produced from the air in such a plant as that at Muscle Shoals, Alabama. The actual products are shown in receptacles fastened to the chart together with steps necessary in producing them. The process starts with lime and coke mixed with nitrogen from the air which produces calcium carbide after being heated in an electric furnace. Ammonia and nitric acid are the two resultant products from further steps in the operation. The ammonium compounds shown after still further operations include prussic acid, insecticides, ammonium salts, mixed fertilizers, naval smoke screens, baking powder, washing powder, and dry batteries."

"From the nitric acid which can be produced largely from the nitrogen in the air comes many useful chemical products. Among the products shown in the exhibit are: aniline dyes, artificial silk and leather, varnish, moving picture films, artificial skin, smokeless powders, anesthetic (laughing gas), tear gas, dynamite, picric acid, and T.N.T. explosive compounds."

SAMPLES ARE SHOWN

"Samples are shown from the first run of calcium cyanamide ever
made in the United States. The importance which this process will attain to in the future is suggested by Thomas A. Edison who is responsible for the statement that it will do more toward the future preservation of human life than any other single development in the field of science, like providing fertilizers and other necessary products from the nitrogen in the air when other supplies have been exhausted.

“A 'coal tar tree,' said to be one of the most complete ever prepared in this country is on exhibit in the chemistry booth. The coal tar tree shows a large number of representative dyes, perfumes, medicinals, and the intermediates made from constituents of coal tar.

DR. LYONS’ DISCOVERIES

“Among original discoveries on exhibit which have been prepared by members of the department of chemistry, is the Petro-Gobel process discovered by Dr. R. E. Lyons, head of the department, for producing permanent, antique and natural variegated color effect in the Indiana limestone. Architects find his process especially adapted to use in interior decorative work, for garden benches, bird baths, and vases. By this process it is possible to change permanently the color of blue stone. Another of Dr. Lyons’ discoveries being exhibited is the so-called 'Lyons process' for the amalgamation of platinum and rusty or fine gold which has made possible a much higher recovery of both metals in dredge mining in California. The increased saving of platinum which results was of prime importance during the war since platinum was then used as a catalyst in the manufacture of nitric and sulphuric acids by modern methods.

ANTI-FREEZE SOLUTION

“Still another chemical product with which Dr. Lyons is responsible is an inexpensive non-corrosive antifreeze solution for the automobile radiator. This solution consists of glucose, alcohol, and water. It is a sufficiently good heat conductor to give perfect engine cooling. The chemical is much less expensive than alcohol and it has none of the disadvantages of calcium chloride solutions which are corrosive to copper, brass, iron, solder, and glycerine and water solutions which will attack rubber connections in radiators.

“Improved processes for electrolytic refining and plating of silver, antimony, lead, tin, iron, and tellurium will be shown as the work of Dr. Frank C. Mathers, member of the department. 'Platin-nig,' a tellurium compound for staining or oxidizing the depressed parts of silverware. Its significance is readily grasped from the fact that the work done by 'platin-nig' which costs 5¢ per oz. was formerly accomplished by means of a platinum compound costing $50 per ounce. Other exhibits which are the work of Dr. Mathers include a rapid settling lime to meet the requirements in the making of paper
from wood, and a lime of abnormal chemical activity prepared by the heating of slaked lime and used as a dehydrating agent.

“The exhibit will contain a number of electric furnace products, such as carborundum and boron carbide, made by students under Professor O. W Brown.

“There will also be an exhibit of a large sample of potassium ferricyanide produced by a new chemical process developed in the Indiana University laboratory for chemical engineering. The exhibit will show specimens of work done by students in storage battery engineering and will show the results of researches in the catalytic reduction of nitro-compounds, such as nitro-benzene and nitro-phenol. Professor Brown is well known for his fundamental research work on storage batteries and his services are frequently sought as a consulting storage battery engineer. During recent years he has been assisted by Dr. C. O. Henke and Mr. J. C. Warner, members of the department, in intensive studies on the action of catalysts.”

The exhibitions of 1922, probably could not have been topped. Thus much of the presentation at the State Fair in 1923 went over the same ground and for good reason. As stated by the IDS on 3 September 1923, the exhibit encompassed

“...charts and specimens of the work of the Department in inorganic chemistry, organic chemistry, physical chemistry, electrochemistry, metallurgy, and engineering.”

This included examples of research work done by staff and graduate students. Patents held by members of the faculty, books, reprints, and even graduate theses were displayed. The exhibit must have been viewed by thousands of residents of the State thus giving them a strong impression of the nature and value of chemistry as perceived by chemists at Indiana University. Again the prevailing emphasis by the faculty on industrial applications of chemistry and other sciences was made clear in the main headline of the IDS in 1923:

“University Shows Modern Industry Science Exhibit.”

Variations on this type of display continued, but as measured by the level of publicity in the IDS, the subsequent chemistry exhibits were less impressive. During 1924, 1925, and 1928 there seemed to be none.

In 1926 a feature was the showing of the structure of storage batteries and some causes of impairment in their performance. There was also a display of dyes made by students in Dr. May’s class.
The exhibit in 1927 again featured practical applications from chemistry. A feature was the showing of tin and copper plating. Many products were shown which it was claimed had resulted from "the 276 chemical discoveries" made at I.U. The exhibition proudly called attention to special mirrors provided by courtesy of the Nurre Mirror Plate Company at Bloomington. They had been made by a new process based on a U.S. Patent issued in 1926 through Lyons' research and assigned to the Nurre company. Beauty and utility were claimed for the mirrors made possible by the process.

The display in 1929 featured the ten-year building program of the university for the Bloomington and Indianapolis campuses. The IDS of 3 September stated that $3,500,000 was projected as the cost. The plans for Bloomington included "Chemistry, Administration, Education, Science, Journalism structures." The new chemistry building was to cost approximately $350,000 and it was to be "erected directly east of the present chemistry building, Wylie hall." The report stated that "a large model of this building is shown in the chemistry exhibit in the I.U. building."

In 1930 many departments and divisions of the university participated in the State Fair. The chemistry display was special and it must have attracted much attention. It was a showing once more in miniature of the planned new chemistry building. In addition there were displays on the importance of chemistry and the place that graduates from the department were playing in the economy.

The State Fair Edition on 5 September 1930, carried an extensive report on the design and construction of the anticipated new building. Thus the total attention to chemistry in 1930 probably exceeded that in any other year. By this time it was known and accepted that the cost would exceed $500,000. Details on the planning, construction and dedication of this building will be given in a subsequent section.

Exhibition in Chicago. With a new building to be proud of, the interests and activities of the department expanded. In the Century of Progress Fair held in Chicago in 1933 and 1934 all the 92 naturally occurring elements available at that time were exhibited. The fluorine was from this Department. It was prepared by Bernard K. Asdell, AB'32, AM'33, under the direction of Mathers, using the method discovered and developed by Mathers in 1918. A feature in exhibiting the fluorine was its successful enclosure and preservation in a glass vial, with which fluorine normally reacts. This was accomplished by making the fluorine and vial completely anhydrous. Dr. B. S. Hopkins, University of Illinois, was in charge of the exhibit.
Museums

The use of display cabinets to exhibit a wide variety of specimens, including chemicals and chemical products was underscored by the university when in 1871 it acquired and soon began to use the Owen Cabinet. The “Science Building,” erected in 1873, provided space for the collection and chemical laboratories on the same floor. The collection probably was used as much for public viewing as for instructional purposes. Through both vicissitudes and good fortune the tradition of museums and displays was continued in different ways, including the use of fairs, and lecture demonstrations.

The Chemistry Building of 1931 provided a commodious museum. As reported prominently in large headlines in the dedication issue of the IDS on 2 April 1931, the “New Chemistry Museum (was) to Contain Many Exhibits.” It stated that

“Some of the leading chemical manufacturing companies of this country and the Mitsui Mining Company of Japan are co-operating with the Chemistry department in the furnishing of exhibit materials — to show the products of modern chemistry in many different fields.”

When the building was constructed the museum occupied most of the space between the auditorium and the access corridors. There were many exhibit cases along the walls and in the central floor space. Over twenty industrial companies had provided exhibition materials by the time the building was dedicated. The rest of the space was employed for storage of demonstration materials for use in lectures and for the preparation of lecture demonstrations.

From time to time new display materials were received and other materials were rearranged or removed. Occasionally specific items were removed temporarily for use in lecture demonstrations. The museum also was used primarily to illustrate discoveries and their applications.

One of the first of innumerable contributions for use in the museum was in June 1932 by E. H. Stuart, AB’14, AM’15, of the chemistry research staff of the Eli Lilly Company. The exhibit illustrated his work in the search for and development of ephedrine products.

Another illustrative addition to the museum was received in 1934 from the Pennsylvania Grade Crude Oil association of Oil City, PA. It consisted of a display rack containing “samples of petroleum products from the raw crude to finished motor oil, gasoline, kerosene, and wax.” (IDS 6 November 1934).

Owing to increasing needs for extra space about 20 years later some of the space for display cases was given up. But several cases were
retained and their use was continued for historical and teaching materials. Eventually a few cases were used for the display of current research work by faculty and students.

**MEETINGS OF HIGH SCHOOL TEACHERS**

For many decades faculty representation of the university and samples of developments in some of the disciplines were also presented through participation in the annual meetings of the Indiana State Teachers Association and other meetings of high school teachers. The Association meetings were almost invariably held in Indianapolis. In October 1925 Dr. Mathers was among the ten faculty members from Bloomington who attended. Such representation of the department gave opportunity for chemistry matters to be discussed with high school teachers and counselors.

Toward the end of the 1920s new representation for the department, especially Dr. H. T. Briscoe, began to gain prominence among the teachers. By 1934 representatives of the university had begun to tour systematically practically every county in Indiana to give information on courses, costs, entrance requirements, and careers (IDS 1 May 1934). That year Briscoe visited Daviess and Martin counties. R. J. Hartman visited Clarke, Kosciusko, Marshall, Orange, and Wabash counties.

The next year, in 1935, Hartman and Cora B. Hennel of the Department of Mathematics spoke to senior classes in the high schools of Terre Haute and Vigo county on behalf of the university and they met interested students. This was done in cooperation with the publicity representatives of the university (IDS 2 March 1935).

Another example of representation was the inclusion of Lyons as principal speaker at the meeting of the Indiana High School Teachers Association at Indiana State Teachers College in April 1938. This was probably his last talk away from the university before his resignation as head of the department less than four months later.

**INVOLVEMENT IN PUBLIC AFFAIRS**

Throughout this century the chemistry faculty has been occasionally requested to give information and/or opinions about chemical matters. During much of his lifetime Mathers was probably sought after the most by the IDS and administrative officials on matters that did not directly concern the administration of the department.

Prohibition: its effect on Chemistry Department. This occurred in particular during the Prohibition Era from 1920 to 1933. This period significantly affected the attitudes and lifestyle of students. It naturally involved the faculty. For example, in March 1923 the IDS sought the views of Mathers regarding the licensing status and use of stills in chemi-
ical laboratories. Such equipment could be useful in producing "home brew." Of course they were essential in teaching and research. Owing to the potential for misuse the government required all stills to be licensed. Mathers' response to the IDS was that so far as he knew the university had never applied for a permit. Characteristically he exclaimed, "it is absolute foolishness." The response also alluded to the fact that he for some time aided law enforcement agencies by analyzing samples they had seized and brought to him for evidence on their alcoholic content. Regarding this he revealingly stated:

"We can't get along without stills. They are necessary in determining the amount of alcohol present in 'white mule' and other liquors taken in police raids, as well as for many other analyses."

Advice on Chemicals: In the same issue the IDS reported Mathers' opinion regarding the "Effects of Deadly Cyanide Acid Fumes (sic)". This inquiry was stimulated by the discussion of a case of cyanide poisoning that had occurred in Chicago.

In March 1926 a report circulated that Lewisite and other gases were being manufactured which could instantly destroy the life of an entire city. Mathers when asked about it strongly cited evidence against such lethality. He commented that, contrary to reports, Lewisite can be shipped in small quantities with reasonable safety. He characteristically asserted that once he "was near (by) when a quart was spilled in the laboratory without harming any one."

Regarding mustard gas, which was widely discussed at that time, Mathers probably made Hoosiers feel better by concluding that "it cannot be used (in war) effectively."

A few weeks later Mathers was interviewed by the IDS (1 May 1926) following his return from a meeting of the American Electrochemical Society in Chicago. He answered several questions regarding scientific sessions he had attended, including a presentation by the Director of the Chemical Warfare Service. In his responses he referred to the use of chlorine treatment for the common cold which was started at I.U. by the university physician, Dr. J. E. P. Holland, following the World War. Apparently without knowledge of the current status of the treatment, Mathers asserted that "Chlorine treatments for colds are proving effective in 75% of the cases." He supported this by quoting the opinion of the Director of Chemical Warfare. Five weeks earlier the IDS had interviewed Dr. Holland who reported that the treatment at I.U. was discontinued in 1925-26 because it was judged to be valueless. Of course the total evidence strongly supported this action and it questioned the wisdom of ever starting the treatment. Although Mathers was pretty cautious and
objective about anything he saw or heard he was not up-to-date in this matter. Generally his views were worth serious consideration.

Another example of the many cases of reactions to world events or local incidents was the reported interview in January 1928 with Mathers concerning the accidental sinking of a submarine by a U.S. Coast Guard ship. Mathers' simple proposed warning system was equipping of submarines with calcium phosphide so employed as to release phosphene, generated in a device within the submarine, and released through a small tube beside the periscope. At night the gas undergoing combustion in the air would emit light from the flame and during the day white smoke would be visible to nearby surface vessels. He felt that this system would be entirely worthwhile and it would not be needed except in harbors where there could be many surface vessels. Whether the method was ever worth adopting, the concurrent development of electronic detection devices made the idea obsolete.

Two other interviews, among many, with Mathers need to be cited. They and others reflect his philosophy and that of the department during the Lyons years. Also, such interviews demonstrate the closeness between the IDS and the academic functions of the faculty and students at that time.

In April 1930 the IDS published a long interview with Mathers concerning news from Germany regarding "an economical process for making sugar from wood cellulose." This induced him to comment extensively on the essentiality of paying serious attention to forests in the southern part of Indiana and the application of science to the production and utilization of forests and wood products. Representative of his manner of speaking and the state of knowledge and the economy in 1926, he stated in part

"...the price of cellulose is advancing so steadily that predictions are freely made that soon our trees will be harvested and converted into cellulose for making rayon, lacquer, explosives, and other allied products."

A few months later, on 19 October a tragic explosion of a British hydrogen-filled dirigible occurred. Once more Mathers was interviewed and he responded knowledgeably for the enlightenment of many in the university community. He explained the explosiveness of hydrogen, the economic necessity of using hydrogen instead of helium in Britain, the greater lifting power of hydrogen, the almost exclusive occurrence of rich levels of helium in some American petroleum fields, and Mathers' belief that helium from the principal petroleum sources in Texas should be transported by pipe line to Chicago where it could be utilized for dirigibles
and other respects, but the United States government prohibited the export of helium for war purposes. Mather's opinions were sound.

On 8 May 1937 a similar and equally tragic loss of life occurred when the great dirigible, the Hindenburg, mysteriously exploded in New Jersey just as it was about to end a cross-Atlantic flight. This craft also was lifted with hydrogen. The IDS quickly interviewed Dr. Briscoe who by that time had attained high recognition on campus. He told again, for a new generation of students, about the differences between hydrogen and helium in dirigibles and the grandeur of this lighter-than-air craft. He said:

"I saw the ship in New York last summer. I wondered then how many trips it would make before such a disaster would demolish it. There is no doubt that if helium had been used instead of the dangerous hydrogen the disaster would not have happened."

By this time Briscoe had become a trusted authority in chemistry and he was convincingly objective as a teacher and counselor. There was obvious ascendancy in his star.

After approximately 1925 Lyons was second to Mathers in the frequency of being quoted in the IDS or elsewhere concerning technical questions about chemistry and its applications. In the early 1920s his views on the refining of petroleum, cracking processes to produce much greater quantities of gasoline from petroleum, and national problems of maintaining adequate supplies of fuels were reported at different times. Occasionally he, like Mathers, pronounced incorrect judgments, as determined by subsequent findings. For example, in March 1925 Lyons boldly and unequivocally challenged a claim from the University of Zurich that the combustion products of "ethyl gasoline" in automobiles is harmful, causing lead poisoning. He asserted that there could not be any harm from the lead through using it in gasoline. Tetraethyllead as a gasoline antiknock preventive was discovered three years before. It was introduced into commercial use soon after 1922. Despite some very early misgivings about injury from the widespread dispersal of lead, and the periodic recurrence of concern, it was not until 1985 that virtually total banning of lead containing gasoline occurred in this country. In his pronouncement about possible harmfulness of lead in gasoline, Lyons was uncharacteristically hasty.

**Science Bureau Service**

During the 1920s there was mounting interest in the scientific community of the university in the development of more productive ties with industries. Through the leadership of Professor A. L. Foley, long-time
head of the Department of Physics, a "Bureau of Science" was created in March 1927. There was no apparent formal organization or funding of the bureau. Apparently it was almost entirely a creation and instrument of Dr. Foley. The primary department was physics, but botany, geology, and chemistry were included. As reported in the IDS 7 November 1927 a purpose was to provide a better link between industry and the expertise in the university. Requests for aid to industrial or not-for-profit projects were given free except in cases that required research. In these cases "attempts are made to get the interested party to fund a research fellowship."

The IDS of 5 January 1928 quoted Dr. Foley as stating that in the nine months of its existence the bureau had received 247 inquiries or requests. Seventeen "were sent to the botany department, 91 to chemistry, 54 to geology, and 85 to the physics department." The IDS on 19 December 1929 made reference to the Bureau and stated that

"Probably the most important contribution of the bureau was the development of the new type of sound absorbing material and methods of applying it in faulty acoustics of theaters, churches, and school buildings..."

In a special edition of the IDS on 2 April 1931 every known scientific and technological contribution of the department of chemistry seems to have been included. The issue was in celebration of the dedication of the new Chemistry Building that day. It included a news story on the contributions of the department to the bureau, but nothing of significance concerning chemistry was reported.

Apparently the bureau faded away soon after 1931. However, the efforts to form it and include the Department of Chemistry in its activity reflects the nature of the environment in which students worked during the 1920s.

**Efforts to Build up Public Image**

There were various efforts of the university to attract favorable attention and become more vital. Starting about 1923 increasing administrative attention was given to becoming better acquainted with different segments of the State. The president and several other administrators pointedly devoted some time to addressing service clubs and chambers of commerce on the needs of the university and the greater role it could play on behalf of the State. This was featured in the IDS on 27 July 1926 and three days later an article on the university's contributions and value were proclaimed in an article headed:
"INDIANA UNIVERSITY CHEMISTS HAVE MADE 214 SCIENTIFIC DISCOVERIES SOME OF THEM ARE IN LARGE SCALE COMMERCIAL USE. THE USE OF THEM MEANS EMPLOYMENT FOR MANY MEN."

Another similar headline appeared in the issue of 4 December 1926.

The quality and scope of research as very concisely summarized in such impartial reviews as those in the Annual Survey of American Chemistry, beginning in 1925, were important in appraising progress in American chemistry. Lyons took advantage of this in January 1929 when he gave the IDS his own analysis of American research contributions cited for the year ending 1 July 1928. The resulting news item as published greatly exaggerated the nature and significance of the reviews. In general, departmental news releases can be credible, but this release, as published, was unquestionably misleading. The main headlines proclaimed that "Writings of 22 I.U. Chemistry Alumni Receive Recognition" and a second headline erroneously stated that their "Manuscripts (were) published in Annual Survey of American Chemistry." As a matter of fact among the many hundreds of persons whose publications were cited in the many reviews, 22 were Indiana University alumni. There was no reference in the reviews or elsewhere in the annual survey that linked them to this university. It is of interest that in the index of this volume of the Annual Survey the names of our alumni are checked in pencil, marks undoubtedly made by Lyons. This volume and many others of this Survey and other books were given to the Chemistry Library by Lyons after he retired. It is also of interest that the names of alumni cited in the first two volumes are also checked. Four names were checked in the first volume, for the year ending 1 July 1926, and 13 were checked in the volume ending 1 July 1927. At least in the first three years analyzed it was indicated that the research productivity was increasing. Thus there was validity in the statement by Lyons in the release:

"This showing is in my judgment noteworthy and gratifying when one considers various departmental handicaps encountered, as meager equipment and small staff. It is complimentary to Indiana University as a training school for chemists."

The manifestation of desire to look good academically is understandable, but it was to be more than another decade before new faculty with diverse backgrounds and new administration of the department could make basic changes. In the meantime some other strengthening advancements were made.

Attention to the courses of instruction, adequacy of the faculty, and various operational needs was urgent.
REVISION OF COURSE NUMBERING

A campus-wide recognition of the inadequacies of the course numbering system resulted in a comprehensive revision in the spring of 1927. At least this permitted better identification of graduate level courses and it reflected the growing recognition that such work should not be simply the addition of more courses without meaningful prerequisites and purposes.

The change in the system was essentially the addition of 200 or 300 to the numbers used up to 1927. Those numbered in the 300's were strictly graduate courses and those in the 200's were as stated in the catalog at that time,

"open to graduate students under certain conditions, for which see the head of the department concerned."

By the middle of the 1940s this change had proved to be seriously inadequate. Another comprehensive change was finally made by adding numbers starting with 500's for graduate courses. All lower numbers were for undergraduate courses. Also, significance was given to the second and third digits in identifying the courses and the sequences in which they might be offered. The change became effective in 1950.

COURSES AND TEACHING RESPONSIBILITIES

The courses and their descriptions in the catalogs for 1930 were virtually the same as those for 1926, before the numbers were changed. From at least 1918 until 1930 the course listings were in the same four categories:

1. Courses required for the AB Degree in Chemistry
2. Special courses in Chemistry For Candidates for the BS Degree in Medicine
3. Special Freshman Courses in Chemistry for Students in Home Economics
4. Elective Courses in Chemistry for Advanced Students

The courses in the successive categories follows, as published in 1930, with the replaced numbers in parentheses; but with descriptive information deleted and the assigned teachers included:

<table>
<thead>
<tr>
<th>Category</th>
<th>Course Description</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101(1) Inorganic Chemistry</td>
<td>Mr. Lyons, Mr. Mathers</td>
</tr>
<tr>
<td></td>
<td>103(3) Qualitative Analysis</td>
<td>Mr. Briscoe and Assistant</td>
</tr>
<tr>
<td></td>
<td>104(4) Quantitative Analysis,</td>
<td>Mr. Brown and Assistant</td>
</tr>
<tr>
<td></td>
<td>Gravimetric Analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>105(5) Quantitative Analysis</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Instructor(s)</td>
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<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>218(18)</td>
<td>Volumetric Analysis</td>
<td>Mr. Brown and Assistant</td>
</tr>
<tr>
<td>206(6)</td>
<td>Physical Chemistry</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>207(7)</td>
<td>Organic Chemistry</td>
<td>Mr. Lyons</td>
</tr>
<tr>
<td>230(30)</td>
<td>Advanced Inorganic Chemistry</td>
<td>Mr. May and Assistant</td>
</tr>
<tr>
<td>2 127(27)</td>
<td>Elementary Organic Chemistry</td>
<td>Mr. Mathers</td>
</tr>
<tr>
<td>208(8)</td>
<td>Physiological Chemistry. Lectures. Summers only</td>
<td>Mr. May</td>
</tr>
<tr>
<td>209(9)</td>
<td>Physiological and Pathological Chemistry.</td>
<td>Mr. May</td>
</tr>
<tr>
<td>3 103c(3c)</td>
<td>Analytical Chemistry for Students in Home Economics</td>
<td>Mr. Briscoe and Assistant</td>
</tr>
<tr>
<td>110(10)</td>
<td>General Chemistry for Students in Home Economics</td>
<td>Mr. Lyons</td>
</tr>
<tr>
<td>4 211(11)</td>
<td>Atomic Theories</td>
<td>Mr. Briscoe</td>
</tr>
<tr>
<td>212(12)</td>
<td>Analytical Organic Chemistry Laboratory</td>
<td>Mr. Lyons</td>
</tr>
<tr>
<td>213(13)</td>
<td>Elementary Metallurgy and Assaying</td>
<td>Mr. Brown and Assistant</td>
</tr>
<tr>
<td>214(14)</td>
<td>Seminary: (1) Inorganic chemistry</td>
<td>(Mr. Lyons, Mr. Brown,</td>
</tr>
<tr>
<td></td>
<td>(2) Organic chemistry</td>
<td>Mr. Mathers, Mr. May</td>
</tr>
<tr>
<td></td>
<td>(3) Physical chemistry</td>
<td>Mr. Briscoe</td>
</tr>
<tr>
<td>215(15)</td>
<td>Advanced Technical and Engineering Analysis</td>
<td>Mr. Mathers</td>
</tr>
<tr>
<td>219(19)</td>
<td>Physical Chemistry. Laboratory work</td>
<td>Mr. Brown and Assistant</td>
</tr>
<tr>
<td>220(20)</td>
<td>Advanced Physical Chemistry</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>222(22)</td>
<td>Electrochemistry</td>
<td>Mr. Brown</td>
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<tr>
<td>223(23)</td>
<td>Metallography</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>224(24)</td>
<td>Advanced Electrochemistry and Electrometallurgy</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>225(25)</td>
<td>Advanced Organic Chemistry</td>
<td>Mr. May</td>
</tr>
<tr>
<td>226a(26a)</td>
<td>Chemical Engineering</td>
<td>Mr. Brown</td>
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<tr>
<td>226b(26b)</td>
<td>Chemical Engineering</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>229(29)</td>
<td>Storage Batteries</td>
<td>Mr. Brown</td>
</tr>
<tr>
<td>231(31)</td>
<td>Advanced Inorganic Chemistry</td>
<td>Mr. Mathers</td>
</tr>
<tr>
<td>232(32)</td>
<td>Gas and Fuel Analysis</td>
<td>Mr. Mathers</td>
</tr>
<tr>
<td>233(33)</td>
<td>Spectrum Analysis and Sugar Analysis</td>
<td>Mr. Mathers</td>
</tr>
</tbody>
</table>
In the Graduate School Bulletin for 1930 the following additional courses, including descriptive information, were listed:

228 Chemical Engineering Laboratory  Mr. Brown
314 Seminar. Same as 214
316 Valency and Molecular Structure  Mr. Briscoe
350 Research. Organic Chemistry  Mr. Lyons
351 Research. Organic and Biochemistry  Mr. May
352 Research. Electrochemistry, Electro-
    Metallurgy, and Physical Chemistry  Mr. Brown
353 Research. Inorganic Chemistry  Mr. Mathers
354 Research. Inorganic Chemistry  Mr. Briscoe

Three years later, in the catalogs for 1933, several changes had occurred. R. J. Hartman and E. W. Kanning had become instructors. The other five members of the faculty (Lyons, Brown, Mathers, May, Briscoe) were professors. Again all were I.U. alumni, and three of the seven had all of their degrees from this university.

The three courses for students in Home Economics (101c, 102, and 110) had been discontinued. The seminary(sic) course had been changed to three separate seminar courses: (313 - Physical Chemistry and Electrochemistry, 314 - Organic Chemistry, and 315 - General and Physical Chemistry). The name of 208 and 209 had been changed to Biological Chemistry. The new courses were:

210 Mathematical Physical Chemistry.
    Chemical Problems  Mr. Hartman
221 Electrometric Methods of
    Chemical Analysis and the
    determination of pH  Mr. Kanning
234 Chemical Engineering: Drawing
    and Designing.  Mr. Kanning
300 Applied Inorganic Chemistry  Mr. Mathers
301 The Rarer Chemical Elements  Mr. Mathers
302 The Theories of Organic Chemistry  Mr. Lyons
303 Theoretical Electrochemistry  Mr. Brown
310 Mathematical Physical Chemistry:
    Chemical Energetics  Mr. Hartman
317 The Phase Rule and the Applications  Mr. Kanning
354 Research: Colloid Chemistry  Mr. Hartman
356 Research: Analytical Chemistry  Mr. Kanning

Of course several of the offerings were given in alternate years and many were in the "arranged" category. With such heavy teaching responsibilities there was much reliance on teaching assistants. Also, until the new Chemistry Building could be occupied in 1931 the crowded
conditions and limited facilities in Wylie Hall made teaching and research less efficient.

One salutary consequence of the appointment of Briscoe to the faculty in 1924 was the emphasis he contributed to basics, especially in physical chemistry. He gave constructive attention to the origins of chemical thought and discoveries (history of chemistry), and very close attention to the creative theoretical aspects of chemistry.

In 1925 Briscoe began to teach a course on atomic theories, valence, and molecular structure. This was undoubtedly the first focus on relevant theories and current frontier developments on this campus. It was stimulating and up to date. Sixty years later a student in that course, Verling Votaw, verbally expressed to H. G. Day his continuing appreciation and remembrance of the high quality and timeliness of the course. In 1935 the outgrowth of the course was published by Briscoe as the book *The Structure and Properties of Matter* (McGraw-Hill). While the book was in final stages of preparation, in 1934, Lyons informed President Bryan that this was

"a splendid interpretation of what is now known concerning the structure of matter in terms of the chemical behavior of matter."

By 1940 the course Journal Reading and Chemical Literature had been introduced by Briscoe. It was given the number 214 which had been used several years earlier for seminars in different areas of chemistry. Later, in 1950 this was changed to Chemical Literature and it was given the designation C400.

In the 1930s periodically lectures were given on the "Lives of Great Men of Science" (There seemed to be no corresponding course on Great Women of Science!). The IDS occasionally reported the lectures. When Briscoe spoke in April 1934, his focus was on John Dalton. He concluded that Dalton's "study of atoms was the most important stimulus and working guide for chemists in the Nineteenth century." Lyons addressed the class on 7 May 1936. The IDS stated that he talked about the contributions of Robert Bunsen.

**Part Time Employment of Students**

The continuing desire of the faculty to promote suitable summer employment for the students was implemented in various ways. A novel arrangement was adopted in 1937 that would affect the employability of several students and provide valuable new experiences. Through the sponsorship of G. C. Hutcherson, AB'09, AM'12, his canning company at Shirley, Indiana established a new short-term training course in chemical and microscopic techniques required in controlling the canning op-
erations of the Shirley Canning Company. The plan called for the admission of 8-10 advanced students in chemistry for instruction on Thursdays, Fridays, and Saturdays to be given by a chemist-microscopist from the company. There was no fee requirement and academic credit was not allowed. As reported in the IDS in March and April 1937, nineteen students were enrolled initially but the total soon became 31. The training program was completed by the first of May. Nine who finished the course were offered positions by the Shirley Company and other canning firms in Indiana.

**ACTION BY I.U. TO AID STUDENTS HURT BY THE DEPRESSION**

Students who had to earn their way through school have been the concern of faculty members and school administrators in every generation. Of course it was a specially dominant concern during the depression years of the 1930s. Prices were low, but the spread between cost and means to pay for the necessities was frequently distressingly high. It was reported in September 1932 that the cost of room and meals was down 20 percent from the year before. But at least one cost was even higher. In July 1932 the price of a postage stamp to mail a letter rose from two cents to three cents. For the students who bought the current (16th edition) *Handbook of Chemistry and Physics* in the I.U. Bookstore the cost in December 1931 was $2.25. It meant little to a student with very limited funds that the price was only about ten percent higher than the first edition cost in 1913. Were it to be reported that the price of the edition (63rd) in 1983 was going to be about $60 it would have been unbelievable. Possibly credulity would have been equally strained to know that the edition in 1983 had 24-32 pages whereas the first edition had 116. At least there could have been consolation in the knowledge, if available, that the prevailing wages of about 25-35 cents per hour would go as far in buying food and books as with prevailing wages fifty years later.

In early March 1933 all banks in the country were closed by executive order until they could be audited and cleared by Federal reserve authorities for resumption of business. Although all banks in Bloomington withstood the depression, even the temporary closing caused serious new financial problems. A response by the university was to extend credit at the cafeteria and commons during the emergency. As reported by the IDS 17 March, such credit amounted to $2,724. Some of this was to chemistry students and probably to one or more teaching assistants. Soon after the banks opened 25 percent had been repaid. The IDS states that

"Those not able to meet their payments ... are requested to see Mrs. (Alice) Nelson in persons (sic)."
On 11 April 1933 a trustees-endorsed plan was put into effect to provide

"Ten cent meals ... three times a day and seven days a week ... at the cafeteria in the Union Building."

The meals were served in dining room E. Students in this special boarding club did their own serving, dish washing, and carrying of dishes and food to and from the main kitchen. Also, students were allowed to bring farm products from home for purchase by Mrs. Nelson at market price and credited to the student's bill. The menus suggested that the plan provided wholesome and pretty well balanced meals.

Of course, during every decade there were instances of special attention the university gave to especially needy students. One of these was the provision of exemption from afternoon classes for students who needed the time for part-time jobs requiring afternoon work. In 1936 Mathers served on the faculty committee to act on applications for exemption. The exempted students generally took enough morning courses to provide full academic loads. Sometime in the latter half of the century the requirement to take some courses in the afternoon was withdrawn.

Breakage fees: A continuing basis for frequent dissatisfaction and sometimes misunderstandings was the assessment and administration of breakage fees in laboratory courses. Such assessments had been made from the time individual laboratory work was performed by students in the latter part of the nineteenth century. From time to time the IDS included articles on laboratory breakage policies and experiences in chemistry since that was news. In July 1923 it reported an interview with Frank (Dad) Eckels, keeper of the chemistry stores. He stated that the total breakage charged to students in the past semester was $1,325. The largest bill for a student was $18.70, which was $10.70 in excess of the deposit he had made at the beginning of the semester. In 1924 the largest bill was $29.29 and the smallest was $0.48. Of course students had to pay all that was assessed or credit for the course was withheld by the university. When a student had occasion to feel that a charge was erroneous this sometimes caused dissatisfaction. Of course there were times that scheming students attempted to out talk the laboratory assistant or storeroom keeper on breakage charges. "Dad" Eckels was alert to many schemes, including the effort to hide small defects in glassware by asking to have it inspected and accepted while it was wet.

By 1932 the breakage fee "demanded of chemistry students and payable for the year in advance" was divided with the student making a deposit of five dollars at the beginning of each semester. Even this amount and the unknown amount of possible extra costs were hardships in many cases. Also, this change did not alleviate irritations and other
problems. The large cost in time for storeroom personnel, clerical workers, and students themselves in dealing with breakage regulations and problems could not be calculated. That seemed to be taken for granted. However, a few decades later the breakage fee charges were abandoned owing to the marked increase in enrollments and the real awareness of costs to personnel and students in the loss of time for checking in and checking out of supplies and equipment.

**STUDENT ORGANIZATIONS**

*Phi Lambda Upsilon.* By the middle of the 1920s students and faculty interest and university support were great enough to warrant the installation of a chapter of Phi Lambda Upsilon, the honorary chemistry fraternity which was founded at the University of Illinois in 1899. It emphasized scholarship and original investigation in chemistry. Unlike Alpha Chi Sigma there were no alchemical and secretive aspects of the organization. The local chapter was chartered in May 1926. The charter members were W. E. Bradt, J. T. Brundage, W. A. Fletcher, V. M. Votaw, K. W. Ray, H. C. McFarlin, A. S. Fieser, E. L. Fox, H. S. Rothrock, and H. T. Briscoe. The latter, a member of the faculty, was soon to become associate professor of chemistry. All the others except Rothrock were graduate students. Rothrock was to receive his AB degree that year. Some of the new members also belonged to Alpha Chi Sigma.

Three years later PLU instituted the awarding of a bronze plaque to "the junior male" student in chemistry with an outstanding record in scholarship and integrity. Also there was to be a cash award of $15 to the same student. Each plaque was to be mounted on a handsome wooden tablet. At first the tablet was displayed in the entrance way of Wylie Hall. After the Chemistry Building was completed it was exhibited in the Chemistry Library, and later in a corridor outside the Chemistry seminar room.

The first initiation of members following the dedication of the Chemistry Building was on 10 May 1931. The new members were Ralph Broyles, William Cathcart, John Dupree, Anson Frohman, Max Harbaugh, Floyd James, Eugene Medcalf, Clemens Olsen, Foster Pepper, David Rothrock, Ralph Stewart, Wendell Stover, and Robert Treadway. Only Stewart was a graduate student. Several were members of Alpha Chi Sigma. Both the initiation and banquet occurred at the Graham Hotel. Frank E. Dalian was president.

The next initiation of members was on 14 March 1932 "at a meeting held in Chem. 201." Those initiated were four graduate students (G. W. Dingle, A. H. Ryker, J. B. Stone, J. E. Weber) and nine seniors (J. B. Coon, J. M. Coon, S. L. Eisler, W. E. Holland, V. Hunt, H. W. Hunter, J. H. McKenzie, H. T. Spannuth, J. D. Spannuth), three juniors
Another role of PLU was to sponsor significant lectures by scientists from other institutions. Perhaps the first lecturer was Professor George H. Coleman of the University of Iowa and at that time district councillor for PLU. On 22 March 1934 he spoke in the Chemistry auditorium on "Research in Two European Laboratories." He had recently returned from Europe where he had been a Guggenheim Fellow.

For a few years PLU collaborated with Alpha Chi Sigma and Iota Sigma Pi in showing "talking pictures" on chemical subjects. The use of educational motion pictures was started here by AXE on 29 October 1931. On 2 November 1934 PLU alone showed films in the Chemistry auditorium. The films were on "The Molecular Theory of Matter," "Oxidation Reduction," "The Chemistry of Combustion," and "Energy and its Transformations." They were from the University of Chicago.

By 1938 PLU had selected the eighth person to receive its annual bronze plaque signifying exceptionally high scholarship. The recipient was R. N. Keller, AB'37, who by that time was a graduate student at the University of Illinois. Later he became Professor of Chemistry at the University of Colorado.

Iota Sigma Pi (Indium). Twenty one years after the chartering of Alpha Chi Sigma at I.U. a somewhat comparable organization of women students in chemistry was formed. It originated in 1929 from a local campus group, the Senior Girls Chemistry Club. At once it petitioned for a charter from Iota Sigma Pi, a national honorary chemistry sorority. The requirements for membership in the new professional sorority included a major or minor in chemistry, high scholastic standing, and faculty recommendation. The petition was granted in April 1930. Formal installation ceremonies were held 19 April at the Graham Hotel, then the most auspicious public place in Bloomington. Miss Florence Cath­erwood of the University of Illinois chapter (Iodine) conducted the installation. The charter members and officers were:

Lucille Beede
Grace Clendenning
Constance Earle
Hallie Isabel Morgan, President
Helen Newsom, Treasurer
Margaret Nice

Margaret Steele
Helen Vernon, Secretary
Esther Weber, Vice President
Jane Williams
Ruth Wimmer

All were members of the 1930 class except Vernon and Weber who were graduate students.

The guests at the banquet included Dean Agnes E. Wells, Dr. Lyons, Eugene Kanning, PG, representing Alpha Chi Sigma, and Robert Hart-
man representing Phi Lambda Upsilon. The new chapter, the eighteenth, was designated Indium. Esther Weber was of special importance because she was the first departmental secretary, although part time, thus helping in the professional development of women students and the more efficient administration of the Department. Dr. Lyons gave encouragement to the formation of the sorority.

As recorded in the History of Iota Sigma Pi (p. 45), the sponsors included Dr. Lyons, Mrs. H. T. Briscoe, Martha Strong (Anatomy), Mrs. Ralph Cleland, and Una Robinson (Home Economics). In 1940 the chapter was visited by national officers McBain, Spencer, Hoobler, and Virginia Bartow. Owing to the war it became inactive in 1944-45 but it was reorganized in 1946. In 1948 Elma Lanterman, then a graduate student, represented Indium at the national convention.

Because the number of women majoring in chemistry remained small the membership in the sorority was augmented by accepting promising majors in other sciences if they were at least minoring in chemistry. Also, certain other women in the university with backgrounds in chemistry were invited to membership. For example, Mrs. Alfred (Clara McMillan) Kinsey and Professor Una Robinson were initiated. Dean of Women Agnes E. Wells and Professor Lila C. Curtis of the Physics Department were guests at the first banquet. On this occasion and many others the IDS report gave many details including the colors used for the decorations. The impressiveness of such occasions, even in the beginning of the depression years, was made clear in the reporting by the IDS. For example, in March 1931, four weeks before the dedication of the new Chemistry Building it was stated that:

"The formal banquet will be held after the initiation at the Rose Tea room....Dr. R. E. Lyons, head of the Chemistry department and Mrs. Lyons, sponsors of the organization, will also be guests at the affair."

All ten initiates had completed 20 hours of chemistry with satisfactory grades. This particular initiation may have been the first for any group in the new building.

The pressures of the great depression and the seriousness of the sorority's leaders were shown in February and March 1932 when Iota Sigma Pi announced through the IDS that it had accumulated a loan fund for women seniors who had completed 20 hours of chemistry. The announcement was made by the president, Esther Weber. The fund was raised through the sale of candy in the Chemistry Building.

A further reflection of the significance of Iota Sigma Pi in the life of the scientific community was shown in the designation of Mrs. Robert Lyons as Patroness of the sorority. The high point was a tea held in the
East Parlors of the Student Building on Sunday afternoon 27 December 1933. Approximately 100 women students attended. The guests included “Prof. and Mrs. H. T. Briscoe, Prof. and Mrs. F. C. Mathers, Prof. and Mrs. C. E. May, Dr. Robert J. Hartman, Dr. Eugene W. Kanning, Miss Lila C. Curtis, honorary member ...” The entertainment included piano selections by Virginia Gilbert, two flute solos by Alvin Borders, and two violin solos by Fred Sharp, director of music at the Bloomington High School. In response to this honor during the week of the 1934 Commencement Mrs. Lyons gave “a formal dinner” for active members of the chapter and to recognize one of the graduating members, Evelyn Strain, who had been appointed assistant librarian in the research division of DuPont’s chemical plant at Niagara Falls, N.Y.

Also, the sorority continued the effort to increase the diversity and utility of women in sciences. In April 1934 the national secretary, Mrs. Helen N. Moore, came to Bloomington from the University of Cincinnati and spoke in the Chemistry auditorium on “The Role of Chemistry in Bacteriology.” She was the first woman to earn a degree in chemical engineering at that university.

In October 1935 the sorority was visited by a well known woman chemistry librarian, Dr. Virginia Bartow, at the University of Illinois. In 1931 she had represented the national office of Iota Sigma Pi at the dedication of the new Chemistry Building.

One of the particularly accomplished graduates of the department, Prudence van Arsdale, was a guest lecturer in the Chemistry auditorium more than once under the sponsorship of the sorority. In March 1936 the topic was “Modern Energy Resources.” Since receiving her AM degree in 1935 she had become a valuable literature searcher for the Universal Oil Company. At that time her field was regarded as one of the most promising for women chemists. She exemplified the role unusually well.

By 1951 the chapter had become virtually inactive. It did not send a delegate to the convention that year. Later it was disbanded.

Alpha Chi Sigma. From its founding at I.U. in 1908 Alpha Chi Sigma was the most visible local organization of chemistry students. Each year with rare exception initiation ceremonies were held and activities were sponsored to benefit the department. In the context of the time of the occurrences, it is illuminating to review the essence of various functions and involvements that continued through the last two decades of Lyons’ headship of the department.

When an initiation banquet was held 12 April 1921, in the Reserve Room in the Cafeteria, each of the five new members spoke on a topic of interest at the time:

Leon Deer. The manufacture of synthetic ammonia
Evert Roomes. The electrolytic deposition of metals for ornamental purposes
Paul Breitmeier. The necessity of graduate work for the chemical engineer

Chester Jones. Some experiences in wireless telegraphy

Lester Quinn. Some phases of industrial chemistry

At the time the fraternity had 21 members. Later that month it sponsored an open lecture by Dr. May who reviewed the life and chemical contributions of the great Emil Fischer, especially his work on purines and sugars. Approximately 100 persons were present.

When an initiation was held on 19 January 1923 the initiates were: Harold Cates, Dewey Criswell, Robert Frye, Lee Smith, and Lawrence Thomas. John R. Kuebler, AB'12, AM'15, national secretary of AXE, and R. M. Lingle, AB'19, of Indianapolis, participated.

Early in May that year new officers were elected for the first semester of 1923-24. They were H. W. Lane, H. J. McFarlin, S. C. Shirley, Philip Stroup, Verling Votaw, and H. M. Hinesley.

By the end of 1923 the fraternity had begun to refer to get-togethers with prospective members and others as smokers and such affairs were occasionally held in social fraternities. In October 1933 about 35 members and guests "were present at the first smoker of Alpha Chi Sigma ... at the Acacia House." Dr. May spoke on the recent ACS meeting he attended in New York. The faculty members who spoke briefly were Lyons and Mathers. Also Instructors C. O. Henke and J. C. Warner spoke.

In 1923 the fraternity started a practice of awarding prizes for scholastic achievement or superiority in chemistry contests. In December that year a prize of $25 was announced to be awarded to the freshman or sophomore enrolled in chemistry who wrote the best article on "How the Science of Chemistry Appeals to Me." This did not last very long. The award was changed to a book gift to the outstanding senior in chemistry. In April 1937 the award, $10 for a book, went to John Shanks. The IDS in March reported that "All seniors in the Chemistry Department may file applications for the award..." This also was soon discontinued.


In April 1925 the fraternity initiated ten pledges including: John H. Sicks, R. H. Haimbaugh, N. W. Humbaugh, Loring McFail, F. Marion Whitacre, Ross Harbaugh, R. Lyons, Jr., Carroll Burroughs, William Robertson, and Wayne Kirkman. To advertise the smoker held in October that year a replica of a huge smoking pipe was displayed in front of Wylie Hall the day of the smoker. The pledges included: Paul Spurgeon, Howard Steele, Robert J. Hartman, Tilman Brundage, Norman Shideler, Fred Jenkins, and Maxwell Votaw.
The initiates in 1926 and 1927 included: Arthur N. Carr, Floyd Peyton, Claude Lantz, Darwin Badertscher, Bert Voss, Harry Leer, Eugene W. Kanning, Frank Welcher, Howard Settle, Robert Etnier, Albert Schwartz, Robin Esarey, Darwin Apple, Marion Aker, Charles F. Short, Neg Shirts, William Stevenson, Byron Arrick, Richard Holderman, Joseph Treon, Robert Blue, Thomas Westfall, and William Thornton. One of the activities was the showing of "A moving picture on the 'Story of Bakelite' and 'storage battery making.'"

By 1928 it had become traditional for AXE to hold an annual smoker. In October that year it was in the Kappa Delta Rho house at 814 East Third. At the spring open meeting, held in Wylie 28, the young full professor and newly married Briscoe spoke on "The evolution of the elements."

The fraternity met at different locations on campus as well as at different social fraternities for smokers. Also, officers were elected for semester terms. In January 1930 a business meeting was held in Science Hall. The officers elected were: George W. Dingle, Joseph F. Treon, Floyd L. James, John S. Peake, Joseph W. Thiel, and David Rothrock. The initiates in April that year were Jesse Coon, John Deupree, Paris Poindexter, Alfred Weaver, and Ralph Bridges II. The latter was a son of Ralph Bridges, one of the charter members.

The next annual smoker was at South Hall 7 October 1930. The high light was a talk by Dr. Briscoe on the new chemistry building under construction and showing of a motion picture on the manufacture of Bakelite.

The year 1930 marked the resumption of publication of "Epsilon End Point," the official news organ of the local chapter of AXE. Articles by Mathers and Briscoe were the special features. The publication was mailed to alumni of Epsilon chapter, thus making it the first vehicle for the maintenance of good bonding between the department and a significant proportion of its alumni. The staff were: Bernard Asdell, Editor-in-chief; Alfred Weaver, alumni editor; John Dupree, business manager; Robert Treadway, circulation manager; and Paris Poindexter, joke editor.

A feature of an AXE dinner held in December 1930 was the talks by John R. Kuebler, national secretary, and Frank B. Wade, head of the chemistry department at Shortridge high school in Indianapolis. Wade had become an authority and noted speaker on precious and semiprecious gems. The dinner marked the 28th anniversary of the founding of the fraternity. By that time there were 47 collegiate chapters.

The annual smoker of AXE in October 1931 was at the Delta Upsilon house. That semester the officers were: Alfred Weaver, William Cathcart, Julius Coon, and Earl Moorman. All the chemistry faculty members belonged to the fraternity.
Later in October AXE sponsored a showing of “moving films” in the Chemistry auditorium. This was probably the first use of the new auditorium for motion pictures. Dr. Briscoe had chosen the films. They were: “Water Supply of a Great City,” “Beyond the Microscope,” “Revelations of XRay,” and “Time.” Viewing the showing was an optional supplement to a general chemistry lecture. It was intended that this new instructional aid would be followed about every three weeks with other educational films.

Apparently the showing of educational films caught on well. The idea was expanded to use “sound film,” which necessitated showings at the local Indiana theater. Also, it involved cooperation with Iota Sigma Pi. It had the goal of raising funds for the purchase of projection equipment for use in the Chemistry auditorium.

As reported in the IDS December 1931, “The Hottest Flame in the World,” “Oil Films on Water,” and “Mountains of Copper”

“...are the subjects of the sound pictures which will be shown from 10 to 11:30 o’clock Saturday morning at the Indiana theater...”

The films were produced by the General Electric Company under the supervision of Dr. I. Langmuir. An admission fee of 25 cents was charged to cover the costs of the showing and to accumulate funding for audio-visual instruction in the department.

The next day, 4 December, the IDS promoted the showing of the films through the publication of an interview with Dr. Mathers. In part the report stated:

“The sound pictures, according to Dr. Mathers, are really more educational than having the lecturer perform certain experiments in person, if the camera has been placed close to the work, thus giving the entire audience a close-up view.”

Such reactions to the new venture must have pleased the officers of AXE for the second semester of 1931-32. They were: Alfred Weaver, William Cathcart, Donald Neese, Virgil Hunt, Earl Moorman, and Joseph Haymond. Dr. Briscoe, who had been on the faculty seven years, was the faculty advisor.

Three months after the first use of “a moving picture production in sound” at the Indiana theater, Alpha Chi Sigma and Iota Sigma Pi sponsored another production. As stated by the IDS 8 March 1932, this concerned:

“...the new discovery of science, the cosmic ray... Robert A. Milliken, noted physicist will lecture in the sound movie as the illustrations
are pictured. Several reels on the transmutation of the elements also
will be shown."

The spring 1932 initiatives in AXE included: Ralph Stewart, Harold
Gigous, Hiram Spannuth, Louis Watson, Alvin Schoor, Wendell Metzner,
Judson West, Howard Bush, George Norman, Alan Ax, George Dolby,
Robert Cavanaugh, and Frank B. Wade. All were seniors, juniors, or
graduate students except Wade who graduated many years before. By
this time the Graham hotel existed and the banquet was held in this
widely recognized new ornament of Bloomington.

In October 1933 AXE began to plan for its role as host of the 13th
biennial national conclave (meeting) of the organization. The planning
committee was composed of two student members of the collegiate chap­
ter at I.U., Earl F. Moorman and Robert M. Cavanaugh; two members
of the professional chapter at Indianapolis, Dale T. Wilson and A. B.
Weaver; one from the collegiate chapter at Rose Polytechnic Institute,
Richard K. Toner; and one from the professional chapter at Terre Haute,
Arthur W. Campbell; the national secretary, John R. Kuebler; and Dr.
Lyons, ex officio. All except Campbell and Toner had been or were
connected with Indiana University.

March 1934 was unusually active for the local chapter. On the
16th J. M. Cosgrove, chief chemist of the Noblitt Sparks Industries at
Columbus, Indiana spoke on “Some Chemical Problems Encountered in
the Manufacturing of Automotive Accessories.” Four days later Professor
R. N. Harger, head of the Department of Biochemistry and Pharmacology
in the School of Medicine, lectured on “Modern Poison Hazards, Real
and Imaginary.”

In April and in May the IDS gave considerable coverage to the
approaching national convention. Again in June, three days before the
meeting, there was additional coverage thus impressing the campus on
the importance of the department. In particular, the publicity called at­
tention to the scheduled open lecture by Frank Wade on “Gold and
Precious Stones in Indiana.”

One hundred forty two delegates attended the conclave. In addition
to business meetings and tours, both to Eli Lilly and Company in Indi­
anapolis and limestone quarries and mills near Bloomington, a dinner
dance was held in Alumni Hall. There was naturally much local pride in
conducting tours through the virtually new Chemistry Building.

In December 1936 AXE attracted more than 200 students and
others, the largest audience reported at any of its open meetings. This
was the viewing of films presented by its guest speaker from Hiram
Walker Company. As stated by the IDS, the films showed “the various
steps in the manufacture of commercial alcohol.” H. F. Willkie, AB’12,
vice president of the company, was the principal speaker.
One of the final actions of the chapter, while Lyons was still head of the department, was in March 1937. A new silver loving cup was presented for the purpose of honoring each year the member of the fraternity having the highest grades each semester. The intention was to engrave the names on the cup periodically and display it in the chemistry library. This was kept up for several years and then discontinued.

Chemistry Club. A recurring interest in something new concerning organizations for chemistry students was manifested in 1924. As reported in the IDS 30 September:

"Wiley (sic) 28 will be the scene of a meeting of those students interested in chemistry at 7 o'clock tonight. Organization of a Chemistry Club and the formation of plans for the year will occupy the embryo chemists, according to Worth Fletcher, '25, President of the organization."

Two weeks later the new Club was addressed by Mathers who gave a resume of reports presented at the recent meeting of the American Electrochemical Society he attended in Detroit.

The interest of the faculty was shown by the scheduling of talks by each member. The Club had been organized earlier that year. Its relationship, if any, to the University Chemical Society started in 1909 is not known. Some of the members also belonged to Alpha Chi Sigma. The organization of 1909 had been discontinued after a few years.

In February 1925 the Club met at the Zeta Tau Alpha house for a business meeting, election of officers, and social hour. The marked coeducational nature of the Club was shown in the announcement that two of the officers were women: Ruth Wimmer and Jeanette Nunamaker. The new president was Wilbur Bradt and the treasurer was Robert Lyons, Jr., son of the head of the department. Two features of the evening were cross-word puzzles and the reading of five minute essays on "my first impressions of the chemistry department."

Student Affiliates of the ACS. In October 1923 Alpha Chi Sigma held "A smoker and meeting for all chemistry students at South Hall." The president of the Chemistry Club explained that the purpose of the club was to organize a student affiliation with the American Chemical Society. In addition, talks were made by Lyons, Mathers, and Briscoe on the stimulating effects of the past World War on chemistry. More than ten years were to pass and Lyons' tenure as head of the Department was to end before an affiliate group was to be established.

Finally on 10 February 1937 the IDS informed all, but probably confused some, that the
"Possibilities of establishing a chemistry club for University students will be discussed at a meeting of Alpha Chi Sigma... at 7 o'clock tonight in room 201 of the Chemistry building..."

The president, Arthur R. Sexton, stated that the formation of such a club had been considered by the three chemistry honorary organizations. Following the meeting each of the three societies appointed a committee to meet together and discuss their objective with members of the chemistry faculty. At that time President Sexton said the purpose of the new club would be

"to raise funds with which to bring speakers prominent in the field of chemistry to monthly meetings of the club and create a spirit of closer fellowship among chemistry students."

Apparently at this meeting nothing was said about the club becoming a Student Affiliate of the American Chemical Society. The steering committee of three which resulted from the meeting of the three initiating committees was composed of the presidents of the three chemistry societies.

Before the end of February an outline of a constitution had been drafted and presented to the chemistry faculty for consideration. By 25 March a revised draft of the proposed constitution was presented to all interested students for adoption. At the meeting officers were nominated and elected.

It is significant that the first event sponsored by the new Chemistry Club was a picnic on Saturday afternoon 24 April 1937. As announced on 20 April there were to be baseball contests, other athletic events, food, and entertainment. This was a forerunner of many organized annual departmental picnics held for several decades.

Within approximately two years, on 29 March 1939, the Chemistry Club met in the Chemistry auditorium and became the Indiana University Student Affiliate chapter of the ACS. New officers were elected for the organization, a faculty sponsor was chosen, and bylaws of the ACS were adopted. The Chemistry Club was dissolved. Thirty students expressed their intention of applying for membership in the new chapter. At that time there were approximately 15 chapters of student Affiliates of the ACS in the United States.

**CHEMISTRY ATHLETES**

Only a few chemistry students participated in varsity athletics. Some made excellent records. Probably the most notable was Wilmer T. Rinehart, AB'29 with Distinction, AM'30, PhD'40. When Rinehart was a freshman, a track coach suggested that he try throwing a javelin, which
was a new sport for him. In his sophomore year he won first at the State meet, the Drake Relays, Georgia Relays, and second in the Big Ten. An injury to his arm kept him out of competition in his senior year. He was named All-American Javelin Thrower for 1928 by Grantland Rice. His record at I.U. remained unbroken for approximately 50 years, probably in part because javelin throwing was finally discontinued in the Big Ten, reportedly because it was too dangerous.

After Rinehart received his master's degree he was for a time assistant track coach and a life insurance salesman. Finally he resumed graduate work and was directed in his research by Briscoe who incidentally was noted on campus about that time for his prowess in handball. Three other outstanding chemistry trackmen in the latter half of the Lyons years were W. P. Konrad, AB'22; Floyd James, AB'31 with Distinction, AM'32, PhD'37; and Donald E. Neese, AB'33. In 1921 Konrad was captain of the track team. He went to the University of Illinois for graduate work. James was a star in cross-country participation. In 1930 the squad won the third consecutive Big Ten title. James was a star during 1930 and 1931. Also, he was elected to Phi Beta Kappa. Eventually he became Professor of Chemistry at Miami University where he retired in 1981. Neese was a member of the 1931, 1932, and 1933 National Collegiate and Big Ten track and cross-country teams. He was captain of the team in 1932 when it won the Big Ten championship. He retired from the chemical division of the Goodyear Tire and Rubber Company in 1973 where he was a specialist in organic coatings for masonry, wood, and metal surfaces. Soon he was persuaded to develop protective coatings for bronze sculptures, a pursuit that is challenging and promising.

Two of the several chemistry student varsity swimmers were Jesse B. Coon, AB'32 and his twin brother Julius M. Coon, AB'32; PhD'38 U. Chicago; MD'45 U. Ill. The former eventually became Professor of Physics at Texas A&M, College Station. Julius Coon was captain of the swimming team in his senior year and he held the Indiana records in the 220 and 440 yard free style for four years. He had a distinguished career in pharmacology and toxicology and was Professor and Chairman of Pharmacology 23 years until he retired in 1976.

In wrestling J. C. Warner, AB'19, MA'20, PhD'23, Hon ScD'54, was a Varsity letterman while he was an undergraduate.

Ward O. Gilbert, AB'22, was described in the IDS (Sept. 28, 1922) as a former Crimson athlete. He became a chemistry teacher and athletic director at Fort Wayne, Indiana. Probably the football player (center) in this period to become the most prominent after graduation was Neal E. Baxter, AB'32, MD'35 whose various distinctive accomplishments warranted listing in Who's Who in America.
PLACEMENT OF GRADUATING STUDENTS AND ALUMNI

At all times the placement of graduating chemistry majors and graduate students has been a notable concern of the department. During about the last 15 years of Lyons' headship, placement publicity became accentuated, especially through the Indiana Daily Student. Both the IDS and Lyons and other faculty members took pride in the accomplishments of the graduates and the roles played by the faculty in placements. Virtually every placement was a news item in the IDS, and periodically rather comprehensive articles appeared. Generally they exaggerated the importance of positions filled. But in retrospect the I.U. graduates in chemistry fared well.

One of the graduates, Floyd Peyton, AB'28, MS'29, in 1976 wrote perceptively about the department from 1924 to 1930:

"In the 1920's and 30's the graduates from the Chemistry department were accepted routinely by industry in the Indianapolis area as well as Procter and Gamble, Dow Chemical and Commercial Solvents Corporation. The graduates were well received and continued to advance in their fields of activity. For me and others like me from small high schools throughout the State with no instruction in chemistry before entering the University it was a tremendous step forward ..."

For many of the students and faculty as well as townspeople the IDS was the main source of understanding of what chemists do after graduating. An example of such reporting was the long front page article on 28 September 1922. The headline proclaimed that "I.U. Chemists Ply Trade in all Sections of the World." The article stated:

"Graduates of the Chemistry Department of Indiana University are 'plying their trade' in all parts of the world, according to reports being received by professors in that Department. A large percentage of the graduates are filling imposing positions with industrial companies where a high form of specialized technical knowledge is required. Others teach in high schools the subjects which they studied at the University, while a few have become research chemists."

In the long report on individuals it stated that

"Seven chemistry graduates of the last year have found positions in industrial concerns whose plants are located in Wisconsin, Oregon, Montana, Michigan, and even Cuba."

In addition, information was given about graduates who had become high school and college teachers, medical students, and graduate students in other institutions or at I.U. It was comprehensive.
Five months later, on 21 February 1923, the publication of a survey by the IDS was headed “Chemistry Grads Steer Clear of ‘Bread Lines.’” Eleven recent graduates were mentioned by name, position, and location. It must have created the feeling that for those who could do it chemistry was something satisfying and very worthwhile.

Also, the Indiana University Alumni Quarterly gave specific and pleasing information on placement. In 1925 it reported that J. C. Warner was married that year and he was then “head of his own chemical company, engaged in the manufacture of furniture polish and floor wax.” That soon ended and in time he became one of the university’s most distinguished university administrators and a leader in the American Chemical Society and the Electrochemical Society.

In June 1926 the IDS had at least two articles about the positions received by chemistry graduates. One also referred lengthily to J. C. Warner. After being employed in four different industrial jobs the report stated that he had accepted an appointment in the Department of Chemical Engineering at Carnegie Institute of Technology. That was the beginning of his career in the academic world.

A longer article two weeks later gave detailed information with a headline stating that “Sixteen Students Accept Work in Chemistry.” Other headings stated: “Five to teach in College — Others will enter Industry,” and “Diversity shown in various lines which men (sic) take up.” Again the news story attributed the source to Lyons. None of the 16 graduates were women.

A comparable news story in June 1927 stated that

“Nine Indiana University graduates of the Chemistry Department including six who received degrees this June, have received fellowships, or appointments in universities and with industrial concerns.”

Each graduate was named and the position was described. A variation was the listing of a woman graduate, Avis Rector. It was stated that she graduated a year earlier and had taught one year in a Tampa, Florida, high school. This year she was returning to Indiana and would teach in the high school at Kentland.

A few news items in the IDS in 1927 referred to job changes made by earlier chemistry graduates. Such items were commonplace during the 1920s and 1930s.

Several reports in 1928 kept the readers of IDS informed in detail on the placement and relocation of graduates. These included C. M. Alter who after receiving an AM degree went ultimately to Harvard for his PhD degree in 1936. At I.U. in 1927-28 he held the Grasselli Fellowship. Eventually he became Chancellor of the University of Denver. Another placement of note was Meredith Pleasant of Indianapolis who after re-
ceiving an AM degree went to Rochester high school where she taught chemistry. Later she enrolled at the University of Illinois where she married W. J. Sparks. Both received PhD degrees there in 1926 and both became distinguished.

The placements in 1929 were more numerous and they proved to be among the most impressive of all time. Dr. Lyons reported that 22 candidates for degrees had already "received appointments in educational institutions and in industrial concerns." The long account given in the IDS on 18 April must have greatly impressed the readers. Many of the persons named were already well known and appreciated on campus; also it had been decided that construction of the finest academic building for I.U. — the Chemistry Building — was to be started in the near future. Chemistry was in the minds of many. The successful graduates in chemistry that year and their immediate placements were in the order given:

**PhD Degree Candidates.**
- Troy C. Daniels. U. California as Assistant Professor in the Chemical College of Pharmacy.
- Florence B. King. Iowa State College as associate professor of food chemistry and nutrition.
- Sister Amata (McGlynn) St. Mary-of-the-Woods College as professor and head of the Department of Chemistry.
- Herschel Hunt. Massachusetts Institute of Technology as instructor in chemistry.

**AM Degree Candidates.**
- Francis M. Whitacre. Case School of Applied Science, as instructor in chemistry.
- Guido H. Stempel. Carnegie Institute of Technology, as instructor in chemistry.
- William J. Sparks. Roessler-Hasslacher Chemical Company, as research chemist.
- Chester M. Alter. Harvard University, as teaching fellow in chemistry.
- Eugene W. Kanning. Indiana University as special fellow in chemistry.
- Robert J. Hartman. Indiana University as assistant in chemistry.
- Eugene D. Scudder. Indiana University, as assistant in chemistry.

**AB Degree Candidates.**
- Charles L. Gregg. Dow Chemical Company, Midland, chemical staff.
- Byron M. Vanderbilt. Purdue University, as assistant in chemistry.
- Wilmer T. Rinehart. Indiana University, as Grasselli Chemical Company Fellow in chemistry.
Muriel Place. Roessler-Hasslacher Chemical Company, chemistry library.
Frank Welcher. Indiana University, as assistant in chemistry.
William L. Bright. Indiana University, as assistant in chemistry.
Robert D. Blue. Indiana University, as Grasselli Chemical Company Fellow in chemistry.
Fred M. Miller. Procter and Gamble Company, chemical staff.

The long time pattern was maintained of remaining at Indiana University for graduate work in chemistry. All seven of the graduates receiving AM degrees had completed all their baccalaureate work at I.U.; three remained and later received doctoral degrees here; three went directly to other institutions and earned doctoral degrees; and one took an industrial position first and later completed a PhD degree.

Seven of the twelve completing baccalaureate degrees took industrial appointments; one went to Purdue for graduate work, and the other four stayed at Indiana for such work. The principal companies attracting our chemistry graduates at that time were Procter and Gamble, Hercules Powder, and the Roessler-Hasslacher Chemical Company.

Three of the 23 graduates who ultimately received clearly national distinction were W. J. Sparks, C. M. Alter, and T. C. Daniels. Twenty five years after graduation from Indiana 14 of the 23 were listed in American Men of Science. Owing primarily to death and retirement none were listed in American Men and Women of Science fifty years later (15th edition). Two or three became recognized by admission to Who's Who in America but fifty years after graduation this high recognition had also faded away.

It is noteworthy that before the end of the 1920s industrial companies began to send representatives to the department to interview seniors and graduate students for employment. The record shows that in May 1929 the Hooker Electrochemical company for the first time had a representative in the department to interview students. Later in the year the chief of the personnel division of the Roessler-Hasslacher chemical company came for the same purpose. This small company already had strong connections with the department. Paul J. Carlisle, AB'13 with High Distinction, AM'14, was the research director and Russel L. Hardy, AB'22 with Distinction, AM'23, was superintendent of metallic sodium production. W. J. Sparks and R. L. Shelley had left the department that year to join the company.

Early in 1930 a representative of the Procter and Gamble Company interviewed prospective employees in the department. A number of chem-
istry graduates had been employed by the company during the 1920s. About the same time two representatives of the DuPont Company interviewed “senior men students.” The individual interviews were preceded by a presentation to all interested persons on chemical positions within the company. As usual the interviewing was done in Lyons’ office, Wylie 30. Alumni in such companies at DuPont and Procter and Gamble seemed to encourage the recruitment.

The IDS on 6 June 1930 ran an unusually long article. The main headlines proclaimed “28 Chemistry Seniors Given Appointment.” The presentation of the news tells much about the attitude of the IDS and the head of the department, and its effect on the readers:

“Twenty-eight seniors and graduate students ..., have received positions and appointments in a large number of the country’s largest industries and institutions ... Six additional seniors have completed their work in chemistry and have been admitted to schools of medicine. ...”

Dr. Lyons was quoted rather extensively. He stated in part

“I am proud of our chemistry graduates, both past and present, and I am interested to see that almost without exception they are making progress. Not many are content to stop with their four years’ course in chemistry here. They go on with preparations for teaching, research and industrial activity but many of them are among the outstanding chemists of this country today.”

The latter claim could not be supported except through the repeated indulgence in his belief that somehow he and most of his little group of chemistry faculty and other academic colleagues were among the outstanding teachers and investigators in this country. Fortunately a goodly proportion of the students seemed to have excellent basic qualities. That could mean much in their development, drive, and adaptability to new situations.

The following summary of the placements announced in 1930 can be compared to the previous summary given here for the placements in 1929:

**PhD Candidates.** None reported in the news release.

**AM Candidates.**

Ernest L. Martin. Procter and Gamble Company, research division.


Evart E. Mayfield. Hercules Powder Company, chemical staff.

Robert C. Gore. Indiana University, I.U. Fellowship.
Rocco Conti. Rayon Division of DuPont Company, research division.
Floyd A. Peyton. University of Michigan, fellowship in alloy research.
Robert D. Blue. Indiana University, reappointed Grasselli fellow.
Eugene W. Kanning. Indiana University, reappointed graduate teaching assistant.
Frank Welcher. Indiana University, reappointed graduate teaching assistant.
William Bright. Indiana University, reappointed graduate teaching assistant.
David Hartley. Indiana University, reappointed graduate teaching assistant.
Harvey A. Doyal. Indiana University, reappointed graduate teaching assistant.
Maurice M. Felger. Indiana University, reappointed graduate teaching assistant.
James A. Young. Teacher of chemistry, Wesleyan College, Central S.C.

AB Degree Candidates.
Darwin Badertscher. Penn State College, Chemistry fellowship.
Bert J. Voss, Jr. University of Chicago, biochemistry fellowship.
Harvey E. Wagoner. Roessler-Hasslacher Company, production department.
Rex H. Bradt. University of Wisconsin, chemistry graduate teaching assistantship.
Frank G. Uhler. Indiana University, Grasselli chemistry fellowship.
Joseph F. Treon. University of Cincinnati, chemistry graduate teaching assistantship.
Charles L. Brubaker. Rayon Division of DuPont Company, operating department summer appointment.
Frank E. Dolian. Commercial Solvents Corporation, operating department, summer appointment; Indiana U. 1930-31 graduate teaching assistantship.
W. W. Tryon, a junior. Fabricoid plant of the DuPont Company, assistant chemist, summer appointment.
George S. Stackhouse. Indiana University, Wolf Coal Saver chemistry fellowship.

As in 1929, too many in the graduation class of 1930 remained at I.U. for graduate work instead of going elsewhere. Ten of the 15 getting AM degrees here had completed their baccalaureate work at Indiana.
The great Depression was a serious handicap to graduates in gaining employment but Lyons and the other chemistry faculty members were diligent advocates for all. In a memorandum on 27 April 1934 Lyons reported (IDS 1 May) that:

"Of the 34 students receiving AB degrees in chemistry, 25 have placement. Of the 19 receiving AM degrees, 16 are known to be employed, and the four students who received the PhD degree have remunerative positions."

Reflective of the marked industrial slowdown, only one of the graduates with a PhD degree was placed in industry. One became a chemistry instructor in the Junior College of LaSalle, Illinois; one became a comparable instructor in the University's Extension Division in the South Bend area; and one was made acting instructor in chemistry at Indiana in Bloomington.

The industrial outlook for employment in chemistry brightened within six weeks. In another report by Lyons on 11 June, the appointment of ten chemistry graduates was cited. One became a graduate assistant in chemistry at Yale and all the others had been given industrial positions. One of them was a woman, Evelyn Strain. She became an assistant librarian in the DuPont Company at Niagara Falls.

Three weeks later the industrial employment of two other 1934 AM graduates was announced. Earl Moorman was employed in the control laboratory of the International Harvester Company in Chicago, and Louis Watson became a chemist with the Hiram Walker Company at Peoria. In both cases chemistry graduates in the class of 1912 had responsible positions in the companies and probably were influential in the selection of Indiana graduates.

The continuing concern for the placement of I.U. graduates was shown in September 1935, several months following the traditional announcements. This was with the statement, "Five additional members of the graduating class in chemistry last June have obtained positions." Two with PhD degrees went to the Technical Laboratory of the Federal Bureau of Investigation. Industrial companies who employed graduates were the Magnavox Company in Fort Wayne and the Thomas Steel Company at Warren, Ohio.

The placement record in 1936 remained active and rather successful. In July Lyons announced the placement of four PhD recipients of that year:

F.A. Griffitts. Maryville College, as Associate Professor of Chemistry.

James E. Hatfield. Eagle-Picher Lead Company, research staff.
Robert H. Treadway. DuPont Company, Grasselli Division, research staff.
John F. Deupree. St. Xavier University, Cincinnati, as Assistant Professor.

By 1937 the announcements of placements had begun to include connections with more of the larger companies and universities. This is shown in the language of the IDS on 21 April:

"Seven Indiana University chemistry majors, four of them members of the class of '37, and three graduate students, have received appointments as assistants in college chemistry departments and positions in leading chemical and industrial firms throughout the country, Dr. Robert E. Lyons, head of the Chemistry Department announced Tuesday."

The graduates and the placements were:

Paul J. Dasher, BS'34, U. Ill.; AM'35, PhD'37 I.U. Goodrich Rubber Company.
William P. Price, AB'34, AM'35. Cornell University, graduate teaching assistant.
Raymond N. Keller, AM'37. University of Illinois, graduate teaching assistant.
LeRoy Dugan, BS'37. University of Washington, graduate teaching assistant.
Franklin S. King, BS'37. Upjohn Company, chemical staff.
John W. Berry, AB'37. Dow Chemical Company, research division.

Four weeks later the placement of two other students was announced:

Alvin M. Borders, AB'31, AM'36. Goodyear Rubber Company, research division.
Lawrence A. Blatz, AB'37. Universal Oil Products Company, chemistry laboratory.

Clearly the department released news of placements without delay. For example, the third announcement in 1937 was on 7 July 1937. Only two were reported:

Arthur R. Sexton, BS'37. Dow Chemical Company, technical staff.
Virgil Hunt, AM'33. Central Normal College, Professor of Chemistry and Dean of Men.
Probably the feelings of graduates about placement in the 1930s is expressed well for a goodly proportion in a letter written to H. G. Day in 1984 by David D. Hartley who received his PhD degree in 1932:

"I had dreams that I might find work with Eli Lilly ... but when the time arrived in 1932 the depression was on to such an extent that Lilly would not accept applications. But out here in Tulsa with PhD's available at $150-200 per month Mid-Continent felt that it could expand and improve its laboratories. It employed me and another (graduate) from U. of Illinois. I knew absolutely nothing about petroleum processing but ... the material was there to be learned... I had a secure living wage, and here I am, content in my retirement."

Most of the graduates in the 1930s struggled some to obtain suitable placement and nearly all were successful. They were productive in their positions and lived responsibly in their communities. One of the most satisfying remembrances was the knowledge that Lyons and all the chemistry faculty were resourceful and caring in their placement efforts.

BLACK STUDENTS IN CHEMISTRY

Apparently Harvey Young was the first black person to enroll at Indiana University. Reference to him was made in the diary kept by T. Wylie. In the entry on 20 August 1882 in his characteristic way Wylie wrote:

"Harvey Young, graduate of Indiana High school came last Thursday intending to enter the Freshman class. He is well recommended has a good appearance ... intelligent & neat ... will be a pioneer colored student in the College ... hope he will do well."

There is no other reference to him in the available Wylie diaries, which were continued until 1892. Also there is no reference to him in Wylie's history of the university which contained a listing of students from 1820 to 1887.

Even before the 20th century there was some black participation in campus and community matters. For example, following the death by assassination of President Garfield a large and extensive campus-community commemoration service was held at the Methodist Church. Concerning the service, Wylie wrote in his diary on 25 September 1881: "Bro. Clay (colored) pastor of the A.M.E. Ch. opened with prayers..."

It is uncertain who the first black students were who earned degrees in chemistry. Possibly the first was Wilson V. Eagleson. He received an AB in 1922 and he completed an AM degree in 1924, but the latter was not awarded until 1926. The 77-page, well written thesis was entitled
“The effect of the conditions of calcination upon the degree of hydration and carbonation of magnesia.” The work was directed by F. C. Mathers. Apparently Mr. Eagleson learned well as indicated in the final conclusion:

“...that a quick set, ready mixed, lime plaster is feasible and may be prepared cheaply enough to compete with the dolomitic plasters now in use providing magnesium carbonate can be manufactured cheaply enough.”

The work was published with Mathers in the *Proceedings of the Indiana Academy of Science* for 1928.

After a short time at Cornell University Eagleson transferred to the University of Pittsburgh for work toward the PhD degree in chemistry. The dissertation had been almost finished when in 1933 he was killed in an automobile accident. In the meantime he had married Frances E. Marshall who received an AB degree in English. In doing so she became the first black female to graduate from Indiana University. When the Neal-Marshall Alumni Club was created in 1981 it was named after the first black male and female graduates.

Another first for Wilson Eagleson was through his father Preston E. Eagleson. The father earned an AB in Philosophy in 1896 and an AM in 1906. He was the first black to earn a graduate degree at I.U. As stated by H. B Wells in his autobiography (p. 214), P. E. Eagleson “became a highly regarded halfback in football and pitcher in baseball on the teams of 1894 and 1895.” The prominent Elizabeth Bridgwaters in Bloomington was Wilson Eagleson's sister.

Henry S. Wilson was probably the second black graduate in chemistry. The AB was in 1923, AM in 1927, and the PhD in 1938. Both theses were well written and the work was directed by Mathers. The research for the latter was conducted at Indiana during the Summer Sessions of 1933-35 and during the year 1937-38. Mr. Wilson was supported by a fellowship of the Julius Rosenwald Fund. The IDS on 13 January 1928 ran a three paragraph article on the master's work as reported to the IDS by Mathers. Then early in 1929 Wilson was named with many other I.U. chemists whose work was cited in a national survey of American chemistry. He died in 1988.

Eugene D. Raines received his PhD degree in chemistry simultaneously with Henry S. Wilson. This was in 1938 under the direction of Prof. Brown. But the record indicates that he was the second to receive an AM degree, in 1934. The thesis for the latter was only 12 pages and it was not impressive. The doctoral thesis was 49 pages and entitled “Nickel, Cadmium and Lead Sulphides as Catalysts in the Vapor Phase Reduction of Nitrobenzene.” The “research was made possible by the
General Education Board” (Rockefeller). For many years Dr. Raines was Head of the Department of Chemistry at Kentucky State College.

Elmer E. O'Banion, AB’34, AM’35, PhD’42, was the last black student to receive a doctoral degree under Prof. Brown’s direction. After a time he joined the faculty of Prairie View State Normal and Industrial College, but in 1941 he returned to Indiana University to complete the PhD degree. Like Raines before him he held a General Education Board Fellowship. In spite of a heavy research schedule under Brown he developed interest in H. G. Day’s work, with others, on the biosynthesis of vitamin K in the intestinal tract of rats. Indeed he volunteered to do some of the necessary animal care work and he contributed in other ways. He was a coauthor of a publication on this work in 1943. O'Banion became Professor and Head of the Department of Natural Sciences at Prairie View. He died in 1971.

Ernest F. Stevenson received AB and AM degrees in 1936 and 1937 respectively. The research was directed by Mathers. Most of his active professional life was devoted to chemistry in the United States Ordnance Division at Picatinny Arsenal in New Jersey.

Edward G. High received AB, AM and PhD degrees in chemistry at I.U. in 1940, 1941, and 1950, respectively. The master’s work was under the direction of May. H. G. Day directed the doctoral work and he was a coauthor of some of the publications and presentations at scientific meetings that followed. The general topic was the effect of xanthophyll, lycopene, and related substances on the utilization of carotene and vitamin A by the rat. The first report, by Dr. High, was at the meeting of the American Chemical Society in 1950 at Houston, Texas. Apparently this was the first time a black person represented this department in giving a scientific paper at a national meeting. The work and presentation were very well received. This is a credit to chemists in this country because at that time segregation was still extensively practiced in the South. Later High satisfied the rigorous scientific criteria for membership in the American Institute of Nutrition, and the American Society of Biological Chemists. He was admitted to membership in 1956 and 1968 respectively. He was a member of several other scientific societies. During his brief but intensive period of residence for the PhD degree in 1948-49, he held a fellowship awarded by the National Institutes of Health. The thesis was finished in absentia while he was serving on the faculty at Prairie View A&M College. In 1953 he joined the biochemistry faculty at Meharry Medical College and remained there the rest of his professional life. Among his several national responsibilities, in 1981-82 he was president of the Indiana University Alumni Association. His death occurred unexpectedly from a heart attack in Indianapolis on 14 June 1986.
THE BEGINNING OF CHEMISTRY IN THE EXTENSION CENTERS

The Indiana University Extension Centers were logical projections of the university at Bloomington to other areas of the State.

One of the first public notices of such activity in chemistry was in the IDS on 1 May 1929. It stated that

"A course in general organic chemistry (227A and 227B) will be offered ... this summer at Indianapolis. It will be taught by Dr. B. S. Davisson ... Six hours of credit will be allowed ..."

This was the only summer instruction to be offered that year by the Extension Center in Indianapolis. It was also given in 1928. Approval of teachers and basic aspects of the courses were the responsibility of the appropriate departments at Bloomington.

Illustrative of such administration is a letter from President Bryan to Dr. Lyons on 10 January 1934 which reported approval of the recommendation of persons to teach chemistry in the Indianapolis Extension Center:

"Concurring in your recommendation to Mr. Cavanaugh (Director) the Executive Committee has given the following persons the title of Instructor in Chemistry in the Extension Division:

William L. Bright
Maurice M. Felger
Frank Welcher"

This is the oldest correspondence available on the approval of chemistry instructors for any extension center.

Chemistry in such centers slowly began with regular instruction for credit starting at Indianapolis. The Extension Teaching Center was established there in 1916 (Cummins pp. 658-682, in Myers II), but apparently no chemistry was taught before the late 1920s. By far the most notable chemistry teacher was Frank T. Welcher. His service on a full time basis began after he received his PhD degree here in 1932. It continued virtually without interruption at Indianapolis until his retirement as Professor Emeritus of Chemistry in 1978.

Extension teaching gradually began in the humanities and social sciences in the areas of South Bend, Fort Wayne, Gary, Southeast (Jeffersonville), and Kokomo, but regularized instruction in chemistry in such areas did not start until the 1940s. The developments at Richmond occurred later. Thus Lyons’ influence in selecting chemistry teachers for extension services was essentially limited to the Indianapolis area. The expansion and strengthening of these campuses continued throughout
the presidency of H. B Wells. By 1962 when E. J. Stahr succeeded Wells the Indiana University Extension System had become ready for gradual conversion to an integral series of four-year degree-granting arms of the total Indiana University. Legislative authorization of this significant change started in 1965. This was greatly implemented during the presidency of J. W. Ryan. The system is now referred to as the University with Eight Front Doors, an advancement in the first years of the T. Ehrlich presidency.

The details of the remarkable development of regional campuses were made available in the book in 1961 by Robert E. Cavanaugh who in 1920 became Director of the Extension Division of Indiana University. He was to remain in charge of the Division until 1946. This is of particular interest because his son Robert M. Cavanaugh received AB and AM degrees in chemistry here before going to Yale for his PhD degree in 1937.

**SOME RELATIONSHIPS BETWEEN THE BLOOMINGTON COMMUNITY AND THE DEPARTMENT OF CHEMISTRY**

During all of Lyons’ years as head of the department, Bloomington and the university were geographically isolated from urban activities and resources. Even during the latter half of his headship the only practical way to reach Bloomington from any of the major population centers, except perhaps Indianapolis, was by train. And from several cities that was somewhat inconvenient. The roads remained narrow, hilly, and crooked until about three decades after Lyons retired.

In 1925 the U.S. census estimate of cities with more than 10,000 population listed Bloomington in that category with 31 other Indiana cities. Only five besides Bloomington were south of Indianapolis. Many of the Bloomington streets, especially on the west side of the city, were poorly paved if at all. Substantial parts of Bloomington were without connection with the sewerage system. No lakes such as Lemon and Monroe apparently had even been imagined. The hospital and medical facilities were indeed undeveloped. There was little to attract promising faculty members except the modest university. Virtually the only chemists within 40 miles of Bloomington were the few who were faculty members at the university. Even so the community was pretty important to the department and other areas of the university.

Three distinct changes occurred in 1924 that moved the community forward. They were the inauguration of limited bus transportation, substantial improvement of the frequently critical water shortages, and rebuilding of the defectively constructed university stadium. All three were referred to frequently in the local news media. All affected chemistry students and the department.
Bus service: On 21 November 1924 the IDS proclaimed that “for the first time, the Bloomington Public will be served with regular transportation about the city.” A Red Star Bus Company initiated the service using “A large 21-passenger bus of the street car type.” Single rides were ten cents and ten ride tickets were 75 cents. From that time onward with only one or two brief lapses there has been some kind of public transportation besides the service of taxicabs.

City water problems: The long-prevailing and at times desperate water inadequacy of Bloomington finally began to move toward a modest solution in 1924. It had existed more than two decades. Politics, shortsightedness, and lack of community respect for scientific knowledge were finally overcome when some of the citizens banded together and took action that unified the public. The situation had become so serious that around 1910 the university built a supplemental water supply near the campus to help meet its needs, but it was not adequate for growing campus needs, and it could not meet the household requirements of faculty and students.

Contending with various makeshift sources of water, in 1915, the city obstinately built Leonard Springs Lake and began to depend on it for most of its water needs. Unfortunately the site had not been properly selected and there were frequent and intolerable leaks owing primarily to the faulty limestone terrain. Geologists and engineers had warned against building a lake at the site and they strongly advised against trying to repair the leaks. Construction of a new lake on Griffy creek, north of the city, was debated hotly.

Finally in March 1924, through a great outpouring of citizen action, a settlement of disputes in favor of a new lake Griffy was reached by city officials. The battles were not quite over but victory was in sight. Promptly the IDS glowingly expressed the response of President Bryan who exclaimed in measured words, “Yesterday (18 March) was the greatest day in the history of Bloomington.” He predicted that with the completion of Griffy Lake and the necessary water treatment facilities, “the city and university will grow by leaps and bounds.” But the problems continued while the new lake and facilities were being constructed and put into operation.

For several months the rainfall was minimal and by December another serious water shortage had become imminent. Finally early in the month a steady rain lasting three days had drenched the area, but knowing the problems well the officials urged the residents not to waste the water. Happily the existence of the new lake and water system greatly improved the water situation.

The IDS and other newspapers continued to carry frequent reports and discussions on the water situation. Because the university’s private source of supplemental water was costly and cumbersome in February
1925 Lyons, as Chairman of the Committee on Student Health, recommended to President Bryan that the university cease all distribution of water to other than university buildings. Immediately water service from the university supply to various houses and professors' homes by pipe line and tank delivery was discontinued. By this action the university community became much more dependent on the new Bloomington water system.

One of the most extravagant reactions to the great improvement was a full page ad published by the Bloomington Chamber of Commerce. It appeared in the State Fair Edition of the IDS 8 September 1925. The main headings proclaimed in part:

Bloomington Is Located in One of the Most Attractive Parts of Beautiful Southern Indiana and Has Excellent Roads over which to Travel for Pleasure or Business

No longer the Sahara of the State but Now the Oasis to Which all May Come with Assurance of Finding a Supply of Good Water

Adequate for all industrial and domestic needs every hour every day every year.

However, this new source was not enough. During every drought the university and community had to curtail the use of water. Occasionally marked restrictions had to be militantly encouraged. The construction of Lake Lemon gave considerable relief, but that did not suffice. Finally the completion of Lake Monroe in 1966 and the prompt development of an extensive city and county-wide water system drawing primarily from that gigantic source solved the water problem for many decades.

A comprehensive and detailed review of the water problems occupies a full chapter in Myers History of Indiana University (pp. 270-290). As president of the Bloomington Chamber of Commerce during the height of the decision making on solving the water problem he was fully informed, deeply concerned, and resourceful. Through Professor Myers and others in the university critical assistance was given to the partial solution of the water problems during the Lyons' years.

Memorial Stadium: The aggravating problems concerning the construction and "repair" of the football stadium on 10th street involved the department of chemistry because it occupied much of Lyons' time during 1924 and 1925. Construction was started in summer 1923, but early in 1924 alarming cracks were discovered in the concrete. Soon the trustees appointed a Stadium Repair Committee to inspect the nearly completed stadium and make recommendations regarding serious allegations that construction was very faulty and steps should be taken
immediately to protect the university. Members of the committee, in addition to Lyons, were A. L. Foley (physics), W. N. Logan (geology) and B. Green of the Osborn Engineering company. It quickly gave substance to the allegations and made specific recommendations. Remedial action was soon started but the enormity of the mounting construction deficiencies, and the clear evidence that the contractors planned to do nothing, galvanized action. Besides this there was much public pressure to have the stadium ready for use before the beginning of the 1924 football season.

Finally in July the trustees decided that the prudent action would be to demolish the defective stadium and erect a new structure. This time a new committee was designated to act closely in a consulting and supervisory capacity in all aspects of construction. A letter dated 5 August 1924 was sent to Lyons at his home requesting him to chair the committee. Others designated were Z. G. Clevenger (Director of Athletics), A. L. Foley, W. J. Huddle (representing alumni), W. N. Logan, and W. J. Titus (State Highway Department bridge engineer). Rapid construction progress was made and Lyons was much involved in supervising the work. This is evidenced in an item in the IDS on 6 October 1924. It stated

“Lack of cut-out boxes, a part of the electrical wiring which is to be installed in the front wall of the rebuilt stadium has been holding up the pouring of concrete for a week, according to Dr. R. E. Lyons, chairman of the Stadium Committee.”

The completed stadium was dedicated 21 November 1925 in connection with the Purdue-Indiana game, with a 0-0 score. Litigation on various aspects of the complicated problems had been in progress more than a year and continued until October 1931 when a compromise was reached and the matter ended.

CONSULTING FEES AND ENTREPRENEURSHIP

In the prolonged litigation concerning the stadium expert testimony was involved. This required interviews and the assembling of evidence by Lyons. Presumably because such services did not directly relate to the needs of the department of chemistry he felt justified in presenting a bill for extra compensation. The amount requested was $1,088. In a letter to President Bryan on 12 October 1925 he wrote in part,

“I beg to submit a statement concerning services in connection with the stadium court case, based upon a rate considerably less than one-half my usual fee for work of this kind.”
Some time later he was asked to withdraw the claim for service. Dr. Lyons participated as an expert witness in a variety of off-campus complaints and legal actions. The awareness of the public in such use of his time while head of the department of chemistry is illustrated by a report in the IDS on 5 May 1922: Dr. Lyons

"...left yesterday for Buffalo, New York, where he has been called to testify as an expert witness in a law suit being tried there on the alleged infringement of patent rights in the manufacture of vegetable glue."

Two years later there was an exchange of letters between Lyons and President Bryan regarding a complaint from a resident of Bloomington who objected to the payment of fees Lyons charged through the Chief of Police for his appearance in court as an expert witness in a "bootlegging" trial.

Presumably none of the fees received were transferred to the university or any special funds for the benefit of students or others. Perhaps because so few facts were available speculation mounted up on the extent and nature of Lyons' income from testimony, consultations, and royalty on patents. Probably many persons acquired exaggerated opinions. Nevertheless his services in connection with the construction of the stadium must have been very useful later in dealing with the planning and construction of the 1931 chemistry building.

Entrepreneurship: In the first decade of the century the Bloomington community did not appear to object when Prof. O. W Brown and associates began the private manufacture of storage batteries just a few blocks west of the campus, at 415 East 7th Street. But in 1924 firm objections were raised when Brown's former student and then junior chemistry faculty member C. O. Henke made plans to begin the manufacture of certain organic chemicals on South Henderson Street. Specific zoning and planning were yet to be adopted in Bloomington.

Of course the action was front page news in the local newspapers. The IDS on 18 July 1924 reported:

"An attempt on the part of Professor C. O. Henke, of the Chemistry Department to erect a chemical laboratory and factory in the residential section of the City, was frustrated yesterday when 18 property owners and residents ... purchased the land from Henke. Henke purchased the lots a week ago and contractors had begun excavation preparatory to erecting the building ... Agitation began immediately upon purchase of the site by Henke and a number of community meetings were held to decide what action would be taken ..."

The quick action resulted in an agreement:
"...that the Monroe County Bank would act as trustee for the protesters, buy the lots and sell them. Henke was approached and agreed to sell."

Thus the emotional concern was quickly brought to a sensible conclusion. It is not known whether the department of chemistry was directly involved. Some of the protesters were members of the university faculty and others were prominently involved in the business and professional life of Bloomington.

This quickly aborted venture was far different from the successful small enterprise for clinical chemistry operated on a part time basis by C. E. May from about 1925 to 1955. He had a small brick building on the north side of Third Street between Walnut and College. It was equipped with a limited amount of clinical equipment and supplies for the chemical analysis of blood and urine samples as a service to local physicians. Of course fees were charged for the analyses. There was apparently no significant questioning of the propriety of the business, or the wisdom of devoting time to it, but it did not contribute anything to teaching or research.

Such enterprise, including consulting service, was not discouraged if it was reputable and it did not interfere with the discharge of responsibilities to the university.

**BUDGETARY PROBLEMS**

The university's struggle for financial support and the meagerness of funding for chemistry were the major problems throughout Lyons' connection with the department. He tried to attract meaningful support but whether he could have accomplished much more than he did is debatable. However the overall support did improve over the years, although not nearly as much as in several other state institutions.

The funding status throughout most of the Lyons years is indicated in an extensive review by President Bryan in the Alumnus Edition of the IDS on 18 March 1929. He showed that the university's income in the fiscal year 1895-96 was $111,289.99. By 1910-11 it had become $315,842.28 and by 1920-21 it was $1,235,761.37. The estimated income for 1929-30 was $2,946,100.

Three years earlier, writing strongly in the IDS (25 September 1926), President Bryan dwelt on the extent of faculty resignations to accept larger salaries at other institutions. He pointed out that 48 resignations had occurred in the last five years "to accept positions in other institutions" and receive "a more than 50% increase over the salary paid at I.U."

**Support staff:** The continuously underbudgeted department of chemistry was notably affected in meeting the needs for supporting staff
as well as faculty. This adversely affected efficiency and quality of services and functions. Reflecting this, most of the correspondence and reports from chemistry to the president’s office were in longhand until the late 1920s. Copying facilities in the university were virtually non-existent until 1923. In that year a university photostat was purchased, apparently at a cost of approximately $1100. Until that time even copies of transcripts were produced by hand. Logically, with only one facility, departments such as chemistry did not make photostatic copies unless the need was impelling.

For example, in a handwritten letter to President Bryan on 21 December 1922 Lyons stated

“I have refrained from asking for a departmental stenographer and typist, for printed stationary, and for a dependable telephone. This has not been because the executive work would not warrant such a request but because I desired to aid you in general university economy and efficiency.”

There was not even a direct method to telephone to the outside from Wylie Hall in 1922. In the December letter Lyons complained

“Some two months ago I made a request for a city telephone because of the harassingly inoperative instrument in Wylie Hall and because of the annoyance to Mrs. Lyons and myself with calls from various university offices during lunch and dinner hours.”

As indicated, the telephone system was so bad it was more feasible to reach Lyons by telephone at his home than at his office.

The enrollment data alone suggests the magnitude of the problems caused by virtually non-existent secretarial services. In a letter to President Bryan 28 September 1921 Lyons stated that in the 26 chemistry classes there were 357 men and 111 women. There were 52 men undergraduate majors and 10 women. Eleven of the graduate students were men and one was a woman.

Budget control: As in his first 25 years of responsibility in the department, Lyons continued his efforts to obtain more control of its meager resources and he kept asking for more support. It rightfully irritated him that the department should have so little control of credits and debits regarding the scanty chemistry funds. For example, on 5 May 1924 he wrote (in longhand) to the president:

“Request is made that the Bursar beginning May, 1924, make a monthly report to the department of chemistry of all items and amounts charged against the chemistry fund and all credits or discounts applying to this fund.”
In the letter he noted that they (presumably the Bursar) had charged against chemistry for all the gas which had been metered for home economics in Wylie Hall as well as for the gas used in Kirkwood and Science Halls. Obviously he did not want the department charged for more than it used. In addition, he wanted the chemistry account credited for the sale of scrap platinum, empty containers, etc.

For many years Lyons had presented requests for improvements in the space available in Wylie Hall. Also he had asked for additions to the building if much more of its space could not be allocated to chemistry. In his budget request dated 22 February 1924 such need was strongly emphasized. In particular he emphasized that the physical condition of the basement and first floor is "discreditable and discouraging."

Four days later he vented his feelings to the trustees. The following was included:

"The pending legislative budget bill as announced in the press provides $325,000 for an addition to our library building and for no other constructive work in Bloomington.

"Why the visiting committee was led to select and make recommendation of one item and later increase the amount for this one item from $225,000 to $325,000 is not clear to me.

"It is a source of great disappointment and embarrassment to me as head of the Department of Chemistry."

Finally the squeaking wheel action paid off in a small way. The IDS on 27 September 1926 announced that the mathematics department had been moved from Wylie Hall to the Library building. The vacated rooms were given to chemistry. The item stated:

"This will enable the chemistry department to have a larger library room, physical chemistry research will be in a room of its own (!). Storage battery research will have an additional room and electric furnace and metallurgical lab, which were formerly in the Journalism building, are now in the basement of Wylie Hall."

This plainly depicts the limited values placed on physical chemistry research by providing less space than for storage battery space.

The frugality of budgetary restrictions greatly affected the department during the 1920s. This is shown in the scantiness of allowances for supplies and expenses (S&E) and small amounts for secretarial support. During much of this time the S&E allowance was about $5000. Laboratory fees paid by the students to the university were credited to this item. After paying for glassware and chemicals little was left for myriad
other costs, especially those for upgrading the laboratory and office resources.

In the report and budgetary request for 1929-30, dated 1 April 1929, a request was included for $300 "to purchase a Dictaphone and employ a typist." There is no indication in this report or any other available records, that there had been any paid secretarial help available in the department.

The departmental budget report on 1 April 1930 provided $300 for secretarial assistance, but there was a notation: "Allowed but not used, 1929-30." The amount for the stockroom manager, Frank ("Dad") Eckels, remained at $1300. Later during the depression this was reduced.

The somberness of the situation in the beginning of the 1930s was shown in President Bryan's restraining letter of 30 April 1931 to Lyons:

"I may say that more than one-half of the deans and heads have kept their budgets within the appropriations of last year ... The University faces the fact of a depression and the incurable fact that we will have no more money next year than we have had this year."

Nevertheless Lyons persisted. On 8 September 1931 he requested the authorization of $7,209 for laboratory assistants and wages for a departmental secretary. The Bursar promptly replied that the two requisitions had been passed favorably by the Executive Committee (at a Saturday meeting), but with the understanding that the authorization

"will fall within the departmental and teaching budget already appropriated for your department."

In the budgetary request for 1931-32 Lyons asked for authorization of funding for the appointment of a faculty member "in microanalytical chemistry or perhaps fermentation chemistry capable of directing and doing research at the level of assistant or associate professor". It was denied. From the time of his appointment to the faculty in 1895 until he resigned in 1938 he never totally gave up the idea of including some bacteriology, such as fermentation chemistry, in the chemistry program.

Other items in the denied request for budgetary increases included: $400 for Dictaphone equipment, $500 for moving and repairing equipment from Wylie Hall to the new building, and $5000 for the provision of analytical balances and many other equipment and supplies items.

Chemistry Secretary: If the request for a combination chemistry secretary and librarian had been granted Esther Weber (Adams) probably would have been the first to fill this role. She did some part-time typing and other secretarial work for Lyons before she received her AB in 1930 and while she was an AM candidate. However she could not earn enough
in chemistry to meet her need. Thus she sought and received employment in the office of the Graduate School. Copies of typed chemistry letters beginning as early as November 1930 bear her imprint. She, the first part-time secretary, stayed more than one year.

Because the department moved to the new building in 1931 it was even more important to have a greater amount of help in the office and connecting chemistry library. Thus the replacement in 1932 was given more hours of work and greater responsibility but low pay. Miss Mollie Goodrich took the job. Soon, on 7 September 1932, Lyons requested the Executive Committee, through Dr. Bryan, to authorize his contrived way to pay Miss Goodrich $750 a year as secretary-librarian, with "$276 from salary budget 1932-33; $474 from 'depreciation fees (sic) included in the department funds 1932-33 for a total of $750."

By 1933-34 the department had achieved some success in staffing. Mollie Goodrich was approved at 40 hours per week. The salary was $850 for the current year and $950 was recommended for 1934-35. The storerooms keeper, F. Eckels, was reduced in salary owing to the depression, as were most of the faculty and staff in the university. For an average of 45 hours per week his salary was $1096. The same was recommended for 1934-35. Other current salaries on the report were:

- R. E. Lyons: 5250
- O. W Brown: 3870
- F. C. Mathers: 3600
- C. E. May: 3420
- H. T. Briscoe: 3420
- R. J. Hartman: 1104
- E. W. Kanning: 1104
- R. E. Gore: 850

Owing to the depression Lyons tried hard to keep the budget request low. The recommended salary increases for faculty were limited to Hartman and Kanning for an increase to $1600 each, and for Gore as instructor to $900. Even so, President Bryan requested him to reduce the recommended raises so that there would not be an increase in the total budget.

The case made by Lyons was cogent, but the effect was like getting blood from a turnip. In presenting the requested budget for 1934-35 the expenditures and income from breakage charges, with net costs to the university were shown for each of the years beginning in 1929. The great decrease in 1932 is striking:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total allowed for supplies and repairs</th>
<th>Breakage paid to Bursar</th>
<th>Net cost to I.U.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>$6,750</td>
<td>$2,316.96</td>
<td>$4,383.04</td>
</tr>
<tr>
<td>1930</td>
<td>6,700</td>
<td>2,316.96</td>
<td>4,160.68</td>
</tr>
<tr>
<td>1931</td>
<td>6,700</td>
<td>2,620.25</td>
<td>4,079.75</td>
</tr>
<tr>
<td>1932</td>
<td>5,695</td>
<td>2,880.28</td>
<td>2,814.72</td>
</tr>
<tr>
<td>1933 (Fiscal year changed)</td>
<td>5,000</td>
<td>2,049.58</td>
<td>2,950.42</td>
</tr>
</tbody>
</table>
The mounting plight of the department was shown in Lyons' reference to increasing enrollment in chemistry and concurrently decreasing allotments. He wrote in the request for 1934-35:

“For example, this semester (II in 1933-34) in quantitative analysis we have seventy-five enrolled and a supply of apparatus adequate for approximately fifty; in the physical chemistry laboratory the enrollment is twenty-five and the available apparatus is sufficient for no more than twelve or fifteen.”

In another part of the budget request Lyons wrote pleadingly, and perhaps more desperately than in any other request:

“The total cost to the University per credit hour in freshman chemistry, including instruction, assistants, and supplies, is approximately $1.13. This is two-thirds lower than in any institution of my knowledge. We have been unable thus far to provide simple equipment in sufficient quantity to prevent loss of time for the large group of 451 freshmen per semester.

“I pray that a way may be found to meet the requested chemistry budget for 1934-35. A reduction in the amounts of supplies and assistants can be met only on the basis of an arbitrary limitation in enrollment in freshmen and/or graduate students.”

Limitations on enrollments in chemistry courses was not adopted, but several decades later, with much more favorable budgetary support, it was necessary for a short time owing to overwhelming increases in enrollment.

So much depended on Lyons in promoting the place of chemistry in the spacious and much more functional new chemistry building it was important to have adequate secretarial assistance and some supervision of the chemistry library. From the time that Mollie Goodrich was appointed in 1932 at least one full time secretary-librarian was available. Early in 1935 a request for an increase of her salary to $1000 a year was supported by Lyons with the statement

“The work of this position has more than doubled during her clemency (sic), the service is to be characterized as splendidly efficient.”

Also, Miss Goodrich was attractive to one of the graduate students, Raymond Keller. The marriage that ensued apparently marks the first in which both parties held appointments in the department. The new Mrs. Keller continued her service to the department until he finished his AM degree in 1937. He received an opportunity to continue his graduate
work at the University of Illinois. Thus on 3 August 1937 Lyons wrote to the President and Board of Trustees:

"Mrs. Raymond Keller, secretary-librarian of the Chemistry department, tenders her resignation, effective September 1, 1937, in order to accompany her husband to the University of Illinois.

"I recommend the appointment of Miss Betty Curts to this position beginning August 23, 1937 at the same salary, $1200.

"Before making this recommendation, I conferred with Dean Rothrock in whose office Miss Curts is employed, and I have his approval."

Dr. Lyons' request for approval received the attention of the new Acting President Wells. The new administrator had been in office less than five weeks. Thus this probably was his first action on an appointment involving staff or faculty in the department. The prompt response to Lyons, dated 13 August 1937, granted the request exactly as made.

COURSES AND CURRICULUM

Course overlap with Purdue: A recurring and substantive concern about undesirable overlapping of courses at Purdue and Indiana related to chemical engineering. Illustrating this, on 18 December 1934 Lyons characteristically wrote to President Bryan:

"Concerning the point raised by Dean Dukes of Purdue Graduate School, as to our courses designated as chemical engineering, I wish to make the following reply:

"Approximately one-third of our chemistry majors have entered some phase of industrial chemistry, and several members of this group have an interest in the fundamental principles of chemical technology.

"In order to meet this situation, our Professor Brown, in 1905, introduced these courses dealing with some of the basic principles that we have. The work has been of great help to this group of students, and we should like to continue it.

"We do not feel that this should be regarded either as duplication or infringement, since we make no claim or offer a complete professional program for training of the chemical engineer."

Since that time the issue has remained well resolved but for several decades this department continued to give limited training in some aspects of industrial chemistry.
Revisions in Courses and Degree Requirements: A curricular issue in 1932 concerned the maximum amount of course work in chemistry that could be required in meeting the requirements for baccalaureate degrees. This arose in early 1931 when the College of Arts and Sciences adopted some revisions in the course requirements in the Concentration Groups. Included with this were rather extensive revisions in course descriptions and the system for numbering the courses. For example, the designation of beginning chemistry was changed from Inorganic Chemistry to General Chemistry. In the correspondence with Lyons the pervasive and direct role of President Bryan was evident rather than the delegation of such matters to the dean of the College of Arts and Sciences. This, and Lyons' promptness in responding are reflected in President Bryan's letter of 24 February 1932 and Lyons letter of 25 February:

Bryan: "When the new course of study for the A.B. degree was adopted last spring, it was clearly the intention that no department might make an absolute requirement of more than 25 hours in the department for a major in the Concentration Group.

"The announcement of your department submitted for publication in the bulletin of Liberal Arts does not conform to this regulation. I respectfully request that your announcement be corrected in accord with the rules of the faculty as soon as possible."

Lyons: "The interpretation given by you and by Dean Stout of Rule 1, page 8, of the printed leaflet of the requirements for the degree A.B. is not in accord with the understanding I had from conferences with the committee as to what they intended to recommend.

"To grant exactly the same degree, A.B. Chemistry major for a course comprising 25 hours and 36 hours, creates an impossible situation in the Department of Chemistry.

"In an endeavor to comply with your request, I submit the following for the catalog copy on page 140:

"To meet the requirements in chemical training demanded for full admission to standard graduate schools and for recommendation for assistantships, scholarships, for employment in chemical industry, the student must have completed at least 36 hours of chemistry distributed as follows: courses 101a, 101b, 203, 204, 206, 207, 218a, 218b, 230a, 230b.

"Courses aggregating the minimum for 25 hours required in one subject in a concentration group may consist of 101a, 101b, 203, 204, 206."

The next catalog, in 1933, incorporated the changes in chemistry virtually as stated in Lyons' letter, but it made clear that more than 25
credit hours in chemistry were important for persons who planned to become professional chemists. The full resolution of the issue soon led to the adoption of a BS curriculum in chemistry as well as the AB for students with less specialized interests.

ORGANIZATIONAL CHANGES AFFECTING CHEMISTRY

Throughout all his years in the department there never seemed to be any departure from Lyons' long status as the firm and wholly accepted head. His standing in this role and as a respected faculty representative was shown in his selection by President Bryan on 31 May 1931 to serve as one of his seven appointees to the new University Senate being formed at that time. Lyons accepted.

The IDS reported the next day that completion of the organization of a representative body of faculty members for the Senate had been announced the day before by the President's office. During the same week a faculty meeting occurred in which resolutions were adopted of marked importance. These endorsed a chairmanship plan as an alternative in departmental administration. By the time President Bryan retired in 1937 this mode of administration had become fully adopted in action and feeling.

Advancement of support for Physical Chemistry: On 5 June 1929 Lyons wrote to the president requesting some support from the Waterman Fund on behalf of Briscoe in advancing physical chemistry research. It was granted. This was one of the first instances, if not the first, that physical chemistry in the department was specifically supported in the procurement of equipment and supplies. There was no reference to practical applications of the research, only the advancement of basic knowledge. This action, and the beginning of Briscoe's research on conductivity in nonaqueous systems, are unheralded landmarks in the advancement of the concept and practice of basic chemical research in the department.

PLANNING AND CONSTRUCTION OF THE CHEMISTRY BUILDING

Within ten years after Lyons became head of the department he began to show with justification that much more space was needed for good teaching and research in chemistry. His efforts were concentrated on the allocation of greater amounts of space in Wylie Hall to chemistry and/or the construction of one or two wings on the east side of the building. The IDS frequently was an accommodating vehicle to the very long campaign for relief.

Finally in June 1926 the IDS strongly emphasized the space problem. Some of the headlines proclaimed:
THE DEPARTMENT WAS FILLED TO CAPACITY TEN YEARS AGO AND IS OVERFLOWING NOW NEW COURSE TO REQUIRE MORE SPACE IU FORCED TO REFUSE ENTRANCE TO MANY IN NO WAY CAN THE 1927 LEGISLATURE GIVE GREATER SERVICE TO ITS CITIZENS THAN BY AN INCREASED APPROPRIATION FOR THE UNIVERSITY WHICH WILL REMEDY SUCH A SITUATION

One story proclaimed that the “Chemistry department has had no addition to the space it occupies for fifteen years....” It stated that

“Chemistry research students are hidden away in the basement of Wylie Hall where many of them do not have over ten square feet of space in which to work.”

In 1926 Lyons stepped up his campaign for chemistry. A notable action was his address in early December at a meeting of the Indiana University Club at the then prominent Hotel Lincoln in Indianapolis. As reported extensively by the IDS, he made a very strong case

“...for moral and financial support of the development of a complete and modern school of chemistry, in which every phase of chemistry should be represented in both instruction and investigative work.”

Dr. Lyons pointed to the ascendancy of chemistry in industry, major universities, planning organizations, and government. This included reference to legislation in the U.S. Senate (Senator Randall’s bill) that would in Lyons’ words “create a national health research institute on a huge and complete scale.”

He compared the support of science with activities in the newly emerging USSR, saying

“Even the Soviet Republics of Russia announced $75,000 in prizes for a synthetic rubber process.”

He asked,

“Is the great state of Indiana interested in research in the sciences?”

In pleading for a major academic facility and program for modern teaching and research Lyons chided the state by concluding that

“There is at present no such school of chemistry in Indiana. Wisconsin and Illinois began to develop such schools ten years ago.”
Eleven days later on 20 December, the IDS gave extensive coverage to the construction needs and aspirations. Much of this was (1) a report of a faculty committee written by W. A. Alexander, who became librarian in 1921, and (2) a report by J. W. Cravens, Registrar, on "The Campus at Indiana University in 1936." The two articles were not consistent in the assessment or prediction of construction developments as respects chemistry, but they must have attracted considerable attention.

Reports of Needed Construction: The Alexander report listed as needs: Power plant, addition to Wylie Hall (presumably for chemistry), building for School of Education, addition to Owen Hall, building for Geology, Zoology, Botany, and Museum. The most important seemed to be an addition to Science Hall (later named Lindley Hall) for the use of physics, auditorium, administration building, building for music, and building for journalism. There was no specific reference to chemistry.

However, the article by Cravens was more expansive and understanding of real needs. After predicting the construction of "a beautiful chapel in the center of the campus," "a modern heating plant," and "assembly hall on Indiana Avenue that will accommodate 6,000 persons," a Men's Memorial Union Building," and "an adequate building for the administrative offices," he stated that

"In 1936 I see a modern chemistry building that is ample for the work of the department that is recognized more and more as the basic science."

He added that

"I see a splendid building for the physics department...."

There were predictions of many other buildings and improvements. It is apparent that the report by the faculty committee, given by Alexander, and the imaginative but constructive predictions by Cravens reflected the general feeling of the faculty and university administration. But there was not yet a firm conviction that the needs for a modern chemistry building were paramount.

Problem Presented to Trustees: Apparently the turning point in administrative responsiveness to definitive action was on 13 May 1927 when President Bryan wrote to Lyons inviting him to

"...meet the Trustees at some time on Friday May 20, to present the problem of the chemistry building."

This was in response to Lyons' constructive but somewhat timid letter of 7 May 1927 to the President and Board of Trustees. The letter
characteristically lacked breadth of vision and good understanding of the status and potential of chemistry at that time. But it was apparent to any who would consider the simple facts that the facilities and resources for chemistry had to be greatly changed. The major statements in the letter were:

“In view of the somewhat increased revenues for buildings and maintenance, I beg to submit for consideration, the following:

1. That plans be now formulated for a new chemistry building, or for an addition to Wylie Hall.

   A total of $500,000 would probably be required to erect and equip a new building. The cost of an addition to our present plant and its equipment could be brought within $175,000 - $200,000.

   A modern laboratory building, complete in modern chemical equipment, would be the ideal provision for years to come. An addition to Wylie Hall, while not affording a perfect solution of the problem, would come more nearly within present financial possibilities, permit of expansion and improvement of the work in chemistry and provide for many of the needs of the immediate future.

2. That a professional school of chemistry be now established and that its development (sic) be advanced as far as adjustments and present funds permit.”

Planning a Building: At the May meeting the board decided either to construct a new building or erect a large addition to Wylie Hall. It requested Robert F. Daggett, architect in Indianapolis, to confer with Lyons and report at their next meeting.

In June Lyons and Daggett recommended a new building. This was accepted and the board suggested as reported by the IDS,

“...that Dr. Lyons familiarize himself with the best chemistry buildings in the country, to formulate an idea as to what kind of building would be most suitable...”

Mr. Daggett was engaged to be the architect and he was to have drawings ready for board consideration in the fall of 1927. In July Lyons visited the chemical laboratories at Cornell University, Princeton, Yale, Harvard, and the University of Buffalo. He properly regarded these laboratories as among the best.

Much of the planning for the new building was finished in 1928. Apparently Lyons scarcely consulted any other chemist. Also, he was reluctant to share information with others. He and the architect worked virtually alone. This perception is supported by Professor Emeritus M. G. Mellon, the major planning resource for chemical laboratories at
Purdue for several decades beginning in the 1920s. In a letter to H. G. Day in 1982, he related the following:

“When in the midst of planning our first large building, I heard that Indiana was somewhat farther along and had completed plans. That was in 1928. As I now recall, I was in Indianapolis and decided to go to Bloomington to see the Indiana floor plans.... I found Dr. Lyons and told him my specific interest. His reply was that the plans were in the safe and he did not want to disturb them.”

**Plans approved:** Finally in March 1929 the board devoted almost a full evening to the examination of general plans as presented by Lyons and Daggett. The next day the plans were approved, but it was not decided whether the two wings should be accepted or definitely where the building should be located. At a special meeting the next week in Indianapolis further discussion was held with the architect. It was almost decided that construction of a separate building would be started soon but the problem of where to build it or what to do about the wings was deferred. Finally on 8 April in President Bryan’s office final decisions were made and they were unanimous. As reported prominently in the IDS the next day:

“The building will be erected immediately east of Wylie Hall and it will be 192 ft. in length, 70 ft. wide and three stories high (plus the ground floor). The estimated cost of this building is $369,000. It was the feeling of the board that the erection of the wings would be economical but the lack of available finances prevented this action at this time.”

Early in May the State Budget Committee approved the planned expenditure. A week later the IDS featured the developments. This included a two-column picture of the architect’s sketch and pictures of Lyons, Brown, Mathers, May, and Briscoe. The one of Mathers featured him in laboratory attire, including a pair of goggles on his forehead.

The entire feature story refers only to Lyons in planning and moving toward the decision for a new building, saying that he “has looked forward to these enlarged quarters for many years.” Concerning the auditorium, the IDS glowingly reported on 10 May that:

“Dr. Lyons takes special pride in the auditorium that is to be one of the most outstanding features of the building... The auditorium will be fitted with an especially designed and equipped lecture table, suitable for all sorts of demonstrations in chemistry. A lantern slide projector and screen will be provided along with screens at the
windows which can be operated mechanically to darken the room.

...

Four months later in another major report the IDS pointed to the auditorium as a special feature, but the planning did not yet include the wings of the building. In referring to the chemistry faculty it was made clear with approbation that all five had "received their undergraduate training at Indiana University."

Finally, on the last day of October the board authorized the architect to include drawings for the two wings. It was decided to request construction bids both for the main building alone and for the main building with the wings. The decision for construction occurred on 17 February 1930 when the Board decided to erect the building with both wings included. The general construction bid was awarded to the E. H. Carson Company at $359,763. Construction was to begin as soon as possible and completion was to occur by 14 June 1931.

Ground broken: In less than three weeks following the awarding of bids for construction ground was broken. As stated by the IDS on 4 March, "Excavation on the site ... began at 1:40 p.m. Monday" (3 March). Because the ground was too soft and boggy to permit the use of trucks, it was necessary to use horses and wagons in hauling the dirt away from the excavation site. By the second week in April construction had become active, employing 48 men. The total weekly payroll was exceeding $1500, or an average of about $33 each.

By the end of June bids had been awarded for the various ancillary features of the building, including plumbing, utilities, and heating. The contract for the laboratory benches and other basic equipment was awarded to the W. W. Kimball Company on a bid of $52,605.

Even though Lyons was deeply involved in planning the building and in closely following the details of construction, he and Mrs. Lyons and their son went to Europe in July. The son had recently graduated from medical school and was to spend two years doing advanced work abroad.

Construction of the building progressed more rapidly than was expected. On 18 September the construction superintendent J. S. Gingrich informed the IDS that the building would be completed and ready for occupancy by 15 January 1931.

Following his return from abroad Lyons resumed actively his monitoring of many aspects of the construction and furnishing of the building. Bids for the supplying of seats for the chemistry auditorium were not considered by the trustees until the middle of December. This was preceded by Lyons' review of each bid and the presentation of his recommendations.
1931 CHEMISTRY BUILDING

PHYSICAL CHEMISTRY LABORATORY IN 1931 BUILDING
Occupancy of Building: The first occupant of any part of the new building, still under construction, was the English Department. Between semesters, in January 1931, the Department partially moved from its quarter in a part of Biology Hall (now Swain East) to the east wing of the new building. The move also included the vacating of four classrooms in Commerce Hall (now Rawles). The IDS stated on 9 January 1931 that

“The east wing (of Chemistry) contains twelve rooms which will furnish ample class and office room for the department.”

The move was concluded early in February. Nine years later the space was vacated so that it could be used by the Department of Chemistry.

On 24 February, as reported in the IDS, the superintendent of Buildings and Grounds, Charles Hays, announced that the Chemistry Building was practically completed. More than half of the furniture had been installed, but much grading and landscaping remained to be finished. Remarkably, even the excavation for the building had started less than 12 months before.

Some national publicity on the construction appeared in February, 1931. One was an illustrated article by Lyons in the *Journal of Chemical Education*, and the other was in *Industrial and Engineering Chemistry*. The latter included news of the chemistry buildings and chemistry equipment at Butler and Purdue Universities. A 44-page history of the department, including an artist's drawing of the new building was prepared by Lyons and published as the March, 1931 *Indiana University Newsletter*. Reprints were made available for widespread distribution.

DEDICATION OF THE NEW BUILDING

The climax of all the action came on 2 April 1931 when “Indiana University's most magnificent hall of learning” (IDS) was dedicated with pomp and ceremony. The extensive buildup of the event by the IDS during the preceding February and March was topped on the day of dedication in the morning (six pages) issue designated the Chemistry Edition. Also, that afternoon a “dedication issue” was published. It included the biographical sketches of the six chemistry alumni who were given honorary doctoral degrees, described the various other dedicatory events, and listed the names of “More than 125 official representatives of universities and colleges, learned societies and industrial firms” who attended. The dedication program was held in connection with the spring national meeting of the American Chemical Society in Indianapolis.

The principal participants in the dedication were: Dr. Lyons; J. W. Fesler, President of the Board of Trustees; President Bryan; Dean F.
Payne; R. F. Daggett, architect; John N. Swan, chairman of the Division of Chemical Education, ACS; L. M. Dennis, head of the chemistry department of Cornell University; L. V. Redman, president-elect of the ACS; Professors E. B. Birge and D. D. Nye of the I.U. School of Music; and the Rev. A. Elliston Cole of the Trinity Episcopal church.

The principal speakers were Professor Louis M. Dennis of Cornell speaking in place of Dean Frank C. Whitmore of the School of Chemistry and Physics at Pennsylvania State College, and Laurence V. Redman, vice president and director of research of the Bakelite Corporation and president-elect of the ACS. Dean Whitmore had to withdraw owing to a death in his family.

Honorary degrees: The high point in the dedication was the awarding of the honorary degrees. The recipients were Leo F. Rettger, Oscar B. Perry, Earl Blough, Oliver C. Martin, James N. Currie, and F. (Paul) Isobe. These were the first chemistry alumni of this university to be so honored by their alma mater. Some bases for such recognition are as follows:

Leo Frederick Rettger, AB, 1896, AM, 1897; PhD 1902, Yale. He became Chairman and Director of Graduate Studies, Department of Bacteriology, Immunology, and Public Health at Yale University. He was a past president of the American Society of Bacteriologists and noted for his research and writing in various areas including bacterial nutrition and metabolism, intestinal flora, and commercial production of useful chemicals through bacterial fermentation, microbial diseases of fowl and cattle, and disinfectant chemicals. He was a native of Huntingburg, Indiana and a laboratory assistant in Dr. Lyons' course in bacteriology while enrolled in graduate work at I.U.

Oscar Butler Perry, AB, 1897; EM, 1900, Columbia University School of Mines. He was associated with some of the greatest mining companies. He designed and built gold dredges in the Yukon territory and Alaska as well as in several states, and he was involved in tin mining in Malay and in Bolivia. In World War I he rendered exceptional engineering service in various military operations, especially in railway, road, and bridge construction and maintenance. He authored numerous professional articles, a book "Gold Dredging in the Yukon" and "History of the 27th Engineers, A.E.F." He was born and raised in Bloomington, Indiana.

Earl Blough, AB, 1899; ScD. (Honorary) 1920, University of Pittsburgh. He taught chemistry and physics in high schools three years. During the next four years he studied engineering and then metallurgy at Cornell University. He then became chief
chemist and metallurgist in a company that later became the Aluminum Company of America. By 1928 he had become vice president and director of Aluminium Limited, later Alcan Aluminium, in Canada. Later the Blough professorship in chemistry was established through his bequest of $100,000 for the department. He was born and raised in LaGrange County, Indiana.

Oliver Curtis Martin, AB, 1900. He was first an assistant chemist in a copper smelting and refining company. Later he was superintendent and chief metallurgist of a plant in New Jersey. Following that he became general manager of a copper refinery in Belgium. His major achievements included the design and construction of an electrochemical copper refinery.

James Nimrod Currie, AB, 1907, AM, 1908; PhD, 1911, University of Wisconsin. He was a “dairyman qualified in chemistry” in the U.S. Department of Agriculture from 1911 to 1917 where he pioneered in research and development on the use of molds and bacteria in the fermentation of abundant products for the production of commercially important citric acid and other organic acids. Following this he was a research chemist and consultant in the Pfizer Company. Dr. Currie was born in Greene County, but he graduated from the Bloomington High School.

Fusanobu (Paul) Isobe, AB 1909; MS 1911, University of Wisconsin. After returning to Japan early in 1912 he soon established himself as an enterprising and successful chemical engineer. This was primarily in the Japanese vegetable oil and fish oil industries through appropriate hydrogenation processes; for the production of satisfactory soda ash and related products for Japan and China; and for being the first to introduce and develop a high pressure process for the synthesis of ammonia in Japan.

The selection of these alumni to receive honorary degrees reflected well on Lyons’ service to the department during his first 36 years as its head. All graduated within the first 14 years of his administration. All except one, Dr. Rettger, were distinctive owing to their achievement largely in the applications of chemistry to practical needs. All except Dr. Isobe were native Hoosiers. In retrospect it is doubtful that any more appropriate selections could have been made at that time.

Professional guests: The professional guests from other institutions and industries, including many alumni, were from all parts of the country and a few were from abroad. They included in the order reported:
George A. Abbott, U. North Dakota
J. W. Aldred, Antioch College
Thomas R. Alexander, Carnegie Institute of Technology
Forrest Anderson, Wilkens-Anderson Company
Joseph C. Arthur, Purdue U.
W. H. Bell, Coleman and Bell Co.
Chauncey Blackburn, College of Wooster
William M. Blanchard, DePauw University
Harvey C. Brill, Miami University
Edwin M. Bruce, Indiana State Teachers College
H. M. Burlage, Purdue U.
L. L. Carrick, North Dakota Agriculture College
Edgar B. Carter, Abbott Laboratories
George H. Colema, U. Iowa
James B. Conant, Harvard U.
Edward H. Cox, Swarthmore College
Leonard Cretcher, Mellon Institute for Industrial Research
James N. Currie, Charles Pfizer Co.
E. B. Curtis, Maugatuck Chemical Co.
Lewis M. Dennis, Cornell U.
A. L. Elder, Syracuse U.
Worth A. Fletcher, Municipal U. of Wichita
J. O. Frank, State Teachers College, Oshkosh, Wisconsin
C. Clement French, Randolph-Macon Women's College
Frank V. Graham, Ball State Teachers' College
Ned Guthrie, Hanover College
A. H. Homberger, U. Louisville
Walter Hoover, Eli Lilly Company
Herschel Hunt, Purdue U.
G. C. Hutcherson, Shirley Canning Company
Fusanobu (Paul) Isobe, Mitsui Mining Co., Japan

Frances C. Keith, Electric Battery Co.
Florence B. King, USDA, Washington
Karl Knaus, Purdue U.
Francis C. Kraukopf, U. Wisconsin
Henry R. Kraybill, Purdue U.
John R. Kuebler, Alpha Chi Sigma Indianapolis
Ernest L. Mattox, M.D., Terre Haute
O. C. Martin, Olen, Belgium
Karl S. Means, Butler U.
Melvin G. Mellon, Purdue U.
Fred M. Miller, Procter & Gamble Co.
R. D. Mullins, Rockford College
T. C. Mullins, U. Arkansas
Lottie E. Munn, Lake Erie College
Lyman C. Newell, Boston U.
C. M. Niezer, trustee, I.U., Fort Wayne
O. R. Overman, U. Illinois
O. B. Perry, San Francisco, CA
Arlie R. Barnes, U. Minnesota, Mayo Foundation
Edward Bartow, U. Iowa
Virginia Bartow, U. Illinois
Ira C. Batman, Trustee of I.U., Terre Haute
Lawrence Bigelow, U. Michigan
Homer P. Rainey, Franklin College
W. C. Ratliff, Bluffton High School
Mrs. George E. Reed, Purdue U.
E. E. Reid, Johns Hopkins U.
Leo F. Rettger, Yale U.
Thomas W. Rogers, Birmingham Southern
Adolph E. Schaar, Schaar Co.
Guy H. Shadlinger, Butler U.
Carl P. Sherwin, Fordham U.
Leo P. Sherman, Grinnell College
R. M. Slagle, PreCote Corp. of Am.
R. J. Smith, Indianapolis Paint & Color
A. L. Strickler, Evansville College
Portrait of T. C. Van Nüys: Included in the dedication was the presentation of the portrait of Dr. Thomas C. Van Nüys who served from 1874 to 1895. In the presentation, on behalf of the donors and the surviving widow and sons, Dr. Lyons referred to

“This portrait of my esteemed teacher, colleague, and predecessor, which when suitably placed in this new Chemistry Building, will constitute a fitting memorial to the first full time professor of chemistry and first head of the Chemistry Department at Indiana.”

Recapitulation: A concise reflection of the major facts and concepts of the completed building and its intended function was included in an article in the IDS on 13 April 1931:

“The central portion of the E fronting on the north, is 192 ft. long by 72 ft. wide, and four stories in height. The two story auditorium projection to the south is 60 ft. by 55 ft. wide and the wings, top and bottom of the E, each three stories, are 100 ft. by 42 ft. By extending these wings additional space may be provided later.

TOTAL COST $565,918

“The building has a total cubic of 1,255,154 ft. and a gross floor area of 85,850 ft. It has been erected and provided with mechanical
equipment for heating, ventilating, plumbing, electric power, light, and elevator, inclusive of architect’s and engineer’s fees, for $505,918. The laboratory and special equipment will increase the cost by approximately $60,000.

“The laboratories for each of the major divisions of chemistry — general, analytical, physical, and organic — occupy the central portion of the building, having north light, and are grouped about a center stockroom on each floor. Smaller laboratories are provided for advanced inorganic, industrial, and biochemistry, gas spectrum, polaroscope, and micro-analysis, catalysis, chemical microscopy, zymochemistry, metallurgy, high temperature furnaces, and electro-chemistry, including storage batteries.

MANY RESEARCH ROOMS

“In addition, twenty-three research rooms are distributed throughout the building and each instructor has been provided with a laboratory and an office. The departmental library adjoins the general office on the ground floor, at the west entrance. Three lecture rooms, each with a seating capacity of 110 are provided in the west wing. The main auditorium has a seating capacity of 500. The rooms have wood floors laid on rockwool and have received special attention as to acoustical treatment. Provision has been made for a general seminar staff conference room on the first floor, a chemical museum, a dark room and vault for storage.”

A comprehensive recapitulation was reported in the Commencement (15 June) edition of the IDS. Also, during the first few months following this feature event of 1930-31 publicity occurred in various external media. Perhaps the most notable responses outside Indiana were in Japan. This was stimulated by the honoring of Dr. Paul Isobe at the dedication. He had been an articulate and loyal alumnus in Japan since his return to that country in 1912. As reported in the 5 August issue of the IDS, the Tokyo Nichi Nichi carried a major illustrated report on the dedicatory exercises. It quoted in full the citation for Dr. Isobe read at the dedication. This was indeed news because Dr. Isobe was the first foreigner to receive an honorary degree from Indiana University.

The move from Wylie Hall to the new building was completed in early summer 1931, much of it with the help of students. The IDS on 24 June carried a story that probably reflects the major mode of action:

“One hundred desks (equipment and supplies lockers) which are now being used in Elementary Organic Chemistry were moved to the new laboratory during final examination week, Dr. (C.E.) May stated. Before supplies were checked and the deposit refunded at the Bursar’s office, each student in the class carried his desk from Wylie Hall to the fourth floor of the Chemistry Building.”
Assuming that all the students enrolled in laboratory courses performed in the same manner innumerable student hours were used in the operation. Presumably some breakage occurred, but through this system the unlucky or careless students responsible absorbed the cost.

**Carvings on building:** A unique and attractive feature of the building was the extensive carving of symbols of chemistry, alchemy, and various ornamental figures in stone on shield-like panels above the first (ground) floor windows across the north front, on the wings, and even at the rear of the building. The striking appearance of the total building, the engravings, and its location gave recognition to the department and stimulated all concerned. Its completion in 1931 and the Memorial Union in 1932 added new dimensions to the usefulness and importance of the university. Chemistry at Indiana had taken an important step toward significance.

**Misjudgments in new building:** All major construction projects include some misjudgments. A notable planning mistake here was in the location of the tubing used to distribute distilled water to many parts of the building. Blocked tin tubing was used and it was buried in the concrete floors slightly below the surface. The water still, located in the penthouse, was operated by condensing steam led into the building from the central heating plant. The hydrostatic pressure of the distilled water was great enough to assure an adequate flow to all the outlets in the different laboratories. Unfortunately, the coefficient of expansion for the buried tubing was not the same as that for the concrete; also it was tightly encased in the concrete. Consequently significant changes in temperature, vibrations, and shifts in position of different portions of the building resulted in cracked or broken water lines. Countless leaks occurred. Finally after about 15 years a different system was installed.

One of the most annoying mistakes was in the failure to provide an adequate telephone system. This problem had existed for chemistry as well as for other departments throughout the years that telephones existed in Wylie Hall. A memorandum on 4 March 1937 from Lyons to the Comptroller, Ward G. Biddle, illustrates the frustrations that were endured. The memo stated in part:

"At the time of the construction of the chemistry building there was included a twelve-station departmental telephone system... The installation has not been satisfactory and at present it is entirely out of commission. Frequent repairs ... have been attempted by electricians without success ..."

The department continued to request four staff phones on the university switchboard with one in the storeroom, one for Briscoe, one for May, and one for Brown, Kanning, and Hartman. Of course there was
a phone in Lyons' office. Apparently Mathers decided that the advantage to him was not worth the cost. Finally, on 8 April 1937 Mr. Biddle replied to the Lyons' memorandum and stated that the Executive Committee had approved "the request of Dr. Lyons for installation of desk set telephones in the Department of Chemistry."

Nearly all the teaching and research laboratories had built-in fume hoods. They were relatively spacious but without windows that could be kept closed when the hoods were in use, thus greatly diminishing the ventilating effectiveness. The hoods were connected to common ducts which led to exhaust fans on top of the building. Thus the hoods varied considerably in the rate of air flow each provided. In addition, parts of the ductwork gradually corroded and soot built up in such degree that it was dangerous as a possible cause of fire and it impeded the already inadequate air flow. The hood system as designed and installed was decidedly inadequate.

These selected examples of the many errors and inadequacies illustrate the kind of mistakes that characterized the impressive structure. Even so there were many salutary features and they should be remembered.

**Resignation of Dr. Lyons and the Beginning of Basic Changes**

Over the more than four decades of Lyons' headship of the department there were continuing frustrations in securing even modest enhancements of funding. This was only partially counterbalanced by the final attainment of his long desired chemistry building. But without corresponding funding for salaries, stipends, equipment, and other resources he was in part imprisoned in his own new and splendid structure. Also, with the retirement of President Bryan effective 1 July 1937 and the beginning of the dynamic new presidency that followed, the changing order probably appeared to be formidable rather than promising to the 68 year old lord of the chemistry domain.

A significant signal of Lyons' unease occurred when in February 1938 he wrote to the new Acting President Wells asking to be relieved from his long membership on the Student Health Committee and the Susan Butler Snow Award Committee.

An important factor in causing his resignation and retirement was the new retirement system, which became effective simultaneously with President Bryan's retirement. The plan was essentially a change from the Carnegie retirement system to the Teachers' Insurance Annuity Plan. The new plan was approved by the General Assembly and implemented with an appropriation of $50,000 in March 1937. President Bryan recommended adoption of the plan and the board accepted it in May.
The plan called for faculty members to retire from administrative responsibilities at 65 years of age and for full retirement at 70. This became effective 1 July 1938. At that time Lyons would be almost 69. He firmly argued that the financial provisions as it affected him would be less favorable than under the existing program. In a letter to “The President and Board of Trustees” on 25 June 1937 he asserted that the new “pension plan offers no benefit in my case.” In fact, he wrote “it is my feeling that compulsory participation is unjust.”

In the meantime other heady deliberations and changes were occurring. Acting President Wells became President on 22 March 1938. Three weeks before in an uncharacteristically impulsive action, surprising in its brevity and sharpness, Lyons resigned effective at the end of that day. The resignation did not become effective as requested. Later, on 4 August, in a much more characteristic and temperate action, Dr. Lyons tendered his resignation both as Professor and Head of the Department. The letter typically expressed loyalty, and he boldly requested that Dr. Briscoe should be made his successor. He wrote concerning the recommendation, “You cannot find his equal in fitness and promise.” Also, he asked for retirement under the provision of the Carnegie Foundation program. The response was favorable to him on both counts.

Quickly the retirement was announced in various newspapers. The Bloomington Evening World wrote

“The resignation of Dr. Lyons ... was not unexpected although he lacked one year of having attained the (full) retirement age.”

The Fall issue of the Indiana Alumni Quarterly devoted approximately three pages to the resignation. In President Wells’ generous comments the statement was aptly made that “the name of Robert E. Lyons and the department have been synonymous.”

Retired President Bryan glowingly expressed the general lay feeling on campus and in the community that “Dr. Lyons has a record which is an imperishable monument.” He wrote further, in part: “He took in good temper what the University could provide for his work and made the most of it.”

This was surely expressed knowledgeably because the two had known each other since Dr. Bryan was the instructor and Dr. Lyons was his student immediately after the student entered the University in 1885.

Dr. Briscoe, the successor but in the role of chairman — new for him and the department — wrote in part

“Dr. Lyons’ record of service to the Department and University will be remembered always for its high quality and notable achievements.”
At the time of the resignation and the beginning of the department's fruitful first chairmanship Dr. Lyons' office was on the north side of the first (now ground) floor, in the west wing of the Chemistry Building. It was between his private "laboratory" to the east and the departmental office to the west. West of this was the Chemistry Library. Dr. Lyons moved to his laboratory which became a combination office-laboratory, and Dr. Briscoe moved into the vacated office. A substantial proportion of the office was occupied by a conference table. It was now frequently used in conferring with the faculty and others. This was a unique practice in the operation of the department. A new administrative system and attitude had come into existence.

References

Most of the information used was taken from various campus sources including minutes of meetings of the Board of Trustees and correspondence between Dr. Lyons and administrative officers. The main sources were the University Archives, University catalogs, the Indiana Daily Student, Indiana University Alumni Quarterly, and Archives of the Department of Chemistry. Other sources included:


Myers, B. D. History of Indiana University, 1902-1937. 1952.


Chapter V
The Briscoe Years
1938 - 1941

On 4 August 1938 Dr. Robert E. Lyons submitted his letter of

"resignation as Professor of Chemistry and Head of the Department of Chemistry effective August 11, 1938 ...."

He was almost 69 years of age and he had been Head of the Department since 1895. H. B Wells had become Acting President 1 July 1937 and President 22 March 1938. Dramatic but rational changes were occurring and it was painfully clear to Lyons that he should step aside. In the letter of resignation he strongly recommended that his successor should be Dr. Herman T. Briscoe. He wrote, "You cannot find his equal in fitness and promise." The resignation and the recommendation were officially accepted by the trustees on 13 August. Immediately the making of a new department was begun with Briscoe serving as the first chairman.

Both the external and internal circumstances of the university were indeed ripe for changes, the needs for which were especially urgent in the Department of Chemistry. The Great Depression was slowly subsiding, the feeling of the State toward the university was expectant and rising, and it was becoming more supportive both in the state government and in various segments of the population. The campuses of the university
were confident in the new departmental leader as well as in the new president. Notably also, worldwide advances in chemical knowledge and its applications were dynamic and far-reaching. It was urgent for the university to move forward in chemistry and in other sciences.

The new chairman indeed had promising credentials in the university, community, and statewide constituency, and among his state and national peers in the profession of chemistry. Notably he and two other esteemed faculty members — W. W. Wright, Professor of Education and F. Harper, Professor of Law — had been selected by President Wells to constitute the landmark Self-Survey Committee. The committee had been appointed by the trustees 15 January 1938 and already it was deeply involved in fact finding, opinion gathering, and the charting of basic recommendations for the university. Years later in his autobiography (p. 417) the then University Chancellor Wells referred extensively to his 25 years in the presidency and the fulfillment of goals and purposes. Much significance was given to the role of the Committee in this achievement. He wrote:

"Every major recommendation of the Self-Survey Committee, formed during the first year of my presidency, had been debated, studied and adopted by the faculty and the trustees."

In the recommendations much attention was given to the structuring of a good administrative organization for the university that was to burst forth so fruitfully and prominently after a century of slow development.

The full scope of Briscoe's qualifications was precisely encapsulated in Wells' autobiography (p. 96), stating that he:

"was a trusted, major figure of the liberal arts college and of course knew the world of science both as a teacher and as a scholar. He had been a high school teacher of Latin so he had a feeling for the humanities as well. Briscoe was a man of wisdom, tact, and patience, with an understanding of the importance of good teaching alongside good scholarship."

The Self-Survey Committee began its exhaustive study early in 1938. By December 1939, the committee presented its findings and recommendations to the faculty for study and debate. In Clark's analysis of the report (II, p. 382) it was concluded that

"For the university the immediate result .... was the aid it rendered in a realignment of the institution to recognize new educational opportunities and to meet the needs of the near future."
Also, Clark pointed out that

"A distinctly advantageous sidelight was the revelation of the unfavorable intercollegiate competitive situation within Indiana itself in which the university had become boxed in prior to 1937, and 1940 was a propitious moment in which to rip away this long-standing inequality."

On the committee Briscoe was the secretary and essentially the hard working middle man in concepts and temperament. It is fair to conclude that he made the major contributions in formulating the recommendations. During the ensuing years he became by far the major contributor in the implementation of the work.

In addition to this special responsibility and his pivotal role in chairing the Department of Chemistry, Briscoe was soon assigned to other heavy responsibilities. Specifically these were under the title of Special Assistant to the President. This role was announced by President Wells in May 1939. Then on 1 June 1940 he became the first incumbent of the newly created office of Dean of the Faculties. One year later, shortly before he was succeeded by a new chairman of chemistry, his title was changed to Vice President, Dean of the Faculties.

Throughout all his years as a member of the faculty Briscoe was primarily interested in teaching and the development of the students. Everything else was a means to this end. This was clearly reflected in his additional role, announced in 1940, as Student Guidance Counselor. These responsibilities came in addition to those he had accepted as Professor (of chemistry) and Dental Advisor at least as early as 1934 and continuing until about 1940.

Following the announcement of the full scope of the evolving student guidance program President Wells, Dr. F. R. Elliott (director of admissions), and Briscoe met on 18 May 1939 with student leaders in the Chemistry Auditorium to receive further explanations by Briscoe and review by all the needs and opportunities of the new development. This was the kickoff for student guidance.

Seemingly every week, if not almost every day, the quickly burgeoning but inconspicuous leadership of Briscoe was felt in the evolving guidance program. This was in addition to all the other duties of a departmental chairman, a special assistant to the president, an active teacher, and still a director of graduate research in chemistry.

Organized counseling received impetus through the designation of specific advisers for freshmen from among the faculty and selected graduate students and advanced undergraduates as assistants. A Committee on Residence Halls was established to promote counseling. Also, in 1939
President Wells made Briscoe chairman of the Scholarships and Student Aid Committee.

The new counseling interest and its formalization were encouraged by Briscoe on the emerging campuses at Indianapolis and elsewhere before the end of 1939. He wrote to the President, in part

"I am very much interested in having someone connected with guidance work spend a couple of days in the Extension Centers of Indianapolis, East Chicago, and Fort Wayne, during the month of January (1940)."

His purpose was to extend guidance to students, promote coordination of functions and programs on the different campuses, and help prepare students for efficient and pleasant transfer to the Bloomington campus where degree programs could be continued after exhausting the then limited opportunities on the other campuses.

All of the evolving work in guidance was handled out of the new chairman's office in the Department of Chemistry. The student guidance correspondence was over the signature of "H. T. Briscoe, Student Guidance Counselor."

There was little extra funding for student guidance during the time that Briscoe had direct responsibility. This is reflected in a letter from President Wells' executive secretary to W. G. Biddle on 25 April 1939 stating:

"We have the telephone approval of the members of the Executive Committee for the appointment of Vincent E. Parker and Thedford P. Dirkse as assistants in Chemistry for the remainder of the academic year effective April 20, 1939, to be paid $100.00 each, in two installments, and to relieve Professor Briscoe while he is organizing the work in student guidance for next year.... Dean Stout and Professor Briscoe recommended these appointments, and President Wells concurs in the recommendation."

There is no indication that any significant additional direct cost was involved in this far-reaching undertaking. Within three years Student Guidance evolved into the Junior Division (later, University Division).

As stated by Clark (III, p. 35),

"Herman Briscoe almost single-handedly devised an advisory system which supplanted an older plan and prepared the way for instituting the Junior Division."

Thus through this man the Department of Chemistry played a vital role in the beginning of organized student counseling. For many decades
the department continued to be innovative in the promotion of counseling.

Of great importance, the new chairman of the department had the confidence of the new president. Briscoe studied situations thoroughly and did not ask for anything without providing clear and convincing reasons for his requests and recommendations. Always his presentations for chemistry were clearly in the best interests of the entire university. He deeply recognized that the needed strengthening of chemistry required the selective recruitment of new faculty with training and backgrounds in other institutions. Thus larger budgetary allotments were necessary for salaries, stipends, supplies, and equipment. He knew that stronger teaching and research programs were necessary and this required more space and facilities as well as more productive faculty in basic areas of chemistry. Also, he knew there were other less tangible needs such as greater credibility amongst major academic and industrial peer groups.

Briscoe was keenly aware of the concurrent developments in the American Chemical Society on the professional training of chemists. Already a program of the ACS was underway for the certification of institutions for such training. Naturally he wanted his department to qualify for certification as soon as possible. In essence he worked understandingly with the university administration to transform the department.

NEW APPOINTMENTS IN CHEMISTRY

Modernization was the keystone of Briscoe's administrative system and he acted swiftly when that was necessary. On 26 August 1938, two weeks after becoming chairman, he informed Dean Stout that William M. Degnan had accepted an instructorship in organic chemistry for 1938-1939. The salary was $2200. The appointment, plus other changes, had been made possible by the retirement of Lyons. Degnan had that year received his PhD degree in organic chemistry at Yale. Remarkably he was the first full-time appointee to the chemistry faculty in this century who had not received some of his training at IU. The end of "in-breeding" in chemistry at IU had begun. Ironically this action was initiated and encouraged by the outstanding mavericks of in-breeding at Indiana University, H. T. Briscoe and H. B Wells.

Degnan's title was Instructor. He was well trained, promising in every way, and his wife Jane also had a doctoral degree in chemistry. Until he was appointed it was customary to designate some part-time graduate assistants as instructors. New faculty beginning with doctoral degrees were made assistant professors. For more than 25 years that followed the Degnan appointment the title Instructor was customary for beginning faculty members with promising records. Briscoe can be credited with the restoration of this title to an appropriate standing.
There were other promising new appointments elsewhere in the university. These, with the appointment in chemistry, were heralded in the first issue of the IDS for 1938-39 on 20 September. The news was prefaced with a bold headline,  

MOST SWEEPING FACULTY CHANGES  
IN INDIANA UNIVERSITY'S  
HISTORY GREET STUDENTS AS  
ONE HUNDRED FIFTEENTH  
ACADEMIC YEAR OPENS  

Apparently the first news item in the IDS concerning the work of the new faculty member in chemistry was on 26 April 1939. At the April meeting of Alpha Chi Sigma Degnan spoke "on recent developments in chemistry as presented at the semi-annual meeting of the American Chemical Society," which he attended. Ten months later he addressed the local student affiliate group of the American Chemical Society. This was on the search to find effective antiseptics to replace carbolic acid. His principal research interests were in the synthesis of local anesthetics, especially for eye surgery. This was reported in the IDS 14 March 1940. Unfortunately Degnan developed tuberculosis and died three years later.  

Other promising appointments in chemistry were made through Briscoe’s efforts. On 13 June 1939 the IDS reported that six new appointments in the university had been made. One of these was “Dr. Fred Stitt, National Research (Council) Fellow at Harvard University to be instructor in chemistry.” The next month, on 28 July, a headline stated: “Two Chemists Obtained.” The article referred again to Stitt and it added that Dr. John H. Billman would also join the chemistry faculty as instructor that fall.  

Stitt received his PhD degree in physical chemistry in 1936 from the California Institute of Technology. One of his responsibilities was to aid Briscoe in teaching general chemistry. This was in addition to teaching and research in physical chemistry. In 1941 he left the department to accept a position at the new Western Regional Research Laboratories of the USDA in California.  

Billman had received his PhD degree in organic chemistry in 1937 at Princeton University. He had spent two years on the faculty at the University of Illinois.  

Probably the first local publicity on Billman’s research was in the IDS in March 1940. He spoke on his research on ketenes at the “Physical Science seminar” on 4 March. Over the years he gradually advanced to the rank of professor, always teaching different courses in organic chemistry and always involved in research. Many graduate students elected to work under his direction.
RAISING THE STIPENDS OF GRADUATE ASSISTANTS

The problem of increasing the interest in doing graduate work in the department was deeply recognized by Briscoe. Of course it included the payment of more competitive stipends, but it was rooted in the need to establish a more promising professional image of the department in the many institutions where excellent chemistry majors were graduating. An increase in the size of stipends could occur virtually at once, but it would require other longer-term actions to instill a new level of confidence that chemistry was becoming one of the best departments at IU. This was deeply recognized by Lyons as well as by Briscoe and others. For example, in Lyons’ budgetary request for 1937-38 a note stated:

“My letter of March 1 (1937) sets out the detail of our present disadvantage in the competition with chemical laboratories in other institutions, as Purdue and those adjoining states, because of our lower stipend with no exemption from fees for these assistants...”

He wrote that four offers of $400 per academic year as graduate assistants had been turned down in favor of offers of $500 to $700 from other institutions. No substantial change in this or other budgetary problems occurred. As expressed by President Wells to Lyons on 6 April, he had

“again presented the request ... for authorization to employ part-time graduate assistants for the next school year, increasing the number of assistants from ten to thirteen, and increasing their stipend from $400.00 annually to $500.00.”

This was approved by the board but with the provision that “the net cost for this change (was) not to exceed $1,350.00.”

One of the first actions of Chairman Briscoe concerning graduate assistants was his request on 20 September 1938 for a compensating increase in the stipends of assistants who were not residents of Indiana. This was to cover the difference between resident and non-resident fees. It was in response to a general authorization granted by the board of trustees. Four months later (25 January 1939) the Executive Committee of the Board approved the recommendation of the Comptroller (W. G. Biddle) “that the non-resident portion of the fees for non-resident teaching assistants be remitted beginning the second semester 1938-39.” Such actions to improve the attractiveness of this department for prospective graduate students continued whenever circumstances would allow.

Owing to the meagerness of the university’s revenues in 1938-39, and the expectation that Briscoe would soon become a major full-time university administrator, extensive reorganization and refurbishing of the
department were deferred. Of course this was with the realization that these changes would be appropriate for the successor to Briscoe in the chairmanship of the department.

**Changes in Other Departments**

Great changes were started in several other science departments with the beginning of the Wells presidency. Botany, zoology, and physics were notable. In addition, the planned transfer of instruction in the first year of dentistry to the Bloomington campus in 1940 significantly affected the Department of Chemistry.

The change in physics was radical and comprehensive. The selection of A. C. G. Mitchell to chair that department included the appointment of some new and vigorous faculty members. The appointees L. K. Langer and E. J. Konopinski were particularly important with Mitchell in bringing in modern physics. Central to this change was the new and promising cyclotron. It was completed in time for its dedication before the end of 1940-41.

Also, the changes in the Department of Botany involved the installation of a new chairman with high professional visibility, Ralph E. Cleland. They included the introduction of bacteriology in the department under the leadership of L. S. McClung, a young and promising organizer and investigator. The expectation for it to become an independent department was soon realized. The appointment of T. M. Sonneborn and others in the Department of Zoology added strength and promise in all the areas of biology.

Thus the ambiance of the changing university was quickly felt throughout the state. Also, it drew the attention of other institutions in the nation. Briscoe was much involved in the planning and direction of the changes.

**Briscoe, Betterment, and Budgets**

Less than three months after he became chairman Briscoe wrote to President Wells, on 7 November 1938, concerning a report he had already made on the Department of Chemistry. He stated in part:

“"In this I have attempted to outline my evaluations of the present department in all respects and to state conservatively my estimate of its immediate needs. It is my opinion that the department should take immediate steps to place itself on a par with some of our neighbors, such as Northwestern, Nebraska, and Iowa, and plan for the future when we may rival even our superior neighbors such as Illinois and Wisconsin. I should be glad to discuss this report with you at your convenience."

The implementation of steps that would help lead to this goal had been earnestly but less credibly expressed many times by Lyons. Probably Lyons' last pleading for support was in a strongly written four-page memorandum to Acting President Wells and dated February 28, 1938. In it he pointed out that during the past five years the total budget for the department was $176,819. He stated that in the comparable period the amount at the University of Illinois was $1,156,000. In this period the annual enrollments in chemistry at Indiana advanced from 2192 to 3592 and the annual budget increased from $30,908 to $39,675.

How rewarding it would have been for Briscoe and Lyons if they could have known that in the early years of the 1980s the status of the department had changed in such degree that it outranked all in the Big Ten except Illinois and Wisconsin — and it was virtually equal to those two in the amount of funding for chemical research and development (C&EN, 64, 59, 1986). In 1984 the calculated amount for Indiana University (Bloomington) was $5,642,000; for Wisconsin (Madison) it was $6,076,000; and for Illinois (Urbana) it was $6,284,000. The amount for Purdue was $5,443,000. These differences were about the same in 1982 and 1983. In rankings with the upper 50 universities in this country Indiana was 14th, Wisconsin 12th, Illinois 10th, Purdue 15th. Some others in the Big Ten were Northwestern 20th, Ohio State 27th, Minnesota 28th, Michigan State 44th, and Michigan 45th.

Differences between Lyons and Briscoe in goals and administrative thoroughness are indicated through comparisons of Lyons' last (1938-39) budget allotment and Briscoe's first (1939-40) approved budget:

<table>
<thead>
<tr>
<th></th>
<th>1938-39</th>
<th>1939-40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Salaries and Wages</td>
<td>39,259.02</td>
<td>41,520.00</td>
</tr>
<tr>
<td>Supplies and Expenses</td>
<td>7,000.00</td>
<td>8,998.00</td>
</tr>
<tr>
<td>Repairs</td>
<td>325.00</td>
<td>250.00</td>
</tr>
<tr>
<td>Capital</td>
<td>2,000.00</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Library</td>
<td>700.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Total</td>
<td>49,284.02</td>
<td>56,768.00</td>
</tr>
</tbody>
</table>

In 1938-39 the eight faculty salaries on a nine month basis, ranged from $4750 for Briscoe to $2550 each for Hartman and Kanning. Salaries of two of the three staff members were $1200 each for twelve months and one was $720. The first two were Betty Curts, Secretary and Librarian, and Frank Eckels, storeroom keeper. The third was Robert Harding, assistant storeroom keeper. The salary for Lyons in his last full year (1937-38) was $5700.

Briscoe's comprehensive request for 1939-40 was accompanied by specific and illuminating comments concerning each of the budgetary categories. They are quoted in much detail as follows:
"Salaries of Present Staff. An attempt has been made to equalize salaries of staff members within the department upon the basis of present rank and service rendered in teaching, direction of research, publications, scholarly work, etc. I have also had in mind the relative salaries of the staff as compared with salary ranges for similar ranks and standings in other schools and departments.

"I believe that Professor Mathers should have the increase indicated because of his industry within the department and because of his recognized standing in the field of electrochemistry, a field to which he has contributed widely and in which he is recognized as outstanding by members of the American Electrochemical Society. The increase in Professor May's salary is necessary, I believe, to bring his compensation somewhere near the level of the other full professors in the department. The increases of salary suggested for Professors Hartman and Kanning are justified, in my opinion, because of the increased interest that they have shown this year in promoting the graduate work and research of the department.

"The salary of the secretary and librarian of the department is increased $100.00, a sum which I believe is fully justified in view of the extremely heavy duties of the secretary in a very large department and in view of Miss Curt's very efficient service to the department. The department really needs a full time assistant secretary.

"I have requested a salary of $1,020.50 for Mr. Harding on the basis of $85.00 per month for twelve months. He now serves only 10 months at $72.00 per month. We need his services very badly throughout the year. Without his service this year, it would have been difficult for me to carry on the work of our freshman course.

"The position of analytical assistant (chemical analysis of purchased coal for the university) was filled during one semester of the year 1938-39. This assistant performs services for the Purchasing Department. If the department wishes to continue this service, at least $250.00 should be allowed for it.

"The increase in the sum requested for instructional assistants has been increased largely because of the decision of the departments of the College of Arts and Sciences to request $600.00 per assistant. The sum requested is for 18 assistants at $600.00. Any smaller number of assistants will necessitate sections in which some assistants will have to supervise 40 to 60 students. It is almost necessary that the number of students per assistant be kept down to 25-30. Our class in Chemistry 101, alone, had in it last fall 760 students. In addition to this course, assistants must be provided for Quantitative Analysis, Qualitative Analysis, Organic, and Physical Chemistry. Our assistants serve approximately 12 hours per week.
Staff Additions

"The Department of Chemistry has the third largest number of class enrollments of all the schools and departments on the campus. Only the School of Business Administration and the Department of English have a larger number. To carry the extremely heavy load, the department has seven staff members. I need not argue further that additions to the staff are necessary even if we are to perform effectively only in undergraduate teaching. We have 51 graduate students in the department. Additions are specially desirable in order that the Department may offer advanced courses for graduate students. It is even more important that additions be made to relieve all staff members so that the Department may require and expect from each member of the staff original work.

"Last fall I requested a greater number of additions than I do this time. This does not mean that fewer new staff members are now needed. My present request is based upon practical consideration of what the University reasonably can be expected to do at this time. The most urgent need is for an instructor in General Chemistry to assist the Chairman in the instruction of the very large class in General Chemistry. The assistance of this instructor is especially important in the supervision of the work of the assistants in the laboratory of this course. During the present year the writer admits that this phase of his work in this course has suffered greatly.

"The best man available should be obtained to strengthen the advanced work in Organic Chemistry. Former reports on the department have indicated the need and the general qualifications of the man for the position.

"An additional store room keeper is badly needed to handle supplies and to aid in their preparation for class use. Our storeroom staff must handle the supplies for a thousand or more students enrolled in laboratory courses at one time. The present staff cannot adequately perform this service. None of the other very necessary services of the storeroom can be provided. The labor of checking supplies, maintaining an up-to-date inventory, distribution of chemicals to different laboratories, the inspection of shipments and of many similar tasks must be performed at present by members of the staff, usually by the chairman, whose time should be free for more important administrative and educational problems.

Supplies and Expenses

"Slight increases are requested for such items as postage, freight, and cylinder demurrage. The very large increase in the allowance for educational supplies is justified by the need of the department for chemicals and laboratory apparatus, a large part of which consists of replacements of materials used or broken each year. A part
of the sum requested is badly needed to equip moderately satisfactorily our laboratories for both undergraduate and graduate instruction. I wish to call attention to the fact that during the present year laboratory fees collected from our students have increased the general fund by an amount of approximately $1000.00 over last year. Receipts from breakage may be expected to show a proportional increase. As the increase in enrollment thus causes an increased drain upon our appropriation, either the appropriation must increase or the department uses more material than it has money to replace. Although breakage adjustments will not be completed until the close of the year, it appears that the income from laboratory fees and breakage will more than cover the appropriation for educational supplies for the year 1938-39. Because of the increase in enrollment the 1938-39 budget is hopelessly inadequate. From now until June 30th, the department must exist on the supplies now on hand.

**Repairs and Maintenance**

"The sum requested is reduced to $250.00. Unless emergency major repairs are necessary we shall not need more than this amount.

**Capital and Replacements**

"An increase of $5000.00 is requested to provide the apparatus needed to equip laboratories moderately satisfactorily. Most of this sum will be used to purchase equipment for instruction in analytical, physical, and organic chemistry. The following list shows some of the most urgent needs. It will be noted that this list of equipment, although incomplete, far exceeds the request. It is impossible to train students for positions in research or industry without giving them instruction in the use of the equipment that they will be expected to use. Our students who enter the graduate schools of other universities are handicapped by their lack of knowledge of procedures and methods that we now can teach only by lectures or from books. As compared to the needs, the request is modest.

**Library**

"The increase in the appropriation for the library is requested for the purpose of adding books needed especially in advanced work and in research. Individual items will cost less than $25.00. The books purchased will be standard reference works and monographs of permanent value. During the years past the library budget has been sufficient to provide only the continuation of periodicals and other works of an accumulative or continuing nature. The sum requested will not provide for the purchase of sets of journals."

By 1939-40 departmental chairmen had begun to submit their budget requests to the dean of the College of Arts and Sciences instead of the President. Although Briscoe's budget request was reasonable, Dean
Stout found that some decreases would be necessary. Briscoe reluctantly accepted the cuts but in his response of 9 May 1939 he asserted

"that none of the changes suggested (by the dean) can be made without serious harm to the work of the department."

The request and the approval for the 1940-41 budget were only modestly higher than in 1939-40, but with the increase in appropriations to the university and the planned appointment of Dr. Ralph L. Shriner to succeed Briscoe as chairman, budgets for the department began to increase very substantially. At this time Briscoe became dean of the faculties, but he scrupulously avoided any inappropriate bias for chemistry. The brief but highly constructive interval as a departmental chairman probably contributed in part to his remarkable equanimity in dealing with scores of chairmen and deans on matters of budgets and other vital problems for almost 20 years.

**STUDY OF CURRICULUM AND COURSE REQUIREMENTS**

The students and others on campus in January 1939 were given information on what was going on when the IDS reported an interview with Briscoe regarding the curriculum and placement of graduating chemistry majors. The chairman stated that

"The curriculum and courses required for degrees are being studied by a special departmental committee to review and determine new courses."

He added that "Some old courses may be dropped or consolidated," but he did not indicate that the changes were imminent.

Three months later the IDS (26 April 1939) gave a follow up concerning the curriculum and other matters stating:

"Robert Spraul, PG, chairman of the (Chemistry) Student Survey Committee, reported that the committee's constructive criticism of the Department of Chemistry has been accepted by Dr. Herman Briscoe...."

Probably because the curricular changes in chemistry would become a major responsibility of the anticipated chairman to follow Briscoe, substantial alterations were deferred.

**SPACE CHANGES IN CHEMISTRY**

Following the end of the 1939-40 academic year the English Department was moved from the east wing of the Chemistry Building to Science (now Lindley) Hall thus providing space for chemistry research
laboratories on all three floors of the wing, more satisfactory space for the main chemistry office and chairman's office on the second floor, and space for teaching physical chemistry on the third floor. After 1940-41 the vacated main office and chairman's office, both adjacent to the Chemistry Library, became available for prompt expansion of the library.

Also, immediately following the 1939-40 academic year the top floor of the west wing of the Chemistry Building, except a classroom (No. 300) on the southwest side, was made available for prompt conversion to quarters for the Division of Bacteriology being created in the Department of Botany.

Oversight of the Department of Chemistry's interest in these space conversions were delegated by Briscoe in large part to Hartman.

**INTRODUCTION OF BIOLOGICAL CHEMISTRY**

In 1939-40 substantial action was taken by the department and central administration to begin the development of a professional program in biological chemistry. This was important in the broadening of teaching and research at Bloomington. Also, it was needed as an essential service for the rapidly developing and changing School of Dentistry. At that time no person on the Bloomington campus was qualified to be designated a biological chemist. Through the support and guidance of Briscoe and Dean Fernandus Payne of the Graduate School actions occurred which started this development.

On 1 January 1940 Dr. W. H. Crawford, from Columbia University, became dean of the School of Dentistry. Through his actions and the strong support of President Wells higher standards of professional training and research soon became apparent. A major change was the institution of the first year of training in dentistry on the Bloomington campus. Unlike the training of first year medical students on this campus at that time, it was to include instruction in biological chemistry instead of deferring this to the second year after the students had transferred to the Indianapolis campus. This part of the education of first year dental students was to be provided through the Department of Chemistry in cooperation with the School of Dentistry. Under similar arrangements the Departments of Anatomy and of Physiology became involved in teaching other courses for first year dental students. Owing to Dean Payne's peripatetic and persuasive role in searching for new faculty members he was assigned the primary responsibility of finding a suitable biological chemist for the consideration of Briscoe and others.

The plan and the search became known to me in the late winter of 1939-40 when I was informed by Dr. E. V. McCollum that he had nominated me. He was head of the Department of Biochemistry at The Johns Hopkins University where I was a member of his faculty. He was
noted for his basic discoveries and leadership in nutritional biochemistry, and was much respected and honored internationally for his emphasis on research concerning relationships between nutrition and oral health.

Finally in April 1940 Dean Payne informed me by letter that he was coming to Johns Hopkins that week and he wished to see me. He arrived at my laboratory before 9 am and we had an informative visit. I was favorably impressed. Reprints of some of my published papers and copies of two submitted manuscripts were mailed to him. In June Dean Payne wrote in part:

“We want you to see the University and see something of the conditions under which you would work. We want to discuss with you your needs, both as to teaching and as to research, also discuss the question of salary.”

At Bloomington Dean Payne was my principal host. He met me at the tiny Bloomington bus depot, where I arrived from Indianapolis about 10 am, drove me about the campus and town, and introduced me to various persons including Briscoe. Also, I was shown various laboratories and offices in the chemistry building including those designated for biological chemistry. I was taken to dinner at Boxman’s restaurant that evening by two members of the zoology faculty, William R. Breneman and Tracy M. Sonneborn. Among others I met that day was Leland S. McClung who, like myself, was about to be appointed to the botany faculty to begin a division of bacteriology. We had much in common. I stayed at the Memorial Union that night.

Before leaving Bloomington I was taken to the nearly new administration building (Bryan Hall) to meet President Wells. He was dynamic, friendly, interested in the right things, and seemingly not too busy to talk briefly about the expectations for chemistry, including biological chemistry. Although I had been somewhat dismayed by some of the deficiencies in facilities I had noted, the meeting with Briscoe had been fruitful and my good expectations had been confirmed. The meeting with the president climaxed the visit and any doubts I had about the university and chemistry moving forward were dispelled.

Immediately after returning to Baltimore I wrote to Dean Payne. I naturally referred to my research which was exciting to me. For the first time in any laboratory experimental acute zinc deficiency was being produced in my animals. My ingenuity and good luck had made this possible. I stated in part

“…it is well that I did not stay longer (in Bloomington) because two of my prize zinc deficient rats were on the verge of dying when I
got to the laboratory today. ...I will be able to get some useful data from them."

The letter also enclosed an itemized account of my travel expenses. Viewed several decades later, the record is astonishing:

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round trip train, including Pullman fare, from Baltimore to Indianapolis.</td>
<td>43.30</td>
</tr>
<tr>
<td>Taxis in Indianapolis (2 x .15)</td>
<td>.30</td>
</tr>
<tr>
<td>Round trip bus fare from Indianapolis to Bloomington</td>
<td>2.10</td>
</tr>
<tr>
<td>Meals</td>
<td>2.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47.95</strong></td>
</tr>
</tbody>
</table>

On 2 July Briscoe thoughtfully wrote unofficially that I would soon receive notification of the appointment. The letter concluded with the assurance,

"...that we are all looking forward to having you with us next year and personally I hope to be able to make you very happy in your new position."

The next day President Wells wrote cordially that on 1 July the Board of Trustees had approved my appointment as

"Assistant Professor of Chemistry for a three-year period, beginning with the academic year 1940-41, with a salary rate of $3250.00 on the ten months’ basis."

During the next 20 years that Briscoe lived all my interactions with him were constructive and pleasant. He was always a representative of the university and the common good even in social situations, but always there was a kind of genuine humility that expressed a feeling of respect for me and every other person.

During the latter part of August my family and I moved to Bloomington. A house at 1014 East First Street was rented and I began to make arrangements for teaching and research in the department. My office on the fourth (later third) floor was room 417A and behind it was my private laboratory 417B. Adjacent to those rooms was the teaching laboratory for biological chemistry room 414. Not far from this room was a laboratory (412) that could be used for graduate research. There were no facilities for the use of experimental animals such as rats, but a narrow semibasement room adjacent to the main storeroom on the first (ground) floor was made available.
The only other faculty members with offices on the top floor were Dr. C. E. May at the other end and Dr. Wm. Degnan whose room (416) was directly across the corridor from my office. Both men were pleasant and cooperative. The only telephone on the floor was in the rear of the service stockroom for the floor. The room was always locked when students were not assigned to the teaching laboratories. Thus it was virtually impossible to receive telephone calls when the storeroom was locked even if the ringing could be heard in our offices.

Within a few weeks that first year one quiet Friday afternoon I was busy at my desk when a pleasant interruption occurred. Two male voices were heard near the top of the stair. Soon President Wells and the President of the Board of Trustees, Ora L. Wildermuth, appeared at my door. Dr. Wells quickly explained that the Board had been in session. After adjournment he and Wildermuth desired to take a brief tour of the campus and greet me if I should be found in my office. The only apparent basis for the visit was for Wildermuth to meet me and for the two to welcome me to the university. They assured me that they were interested in my progress and wished to be supportive in any ways that were feasible. Obviously they definitely wanted to express this in person because there were 96 steps from the ground floor to the top floor. The visit gave me further assurance that the university wanted the department, including me, to move forward.

**EXAMPLES OF ACTIVITIES AND ATTITUDES ON CAMPUS**

It is important to understand the attitudes, activities, and problems felt in the department and the university community during the period of basic changes under Briscoe's brief chairmanship. These are reflected in the following selected news items reported in the IDS:

- On 22 April 1938 on the Women's Page Briscoe was quoted extensively concerning employment opportunities for women chemists. Because he was well aware of current feeling he stated that "The most promising work for which women interested in chemistry can train is research in literature." He also felt that "Stenographical and secretarial work with executives of large chemical companies offers another chance for a career to women interested in chemistry." He pointed out that "Hospitals and clinics employ women as laboratory technicians." He did not make reference to women working as research chemists or becoming employed in other areas of chemistry.

- Six days later Briscoe was headlined in a report stating that he and five graduate students were going to attend the biennial student meeting of the Indiana section of the American Chemical Society to be held in Indianapolis. Among the scheduled speakers
was Dean F. C. Whitmore of Pennsylvania State College who was then president of the ACS. Briscoe was the only faculty member mentioned in the article.

- On 23 September it was stated that the first university faculty meeting of 1938-39 was to be in the Chemistry Auditorium. At the meeting President Wells announced that at his suggestion the Board of Trustees had set aside plans for a costly inauguration and agreed to have the inaugural fund of $2500 transferred to the university's research funds.

- A new textbook on quantitative analysis by E. W. Kanning was published (IDS 28 September 1938).

- On 18 October it was reported that at a forthcoming meeting of the Indiana section of the ACS at Indiana University Briscoe would speak on "The Place of Chemistry at Indiana University" and Mathers would address the group on "Recent Studies on Electroplating."

- In February 1939 it was announced that during the month "A series of ten lectures on recent developments in science will be given by six members of the university faculty at the Indianapolis Center of the Extension Division." The speakers were the newly appointed A. C. G. Mitchell in Physics and R. E. Cleland in Botany. Others were R. Kroc, A. C. Kinsey, and W. R. Breneman in Zoology, and H. T. Briscoe. The latter speaker and Breneman spoke two times each.

- Another documentation of the diversity of Briscoe's commitment to the university is in the report on 18 July 1939 that a grant (Fellowship) had been received for research "on problems peculiar to the cement and concrete industry." It was from the Concrete Silo Company of Bloomfield, Indiana. Briscoe was to direct the work and J. R. Sproul would be the recipient of the graduate fellowship.

- Still another matter of some importance was guidance in settling the question of whether the department should have a new organization, Student Affiliates of the American Chemical Society. Briscoe discussed this with chemistry students in February 1939. Fourteen years before (IDS 9 October 1925) the local chapter of Alpha Chi Sigma had made some inquiry about forming a section of the ACS at Bloomington.

- During the last nine months of 1939 Briscoe took time to speak to various groups locally and in the state such as the following: (a) local Alpha Chi Sigma on 15 March; (b) Scabbard and Blade (honorary organization for advanced military students) on 16 March; (c) Kiwanis Club of Richmond, Indiana on 29 September; (d) Indiana Academy of Science meeting at Indiana State Teachers
College on 10 November; (e) Mothers of University coeds on “Student Guidance at Indiana University” in Indianapolis on 2 December; and (f) on 18 December he addressed the local chapter of Phi Beta Kappa on “The Skeptical Chymist.” That year he was president of the chapter. The meeting was in the Chemistry Auditorium.

In April 1939 at the general meeting of the Electrochemical Society at Columbus, Ohio, O. W Brown and graduate student Bernard Berkowitz gave a paper on the electrolytic preparation of 5,7-di-iodo-8-quinolinol. Almost a year later (16 February 1940) a brief item on the front page reported without elaboration that Berkowitz had “received a fellowship from Merck & Co.... (for) work on a certain new medicinal compound under the supervision of Prof. O. W Brown ... in co-operation with the research laboratory of that company for one year.” Immediately following this Mathers in his watchful style wrote critically to the editor of IDS stating in part “The Berkowitz item was cut to a mere skeleton although it really represented a marked achievement for the University.” He added that “The University is starving for more extensive recognition yet our paper ... fails utterly to make something out of an accomplishment.” It is probable that this was the first grant of any kind from the Merck Company in support of chemistry at this university.

At the October regular meeting of Phi Lambda Upsilon the main feature was a lecture by Mathers on “The Chemist and Patents.”

Later in October Phi Lambda Upsilon held a special meeting in which L. D. Wilson of the E. H. Sargent Company exhibited and demonstrated the use of the recently developed Heyrovsky Micropolarograph. The meeting was in the Chemistry Auditorium. Six months later Kanning followed this with a talk at the March 1940 meeting of the Indiana Section of the ACS in Indianapolis. He spoke on “Polarographic Analysis.”

Also in October faculty members F. C. Mathers, F. Stitt, and E. W. Kanning with two graduate students, A. Gassman and A. F. Schmelzle, attended a sectional dinner meeting of the ACS at Indiana State Teachers College in Terre Haute. The lecture was by A. A. Blanchard of MIT.

In November 1939 Phi Lambda Upsilon sponsored a lecture in the Chemistry Auditorium by G. A. Roush, ’04, distinguished metallurgist. The lecture was on “Strategic Materials.” It dealt with the problem of obtaining necessary mineral supplies in time of war.
• Late in November Briscoe reported to the IDS that W. J. Sparks, '26, had been appointed Chief of the oil and protein division of the Northern Regional Research Laboratory of the USDA.
• Early in December the IDS extensively reported the publication of R. J. Hartman’s new book “Colloid Chemistry.” The Houghton Mifflin Company published the book under the editorship of Briscoe who had held that role several years. It was proudly announced that adoptions had occurred by the University of London, Stanford University, and the University of Illinois.

OTHER EVIDENCES OF CHANGE

During the rest of 1939-40 and for at least another decade the IDS continued to serve as an insightful window to activities in chemistry and on campus that were important to chemistry. Talks at seminars, chemistry organizations, recognitions to faculty and students, and academic organizational changes were reported extensively. The nature of these activities gauged the changing status of the department and university. The following reflect some of the changes:

By 1940 references to seminars became common. For example, on 12 March 1940 it was reported that

“Robert J. Lee, PG, will discuss ‘Catalytic Oxidation’ at the Physical Chemistry seminar at 7:15 o’clock tonight in Chemistry 203.”

The next evening C. E. May spoke at a meeting of the newly organized Student Affiliate (ACS) group in Chemistry 200. He reported on the organic chemistry symposium of the ACS held in St. Louis three months before. Included in his talk was reference to “work which has been done recently attempting to discover the substance in marijuana which produces the toxic effect.”

Another measure of change was a talk by Briscoe at the 17 May 1940 meeting of Student Affiliates, “at 7:30 o’clock tonight in Room 203 of the Chemistry building.” He spoke on “The Literature of Chemistry.” He emphasized that “Students in chemistry should begin a personal library as soon as possible.” Copies of his list of special reference books were distributed. A course on the literature of chemistry was not started until two years later.

The close linkage between the local chapter of Alpha Chi Sigma and the national organization was made clear from time to time through periodic visits by the chemistry alumnus, John R. Kuebler, AB’12, AM’15. He was for many years the professional fraternity’s national secretary editor. Also the national office was in Indianapolis. One visit was on 25 February 1940 to attend the local fraternity’s banquet and initiation
services. Students initiated at that time were R. Reed, J. W. Boehne, D. F. Fink, and W. A. Foster.

In the Chemistry Department and almost everywhere in 1939 and early 1940 fears of the mounting military might of Germany continued to grow. Also, the United States was taking steps to improve its military and civilian defenses. Various members of the faculty were giving talks that generally focused on chemistry in defense and war. For example, on 8 March Hartman was quoted extensively on his recent talk at the Kiwanis club luncheon at the Graham hotel. His view, as expressed by the IDS, was that

"Economic chaos is the main instigator of war and when this is taken into consideration, war will not be so imminent."

Apparently Hartman gave particular attention to chemical research and technology that were creating vital synthetic products.

During the same week the IDS in three different issues extensively covered two lectures given by L. F. Livingston, manager of the Agricultural Extension Division of the duPont Company.

One was sponsored by Phi Lambda Upsilon and held in the Chemistry Auditorium. The other was at the weekly luncheon of the Rotary Club at the Graham Hotel. He spoke comprehensively on the applications of synthetic and process chemistry in the production of new industrial chemicals and other vastly important products. The major new products displayed and discussed were Nylon, Lucite, Duco enamel, Rayon, motion picture film and other films, Pyralin, several cellulose products including cellophane, and safety glass. In step with the thinking and activity of that time, Livingston emphasized that

"Research is needed to develop new uses for our present agricultural crops and to develop entirely new crops which can be used directly by the factories of the country."

Two weeks later, on 22 March 1940, the noted scientific criminologist J. H. Mathews lectured in the Chemistry Auditorium under the sponsorship of Alpha Chi Sigma. At that time he had been Chairman of the Department of Chemistry at Wisconsin 21 years. He had received high national attention for his success in applying science to the solution of various major crimes. Also, he was the principal founder of the professional fraternity in 1902. As stated by the IDS,

"In his talk he will show, by means of lantern slides, how certain murder mysteries have been solved and the identity of the criminal established."
The honorary chemistry sorority, Iota Sigma Pi, was fairly active in the 1930s and 1940s. On 26 March 1940 it sponsored a lecture by Grace G. Spencer identified as a "technician in the technical laboratories of Sears, Roebuck, and Company, Chicago." She spoke on "Recent Advances in Electroplating of Interest to the Consumer." Briscoe introduced the speaker. That afternoon he spoke to the City Panhellenic Council on "Student Guidance." This was at the Kappa Delta sorority house.

One month after the Iota Sigma Pi meeting the chapter was visited by the national president, Dr. Evelyn L. McBain, who was a member of the chemistry faculty at Stanford University.

In April 1940 Hartman again, speaking to Student Affiliates of the ACS, was cited extensively in the IDS on his views concerning the achievements of chemistry in the synthesis of essential products and in the extension of the usefulness of natural products. In particular he referred to the extraction of oil from shale and the use of coal as a source of liquid fuel. A week before this lecture he spoke on some considerations of colloid chemistry in the explanation of "biological phenomenon."

During the same month seven members of the chemistry faculty attended the meeting of the ACS in Cincinnati.

Also in April 1940 the department and university were highly honored through the election of Mathers to the presidency of the Electrochemical Society. Eighteen years later he had the rare distinction of being made an honorary member of this important national professional society. He was the first member of the chemistry faculty to become the head of an important national organization. It is remarkable that four of his former students also became presidents of the Electrochemical Society. They are John C. Warner, Lyle I. Gilbertson, Harry C. Gatos, and Cecil V. King. In addition, Gatos was made an honorary member of the Society.

Another honor came to a student and the department in May 1940 when Herbert S. Gutowsky, '40, was given the outstanding undergraduate award by the Indiana Section of the ACS. Other sections of the ACS made similar awards to 23 other outstanding seniors throughout the United States. During several decades the former student Gutowsky received some of the highest honors for scientists including the National Medal of Science in 1977.

The most important campus news of 1940 was announced by the IDS on 1 June. Two inch headlines across the front page proclaimed

BRISCOE NAMED FACULTY'S DEAN

This had been reported to the faculty a short time before by President Wells with the information that the appointment was effective for the Bloomington and Indianapolis campuses, meaning in effect for the entire university. The public could read in the IDS that
“Dr. Briscoe’s new work will be to assist President Wells in academic administration of the University, to serve on all general University committees, and to continue in charge of the recently established Student Guidance program.”

It was stated further that

“Dean Briscoe will take over his new work today, but he will continue to serve as the head (sic) of the Department of Chemistry until a successor is appointed.”

During the rest of June the IDS ran at least two extensive informational articles about the new dean and his accomplishments. One was an editorial.

In ironic contrast between the forward movement in university administration and the backwardness of the State in providing satisfactory vehicular transportation for Bloomington, in the same issue of the IDS an editorial lamented the distressful condition of the only road between Bloomington and Indianapolis. The editorial was headed

75 CURVES IN 11 MILES FEATURE STATE ROAD 37

The most troublesome part of the road was

“the short distance of 11.8 miles between the end of the concrete 6.5 miles south of Martinsville and the Griffey creek bridge 1.7 miles north of Bloomington.”

The marked inadequacy of this totally two-lane highway was a continuous source of annoyance and occasionally the cause of fatal accidents. The establishment of a new administrative structure, the attraction of a strong and promising faculty, and the provision of safe and convenient access to the university were responsibilities that had to be addressed. Even from the beginning of the major changes toward a great university about 1938 it was more than 30 years before a safe four-lane highway was provided.

The 1940-41 academic year was marked by new beginnings and new expectations. Importantly there were eight new graduate teaching assistants, as follows: Edward Hart, Clarence Hochanadel, Robert Lewis, Henry Nachstein, Lawrence Meem, Earl Parker, Arthur Radike, and William Wilkinson. All except the latter were from other states. Also, a new secretary-librarian, Mrs. Cleona Harvey started as a replacement for Betty Curts who had resigned; and storeroom service was doubled.
by adding Glenn Hepley to support Frank Eckels who was approaching retirement.

**The First Year of Biological Chemistry at IU**

During the first semester of 1940-41 I taught Biological Chemistry 208 (Lecture) and 209 (Laboratory). Twenty-seven seniors and graduate students were enrolled in the lecture course and 17 in the laboratory. Several were majors in zoology, botany, and the program in bacteriology which was also starting that semester. In that class and in all that followed during my years of teaching it most of the students were alert and promising. Some were exceptionally capable and productive. Two notable non-chemistry beginning graduate students were John R. Preer (zoology) and Louise B. Brandau (botany). They generally sat side by side. Their research directors were T. Sonneborn and R. Cleland respectively. Both directors became members of the National Academy of Sciences and eventually Preer became a member. Within about 14 months John and Louise were married. It is tempting to think that their participation together in the course influenced them to get married and work together throughout their professional lives.

Among the chemistry graduate students in that first class two in particular stand out, namely Phil Hidy and Edward G. High. Hidy, my first doctoral student at IU, received his PhD degree in 1944. After a few years on the faculty at Baylor University he chose to make industrial chemistry his lifework, at Commercial Solvents Corp. at Terre Haute. High returned to IU in 1947, some time after World War II had ended, and completed his doctoral degree with me in 1950. Within a few years he became well established at Meharry Medical College where he was Chairman of the Department of Biochemistry many years. During 1981-82 he was president of the Indiana University Alumni Association. Tragically he died from a massive heart attack in June 1986, during a stopover in Indianapolis while enroute with his wife to the annual Alumni Weekend at Bloomington.

Until fall 1940 the two biological chemistry courses had been taught only in summer sessions, probably as classical physiological chemistry, and the teacher was C. E. May, an organic chemist. When I made a comprehensive report to Dean Stout in April 1941 I wrote in part:

“No. 208 is designed to present the principles of general biological chemistry. It is intended primarily for undergraduate seniors and post graduates majoring in chemistry, biology and botany. It is of considerable value to premedical students because it prepares them for the first year medical courses and supplements the biochemistry required in the second year of medicine.”
Much of my time in 1940-41 was devoted to the troublesome problem of procuring greatly needed chemicals, glassware, a few simple instruments, a relatively low cost centrifuge (International), household refrigerator, and a few other items for my research and the instructional laboratory. Also, it was necessary to obtain some special facilities for my research on the production and study of zinc deficiency in laboratory mice.

One of the problems was the procurement of acceptable quarters in which laboratory rats and mice could be housed and maintained under experimental conditions. Before the end of 1940 a semi-basement room (116) adjacent to the main chemistry stockroom was made available. It was approximately 12' x 20' with one casement window on the west end and one door connecting with a corridor on the west side of the stockroom. One small sink at the end of an old laboratory bench on the north side constituted the furnishing. The wooden top bench and sink had been brought to the building from Wylie Hall. They were probably more than 50 years old. During the past few years it had been used in the quality testing of coal for the University Purchasing Department. This miserably inadequate facility had to be used as well as possible until a laboratory on the fourth floor, room 410, was converted to a modest animal facility about four years later.

During the first few months the research I started at Johns Hopkins was continued on acute zinc deficiency. Experimental mice were used instead of rats. This required persistent efforts to obtain special animal cages, apparatus and supplies. Some financial support was granted by the Graduate School (Dean Payne). Also, I applied to the American Medical Association for $400 and it was promptly awarded.

Teaching in the second semester was more demanding in the fledgling biological chemistry program. The new course Dent. 104 (later 109) was given for all students in the freshman dental class, and a few others, making a total of 49 in the first year (second semester). There were three lectures per week and two laboratory sections. In addition, a new course No. 311, was introduced, Seminar: Biological Chemistry. Eleven students participated. Each reviewed one or more assigned timely topics and prepared written critiques, mimeographed copies of which were distributed to all members of the seminar at the time a report was orally presented. Generally there was considerable discussion. This was the beginning of seminars in biological chemistry. Such programs had been started a few years earlier in organic chemistry, physical chemistry, and in electrochemistry.

During this first year I published six research articles on work I did at Johns Hopkins University, two of which were from the doctoral research of my student there, M. E. Shils. In addition, in Chicago in April 1941 I presented a paper on zinc deficiency at the annual meeting of the
Federation of American Societies for Experimental Biology. Also in May 1941 I attended by invitation President Roosevelt’s National Nutrition Conference for Defense, held in Washington. Less than a year afterwards many persons who attended became actively involved in the armed forces, defense industries, and various other aspects of World War II.

In my first annual faculty report for 1940-41 the following statement was included:

“I have encouraged my students to discover biochemical fields of special interest to them ... (thus) opening up new horizons and making the subject, as a whole, really alive.”

News regarding new faculty in 1940 was well reported by the IDS. On 14 September it gave information on nine named by the new dean of the faculties. It stated that they were

“To complement the University’s continued expansion of physical facilities and the growing increase in enrollment.”

These included myself and Leland S. McClung.

The busy chairman Briscoe and his wife Orah took time to be sociable. As reported by the IDS on 2 October

“Prof. Herman T. Briscoe, dean of faculties (sic), and Mrs. Briscoe will entertain members of the Department of Chemistry at a dinner Thursday evening in the Colonial tearoom (ground floor of the Union building). The dinner will precede the reception given by the Faculty Women’s Club for new faculty members and their wives.”

The Days were guests of the Briscoes at the dinner.

In the series of articles about new faculty members on 8 October the IDS wrote about H. G. Day in a column “This and That About New Faculty Members.” At that time the writer perceived him to be “... young ... blond ... muscular ... business like ... precise...” A notably accurate observation was that his “pet hate is reporters who garble scientific news.”

Two days later the IDS reported expansively that the new faculty member

“...discussed the history, extent and application of biochemistry at the first meeting of the Indiana University student affiliate (sic) of the American Chemical Society.”

Memory of what was said has faded but positively it was not as sweeping as the report suggests. The next to newest faculty member Fred
HARRY G. DAY •277

Stitt, was referred to in connection with an announcement that two seniors would be awarded honorary membership in the ACS in the next spring.

My first lecture to the Student Affiliates group was my first public address at IU. Later, on 12 December, the IDS stated that I would speak that evening at the meeting of Sigma Xi in Owen Hall. The topic was "The significance of Trace Organic (sic) Elements in Animal Nutrition." Of course "inorganic" was correct instead of "organic."

Again on 29 January 1941 the IDS informed its readers that on the next day Prof. Day would speak at the monthly meeting of the Graduate Club "in the East parlors of the Student building." The officers in charge were a graduate student and an instructor in the Department of English.

LECTURES BY OTHER CHEMISTRY FACULTY

A significant item in the IDS on 1 October 1940 was the report on the plans of Mathers and a recently graduated student W. J. Guest to present papers at a meeting of the Electrochemical Society in Ottawa, Canada. This was probably the first time that Mathers had been referred to in the IDS as president of the Society following its reporting of his election to it several months earlier. Two weeks later the IDS reported that he met with PLU and presented his impressions of the meeting. Again he was identified as president of the Society.

In December 1940 the IDS noted that Mathers had recently spoken to the American Electroplaters Society in Indianapolis. The subject was "The Addition Agents in Platinum Solutions."

R. J. Hartman was the other full time faculty member in particular who was mentioned from time to time in the IDS. On 10 October 1940 it stated that he as retiring president of Sigma Xi spoke on "Chemical Kinetics."

From time to time Briscoe still gave public lectures on chemistry. On 5 December he addressed the local Kiwanis Club on "Chemistry in War." Almost exactly one year later the bombing of Pearl Harbor occurred. This precipitated the entrance of the United States into World War II.

BEGINNING OF STUDENT GOVERNMENT ON CAMPUS

Also in 1940, under Briscoe, an effective move toward student government was started. On 8 October he announced that the Administrative Council, composed of the academic deans, took steps to appoint a student committee to study the problem and draw up plans for the organization of student government. Interested students were invited to file applications. As reported by the IDS on 9 October, Briscoe
"...said that the function of the Administrative Council will be only to approve the final plan to see that it satisfies the student body as a whole."

The idea of establishing a significant level of student government stimulated some student opposition as well as support. Two letters to the editor of the IDS were written by a beginning chemistry major Chester Davis in late October — early November. One letter seems to reflect some points of view that were prominent in the campus-wide discussion. He wrote:

"So its 'just the independent students who are for student government'? And who else do you think might want it? ... Student Government means Equal Chance for both the organized and unorganized student, and that is one thing the organized students are trying to prevent."

Notably two decades later Chester Davis became exceptionally successful in dye and pigment chemistry and its applications to printing. His extraordinary generosity to this university in later years on behalf of chemistry and physics still reflected his strong interest in students, especially those who demonstrated creative promise and independence in thinking.

Finally in the movement toward student government a plan with a constitution and by-laws was presented late in 1941. After consideration by the Administrative Council it was submitted for faculty approval. The important action was seriously considered but it aroused considerable mirth over the proposed definition of a quorum. The definition stated that a quorum is a majority of those present! The definition was appropriately changed and eventually a program of student government was initiated.

NON-ACADEMIC STAFF

Also, Briscoe made constructive moves in strengthening the non-faculty resources of the department, especially in providing more support and skill in the maintenance of laboratory equipment and supplies. Beginning in 1940-41 a third full time "storeroom keeper" Glenn Hepley was employed in part to prepare for the eventual replacement of the aging Frank Eckels as head of that service. The salary of Robert Harding as assistant was significantly raised and he was given encouragement and time to provide some glassblowing service. He left the department in 1944. After Eckels' retirement in 1946 Hepley became head of the storeroom system.
One year before Briscoe became chairman, Betty Curts succeeded Mollie Keller as secretary and librarian of the department. In August 1940 she resigned and was succeeded by Mrs. Cleona Harvey. When Briscoe began his full-time duties as dean of the faculties in summer 1941 Mrs. Harvey moved with him to his office in Bryan Hall. She was succeeded by Grace Albrecht as secretary. About the same time the main chemistry office was moved to the east end of the second (now first) floor. The chemistry library space was expanded. Mary Ballou became the first librarian without other duties, but the principal library resources for the new division of bacteriology were combined with those of chemistry. Thus she was responsible for both.

About this time a more systematic and indeed necessary policy was adopted by the university concerning the administration of non-academic services and personnel. Implementation was begun soon thereafter. This came noticeably to the attention of the campus on 13 September 1941 when an article on it appeared in the IDS. It announced that a "personnel head will be chosen by examination" and the person "will have charge of the Personnel Division which was established last year." This significant development in selecting, training, and recognizing worthy services of personnel came just at the time non-academic staff were becoming especially important in the growth and vitalization of chemistry.

CONTINUING ANNOUNCEMENT OF PLACEMENT OF GRADUATING STUDENTS

Under chairman Briscoe the Department of Chemistry continued the practice of announcing periodically the placement of graduating students. Probably the last placement announcement he made to the IDS as chairman was on 19 May 1941. He stated that 90 percent of those who would graduate the next month had already received jobs, and that this was

"...not only because of the defense program, but also because of the sky-rocketing production of rayon, nylon, and other chemistry-created industries."

RETROSPECTION

During the three years of Briscoe's chairmanship (1938-41) he led the university in starting the department toward an ever-expanding level of productivity in chemical education and research. Its stature and respect in professional chemistry acquired increasing significance. Within less than four decades it became a truly major department in this country. In this development all areas of the university shared equally in deriving the benefits from his wisdom, devotion, and credibility.
A major role of this model teacher-administrator was in the selection of his successor as chairman, Ralph L. Shriner. Briscoe's nature and the basis for his effectiveness are aptly expressed in the words of his administrative secretary for sixteen years, Lucile B. Languell:

"He was not only a great administrator and teacher but he was also a true friend to all who sought his valuable advice. He was completely unselfish, always thinking of the interests of others, and it was his kindly ways that brought so many people to him for help with their problems. Among these people were not only faculty members but staff employees as well."

References

As in earlier chapters, many of the relevant letters, documents, and reports in the University and Department of Chemistry Archives were consulted. The Arbutus, Indiana Alumni Magazine, letters from alumni and faculty, and especially the Indiana Daily Student were invaluable sources of information and opinion. In addition, I knew Dr. Briscoe well during the last twenty years of his life.

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Wells, H. B In behalf of the Herman T. Briscoe Memorial Professorship in Chemistry. The Indiana University Foundation 1960. (An 8-page brochure explaining the reason for establishing the professorship and supported by brief statements by twelve of his friends and colleagues.)

Chapter VI

The Shriner Years: 1941 - 1946

During 1940-41 one of the obviously major needs of the university was to select and attract a highly promising chairman to follow H. T. Briscoe who was designated that year to become the first dean of the faculties. Characteristically Briscoe moved quietly in searching for his successor. He sought and listened to the views of faculty members in the department and trusted leaders in chemistry elsewhere. This culminated in the selection and attraction of Dr. Ralph L. Shriner, the right person for the times and the needs of the department. He was a productive, resourceful, and widely recognized leader in both the academic and industrial worlds of chemistry.

The public announcement of the selection was made by President Wells in the IDS of 15 July 1941. In this issue and in the issue of 18 September extensive articles informed the campus about the person and his work. The final decision was made by Briscoe and Wells in May. The board approved the appointment on 2 June and the formal notification was made by Wells a week later.

In consulting some of the most knowledgeable chemists Briscoe was advised in particular by Dr. W. A. Noyes, Jr. that the greatest specific need which a new chairman would have to address was in the teaching of physical chemistry. He wrote, “a change is necessary as soon as possible.”
The eminent suitability of Shriner is reflected in a long letter he wrote to Briscoe on 26 May. This concerned his concepts of the status and needs of the department as well as his own research, editorial and writing work, and consulting responsibilities as well as his interests in teaching. These included his commitments on the active continuation of *Organic Syntheses*, co-authorship and consequent need for periodic revision of *Systematic Identification of Organic Compounds*, *Quantitative Analysis of Organic Compounds*, and updating of two chapters in the widely used *Organic Chemistry* by H. Gilman. The consulting responsibility was limited to a major chemical company which generally required him to be absent from campus responsibilities three days every other month.

Regarding research and teaching, he pointed out that at Illinois as of September that year he would have to leave ten advanced candidates for the PhD degree and that arrangements would be made for them to complete their work at Illinois under other supervision. At Indiana he would want to direct about five students whereas he had been accustomed to directing 3-4 times that many. He emphasized that he did not want to take any students away from other faculty members. He wished to teach one undergraduate or graduate course in organic chemistry per semester, but he planned not to teach in the summer session because he would use much of his time then in writing.

Impressively the interest in salary was far less important than the other matters he discussed, specifying only that “The salary should be such that it commands respect of ones contemporaries.”

Shriner naturally discussed the situation at Indiana with some of his colleagues at Illinois. Referring specifically to Roger Adams and Carl Marvel he wrote,

“Both of them would like to see the Department of Chemistry at Indiana strengthened since this works to the mutual advantage of all chemists.”

Literally Shriner began the new responsibilities with his sleeves rolled up, and much of the time with a cigar in his mouth. Fourteen years earlier he had joined the faculty at the University of Illinois as assistant professor and within eight years he had become professor. Also, he had done his graduate work at Illinois, receiving his PhD degree in 1925. For two years he had taught and published important research at the New York Agricultural Experiment Station. Thus during 16 years he had become a widely recognized leader in research and teaching. He was highly regarded by his noted colleagues at the University of Illinois. Clearly his excellence instantly attracted favorable attention to Indiana University. It signified to the leaders in American chemistry that this
university was determined to have a strong department of chemistry. The appointment was another large step toward this goal.

The new chairman had other interests. His wife Rachel and daughter Joan complemented his intense devotion to chemistry and his responsibilities as the leader of the department. He delighted in fishing once per year in the northlands, and with Rachel it pleased him much to play bridge with friends when time permitted. Also, he took pleasure in helping Rachel some in pursuing her talents in art work, especially in ceramics.

The selection was in line with the broad program of brightening the image of Indiana University. As pointed out by Clark in his history of the university (III, p. 357),

“Herman T. Briscoe and Fernandus Payne held a series of conferences in the spring of 1941 hoping to devise plans for elevating Indiana’s national standing. They evaluated with intensive care the departments in the College of Arts and Sciences, and then resolved to concentrate on twelve of them.”

Chemistry was one of the twelve departments “targeted.” Building up chemistry and the other selected departments was going to cost extra money and this would entail some budgetary adjustments. There was no notable outcry in opposition; perhaps because it seemed to be entirely in the best interest of the university. This is in marked contrast to the uproar made by many faculty members over forty years later when an administrative decision was made to further strengthen certain departments and schools through a targeting program in the budgeting of funds.

In the first interview with Shriner, by the IDS, published in September 1941, the focus seemed to be on chemical research in connection with the national defense effort. This was three months before the country became directly involved in World War II. It turned out that nearly all his time in the department was to be limited to the years of that war.

Two days after the interview was published the IDS reported that Shriner and four other IU faculty members were to give a series of nine non-technical lectures on strategic war materials at the IU Extension Center in Indianapolis on successive Tuesday evenings. The four others were R. J. Hartman, E. W. Kanning, and J. H. Billman from chemistry and Ralph Esarey of the Geology Department.

During the same week that this news item appeared Dean Briscoe addressed the Bloomington Rotary club on “Chemistry and Chemical Warfare.”

ENTRY OF THIS COUNTRY INTO WORLD WAR II

The entry of this country into the war came sooner and more precipitously than the public expected. When classes ended on Friday afternoon 5 December 1941 there was no expectation that on Sunday
the infamous bombing of Pearl Harbor or any other deadly act of war against the United States would occur.

An illustration of the near panic in some of the students is shown in the almost immediate reaction of one of my graduate students. He had just started an experiment involving the use of several laboratory rats for a period of several weeks. It happened that he roomed near my home. When he heard the startling radio news of the bombing that Sunday he presumed, as many male students did, that soon he and others would be called up for military service. Thus he quickly came to my house for consultation and probably for assurance that in some way there was still a future for himself and others. Almost his first question was "shall I go kill the (experimental) rats?" He had concluded that he would be called up for military service within a few days. Of course I quickly convinced him that we could expect the country to make rational adjustments. At least the semester could be finished without great interruption.

An examination had been scheduled for my class in biological chemistry the next morning. When I met the class the examination was postponed and much of the hour was devoted to an attempt at restoring confidence and a sense of direction. Concerning that morning, 41 years later a student in the class wrote to me:

"It was one of those grave moments in a lifetime when a perilous future was contemplated. I have always been grateful that you calmly and soberly shared your thoughts with us on that memorable day."

There were comparable reactions between students and faculty in other courses.

CHEMISTRY FACULTY APPOINTMENTS AND CHANGES

The first chemistry faculty appointees selected by Chairman Shriner were Dr. Donald G. Thomas from the University of Michigan, Dr. James Homer Jones from Columbia University, Christian E. Kaslow who was completing his PhD degree at the University of Minnesota, and Dr. Elijah Swift, Jr. (Harvard) from Lawrence College. They came to the Bloomington campus as instructors in 1941-42. Besides these four, and in accordance with the responsibilities of the department for the chemistry instructional staff in the extension centers, Shriner appointed Dr. William Hered instructor at the Calumet Extension Center. Hered received his degree at the University of Chicago. In addition, owing to Dr. William Degnan's continuing illness in 1941-42, it was necessary to extend the leave of absence that Briscoe had approved earlier.

With the appointment of young faculty members it was gratifying that at the same time Professor O. W Brown was awarded an honorary
ScD degree by Huntington College. He had been a member of the IU faculty since 1899 but had never completed the doctoral work he started in 1897 at Cornell University. In 1943 he and four faculty members in other departments retired. Brown was loved and respected by all, but discerning chemists recognized that his talents and some of his achievements in applied electrochemistry and storage batteries were not matched in physical chemistry, the area in which he held varying degrees of responsibility throughout his 44 years on the faculty.

ACCREDITATION FOR PROFESSIONAL TRAINING IN CHEMISTRY

The upward movement of the department was enhanced by various factors. An important one was the program of the American Chemical Society to develop and implement standards for accrediting chemistry departments in colleges, technical schools, and universities which provided training intended to qualify students as professional chemists. The program was started in 1936 through the work and leadership of its Committee on the Professional Training of Chemists. One of the primary purposes of establishing standards was “to list the institutions where adequate chemical training may be obtained for a professional career.” This particular objective commanded the attention of academic administrators throughout the country. It was used effectively by many chemistry chairmen and others to gain the internal support necessary to meet national standards, thus strengthening many departments.

The first chairman of the ACS Committee was Dr. Roger Adams, one of the most noted research chemists and administrators who for many years was Chairman of the Department of Chemistry at the University of Illinois. One of the committee’s first actions was to send a comprehensive questionnaire to more than 750 educational institutions concerning their standards of training and resources for such training. This was reported briefly by Adams in the News Edition of Industrial and Engineering Chemistry on 10 April 1938. In the report he was identified as the chairman of “The American Chemical Society Committee on the Accrediting of Chemistry Departments.” The questionnaire was thus received at Indiana University near the time that the dramatic change was occurring in the presidency of the institution and shortly before Lyons was succeeded by Briscoe in administering the Department of Chemistry.

The response of this university, if any, to the first questionnaire is not known, but early in 1939 the department was included in a general mailing from the committee requesting “Bachelor’s Degree Supplementary Information and Information Concerning Graduate Studies.” By this time the ACS had authorized the committee “to proceed to formulate information for the preliminary accrediting of eligible institutions.” A response to the voluminous questionnaire was desired by 26 June 1939.
A follow-up request for more information, dated 20 July 1939, was evidently sent to many institutions. This department's comprehensive response was made by Briscoe on 28 July. Far above others at IU, he recognized the different areas that should be markedly strengthened not only to merit ACS accreditation but to be unquestionably strong in comparison with well recognized departments elsewhere.

For example, concerning the curriculum, the following was included in the report:

"Plans are now under way for revisions of the program for the year 1939-40. Course 3 (quantitative analysis) will be divided into two groups, one of chemistry majors and the other of pre-medics and other students. Course 8 (Mathematical, physical chemistry) will be dropped and students will be expected to receive mathematical training in regular mathematical courses. Colloid chemistry, number 13, will be continued into a three-hour course given during one semester. Course 14, Determination of pH, will be dropped, and in its place will be added an advanced course in analytical chemistry called Physical Chemical Methods of Analysis."

In relation to the number of students being served, the department was still very under staffed. During 1938-39 the List of faculty members were: O. W Brown, F. C. Mathers, C. E. May, H. T. Briscoe, R. J. Hartman, E. W. Kanning, Wm. M. Degnan. Seven PhD degrees were awarded in four different areas. That year there were 75 baccalaureate degrees, including 18 BS degrees in chemistry. Only one recipient was a woman. Two more faculty, J. H. Billman and F. J. Stitt, were added in 1939 and one, H. G. Day, in 1940.

Dr. W. Albert Noyes, Jr. was one of the several highly recognized chemists consulted by Briscoe. At this time, early in 1941, there were 10 faculty members and about 20 graduate assistants. There were approximately 2400 undergraduate course enrollments. Noyes concluded in a letter on 21 May 1941 that in comparison with other institutions IU should have

"...a minimum staff (faculty) of 20 and probably about 40 graduate assistants would be necessary to handle that number of students adequately."

Some other outstanding chemists probably would have recommended a minimum of about 15 and 30 respectively.

The virtually equal problem was the weakness in physical chemistry. As concluded by Noyes,

"The teaching of physical chemistry is at present the weakest point in the undergraduate instruction at Indiana as far as I can tell."
The actions of Dean Briscoe on behalf of accreditation led the Committee on Professional Training to send its representative Dean S. C. Lind to Bloomington in October 1940. Dean Lind, from the University of Minnesota, made a favorable report to the committee shortly after the visit, but this was much influenced by the recent changes not only in chemistry but elsewhere in the university. As he wrote later to Shriner in October 1941, the committee was well aware of changes that were occurring, including the successful search for a chairman to succeed Briscoe. For such reasons Lind wrote that

"...the Committee as usual decided to await developments before making a decision."

There was no doubt that after a suitable period of observing the department, following the appointment of Shriner, accreditation would occur. Lind stated that during his visit in 1940 he

"...had very satisfactory conferences with (both Dean Briscoe and President Wells) ... and was assured that they intended to support the Department of Chemistry adequately, and that they have plans for its expansion and improvement."

Finally in September 1942 the committee included Indiana University in its listing of accredited institutions, where it has remained since that time. In the Big Ten institutions Indiana University, except for Michigan State University, was the last to be accredited. Michigan State did not develop as a university until after the end of World War II. The other institutions in Indiana accredited before IU were DePauw, Notre Dame, Purdue, and Wabash College.

The comprehensive and well-documented application for accreditation was prepared and submitted within approximately one year after Shriner joined the faculty. It reflects objectively the status of the department in 1942-43. Concerning the chemistry faculty (staff) he wrote in part:

"The staff has been increased from seven (in 1938) to thirteen and the teaching load cut so that, in general, the senior staff have to devote about 12 hours or less to actual class and laboratory work and the balance of their time is spent on research.

"The staff at one time was highly inbred — a majority being Indiana men. In employing new men both Dean Briscoe and I have appointed only those who have had work at other schools ...

"Mr. C. E. Kaslow has completed the work for the Ph.D. degree at Minnesota and the degree will be granted in October or February of 1943 ...
"The work in analytical chemistry is to be taken over by Dr. L. L. Merritt who was trained at Michigan and comes to us highly recommended by Dr. Willard. This change will very materially strengthen the work in quantitative and in instrumental methods of analysis.

"The course and work in Physical Chemistry have been re-vamped during the past four years. A new laboratory has been equipped and the laboratory work very materially improved. Most of this was done by Dean Briscoe and Dr. Hartman. At present the courses in physical are being given by Drs. Swift (Harvard) and Jones (Texas)"

Concerning organic chemistry Dr. Shriner wrote:

"Professor May teaches the premedics and this takes most of his time. The organic courses for undergraduate chemists and graduates are given by Drs. Billman (Princeton), Thomas (Michigan) and myself. They are soundly organized and our training in this field is now very good."

Also, he wrote:

"The advanced inorganic chemistry and qualitative analysis are taught by Prof. Mathers. He is very well trained and has been doing a fine job for many years. He is actively interested in research in electrochemistry and was President of the American Electrochemical Society two years ago."

The pivotal application was concluded by writing:

"...we have a department with a high percentage (75%) of young men interested in both teaching and research. We have a progressive, forward looking administration. ... I have every reason to believe that the future will be good."

That a goodly proportion of the chemistry majors at that time had superior academic abilities is suggested by the proportion of such students elected to Phi Beta Kappa. As reported by the IDS on 25 November 1941, nineteen members of the senior class (at that time) were elected and five were chemistry majors. These majors were: J. J. Reinhard, Jr., J. S. Fitzpatrick, H. L. Conn, T. E. Bockstahler, and N. B. Hasler. If the curricular standards of PBK at that time had not been so demanding for credits in non-science courses more of the chemistry majors taking BS degrees would have qualified, thus increasing the proportion of such majors elected to PBK.
In 1949, seven years after gaining a place in the listing of the accredited institutions, the first ranking by the Committee on Professional Training was pretty modest. All the institutions known to offer training leading to the PhD in chemistry were evaluated through a questionnaire to 418 professors noted for their contributions in the four basic fields of research in chemistry departments at that time. Over 300 responded. Based on the responses Indiana University was in the middle 40 percent of all departments for inorganic, organic, and physical chemistry, and in the upper 20 per cent for analytical chemistry. The overall standing for the department was in the 40 per cent or C category. The ratings were not made public, but upon request any rated department could receive a report on its standing (letter of 23 November 1949 from E. M. Billings to F. T. Gucker, Jr.). There is no known rating of such depth and quality before this time, but clearly the general feeling among nationally recognized chemists and chemistry departments was that during the prior decade remarkable advances had been made.

In contrast with the status of the emerging department in the 1940s, in 1980 the chairman of the department Dr. A. Allerhand informed the university that a highly credible Rating of Graduate and Professional Programs (The Gourman Report) had classified IU as number 15 in the nation and number 3 in the Big Ten.

Concerning the number of graduates, as headlined in Chemical and Engineering News 19 May 1986, “Indiana (is) new leader of graduate listing.” The full page article pointed out that during 1984-85 this department had a total of 149 baccalaureate graduates. The second highest was the University of North Carolina (114) and the third highest was the University of Illinois (102). Indiana was 17th in the number of graduates completing the program certified by the ACS’s Committee on Professional Training. The University of Illinois was second. In the ranking for graduates with PhD degrees Indiana was 11th, the University of California-Berkeley was 1st, and the University of Illinois-Urbana was 2nd.

The significance of the emergence of this department and others in the university was highlighted in 1943 through President Wells’ report (Indiana University Bulletin) on his first five years (1937-42) in the presidency of the university. The exciting fundamental changes were so extensive and progressive that he could mention “only new full professors, heads of departments, or representatives of new fields.” Concerning chemistry he wrote:

“A remarkable growth in the work of the Department of Chemistry has taken place. The size of the teaching staff was increased twofold in order to provide for small classes, for courses in the entire field of chemistry, and to enable members of the faculty to devote more
time to important research. More space was provided for the Department by moving the Department of English to Science Hall. Professor Herman T. Briscoe was named chairman in 1938, but resigned in 1941 to become dean of the faculties. In 1941 Professor Ralph L. Shriner, whose special field is organic chemistry was named chairman. In the same year work in biochemistry was begun with the appointment of Assistant Professor Harry G. Day. Considerable research both directly and indirectly connected with our war effort is being carried on in the Department.”

Further Changes in the Faculty

One of the changes was the increasing number and training of chemistry faculty members. Two additions in Shriners’ early years, who continued here until they retired several decades later, were Lynne L. Merritt, Jr. and Ernest E. Campaigne, both entering as instructors. The first received his PhD degree at the University of Michigan in 1940 and the second received his at Northwestern University in the same year. Both had post-doctoral research and teaching experience. The first came in summer 1942 and the second late in 1943. Merritt immediately began a new and progressive dimension in analytical chemistry through the enthusiastic but careful introduction of instrumental methods of analysis, and in creating a recognition of opportunities for fruitful research in this area of chemistry. Campaigne soon began to provide masterful guidance and enthusiasm in making medicinal chemistry important in the department. His focus was on thiophenes and other organic sulfur compounds.

Also, early in Shriner’s second year two members of the faculty, R. J. Hartman and E. W. Kanning, left to continue their careers together, but in industrial chemistry. They had been together in the department since they entered as students in 1924. From 1942 to 1945 they were with the Dow Chemical Company at Midland. For the next three years they were with the Arco Company in Cleveland, the first as the director of the industrial division and the second as director of research. Information regarding their progress faded away sometime after they formed their own company, Kanartec Coatings, Inc. in 1948.

Budgetary Enhancements

The problem of strengthening the faculty and attracting more promising graduate students was of course greatly dependent on budgetary resources and policies concerning salaries and stipends, especially at the beginning of Shriner’s chairmanship. An example of this is reflected in a brief memo of 14 October 1941 to Shriner from W. G. Biddle, Secretary of the Executive Committee. It reported that approval had been given
"...for permission to use up to $810 of the $2,000 allotted in the Department of Chemistry budget for a new instructor, to employ an additional storesroom helper from October 1, 1941 to June 30, 1942, at a salary of $85.00 to $90.00 per month."

It was added that "This approval was given for the year 1941-42 only."

Another example of marked budgetary limitations both for the department and the university administration comes from the exchange that occurred between responsible officers and Shriner in dealing with urgent departmental funding needs that were clearly in excess of the budgetary allotment. On 31 October, which was early in the fiscal year, Shriner presented Dean Stout with a detailed analysis of problems concerning the depletion of funding for Supplies and Expenses, Capital, and Repairs. He showed that it was urgent to have $1500 added to the chemistry budget for S&E and that in the stringent circumstances a little could be transferred to it from the repairs category. A supporting paragraph and the summary of specific needs are illuminating:

"The requisitions in process amount to about $258.00. These are chiefly items for the teaching of biochemistry. Investigation has disclosed that the necessary chemicals for organic chemistry (Chemistry 207) were not ordered. These amount to $350.00. No steam cones are in the Department and these should be made in the University shops.

"The estimated cost for this year is $105.00. In order to protect the students in certain laboratories, we should install five fire extinguishers. Estimated cost, $56.00.

"Hence, the following represents the money needed to carry on the teaching and instructional work for the next eight months.

<table>
<thead>
<tr>
<th>Current running expenses</th>
<th>844.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requisitions in Progress</td>
<td>258.00</td>
</tr>
<tr>
<td>(For Biochemistry)</td>
<td></td>
</tr>
<tr>
<td>Chemicals (For Chem. 207)</td>
<td>350.00</td>
</tr>
<tr>
<td>Steam cones</td>
<td>105.00</td>
</tr>
<tr>
<td>Fire Extinguishers</td>
<td>56.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1613.00</strong></td>
</tr>
</tbody>
</table>

The request was granted two weeks later. In the exchange of letters prior to the action, Dean Stout expressed to President Wells his belief that the need for this budgetary adjustment should have been known by all concerned when the earlier request was made for a transfer that would permit the employment of an additional person for the storeroom. He did add that he was "proud of both of them" (Shriner and the depart-
ment). He also added "I think we shall have to look to Dean Briscoe especially for his help."

Further insight on the transition from impoverishment of teaching and research to respectability is revealed in Shriner's letter of 6 November to President Wells. He thanked the president for placing "an additional $1500 on the agenda for the next meeting of the Board of Trustees." He explained that much of the problem

"...during the past two months has been due in part to the necessity of obtaining many common chemicals and pieces of apparatus needed by our new instructors..."

The new faculty members were quite aware of the better teaching programs and resources in some of the major universities and each strongly desired to have modern experiments and apparatus in this department.

Shriner frequently, but reasonably informed the university administration of the comparatively low standing of chemistry faculty and graduate students here in salaries and stipends. All concerned knew about it. The problem was to move forward as effectively as possible. An example is in his letter of 8 April 1943 to President Wells, in support of his second annual budgetary request. The request, in duplicate, for 1943-44 was submitted to Dean F. Payne who was serving temporarily as dean of the College of Arts and Sciences. The dean also received a copy of the letter to the president.

The letter pointed out that during the two years since he had come to the university and several new appointments had been made

"...the demand for chemists has increased with the result that the salaries of our instructors are far below those which are being paid by other research institutions, by the government research laboratories, and by many of the universities whose chemistry departments have a high standing."

The requests made in the proposed budget realistically were less than necessary to bring our salary scale to a par with those in various high standing institutions. In his characteristic way he wrote:

"However I believe that if we can grant the increase recommended that the men will feel that the university really recognizes all that they have done during the past two years. It is really the work of these new men which has made it possible for us to meet the standards of the ACS."
In response to an inquiry the president had made regarding adjustments for changes in the cost of living he suggested that

"An increase of approximately 20 to 25% should be made on salaries below $1500 (non-academic staff), about 20% on salaries from $1500 to $2000. On salaries ranging from $2000 to $3000 about 20% increase would do much ... On salaries between $3000 and $4000 about a 15% increase and from $4000 to $5000 about 5% increase. No increase is necessary for members of the staff receiving $5000 or more."

This response represents well the chairman’s thinking on the determination of appropriate salary levels. It is significant that on this and other occasions he recommended nothing additionally for himself, except as might be necessary to reflect favorably to others the stature of the department and the university.

Shriner’s views concerning the stipends for graduate students were consistent with those regarding faculty and non-academic employees. In the proposed budget for 1943-44 the stipends for assistants without experience were $350 per semester and $400 for those with two or more semesters of experience. During that time and throughout the war period the university had three full semesters per year to accelerate the academic work.

A few months after Shriner came to the department he proposed to President Wells that remission of fees for graduate assistants as well as higher stipends, would help resolve the pressing problem of providing teaching assistance at the introductory levels. Robert Ittner, at that time assistant to President Wells, became actively involved in the problem. In part at least through Ittner, the change in pay rates for graduate assistants was approved.

MACHINE SHOP AND GLASSBLOWING RESOURCES

Another critical area for development was in machine shop and glassblowing resources. In 1941 there were literally no facilities and no personnel in the department to enable the construction or significant modification of laboratory equipment. Only the simplest of glassblowing equipment existed and only one staff member (R. Harding) had any capability in constructing or repairing glass apparatus.

The Physics Department, in its upsurge and the development of its first cyclotron, had developed good machine shop facilities. The spirit of cooperation existed but it was not feasible for any chemistry personnel to work in the physics shop and not much needed machine work for chemistry could be handled satisfactorily by the machinists in that shop.
Again, the standards of the American Chemical Society for accreditation played a part in providing machine shop and glassblowing resources. In 1942 and at all other times the ACS specified that “Adequate shop facilities must be available.” Action was started at once by the department to correct this deficiency but owing to the lack of resources the beginning was very modest.

The first “machine shop” was created, late in 1941, by taking over a modest size classroom (R. 136) at the east end of the first (ground) floor. Only the chairs were removed. Much of the task of building work benches, shelves, racks, and installing supplies and equipment was furnished voluntarily by faculty and students. Hand tools and even a few articles such as a small home workshop-type of lathe were purchased at Sears Roebuck or related suppliers of earnest amateurs. Both metal working and wood working were provided for in the simplest way possible. There was no means for special ventilation and a trained machinist was not to be employed until fall 1947. The room and the facilities were to be used by authorized students and faculty on an honor system. It worked surprisingly well until better resources could be provided and more sophisticated needs made better facilities imperative. Correspondingly with such resources continuous supervision was necessary.

CHEMISTRY LIBRARY

The ACS accreditation standards in 1942 also specified that “The (chemistry) library must include the leading scientific journals.” Even at that time the department fully satisfied this requirement, as it was generally interpreted by the ACS, but from a research point of view there were large deficiencies. To have a university department strong in diverse areas of research as well as in teaching it was imperative to correct the deficiencies and diligently move toward excellence in library resources.

Briscoe was a constant and effective supporter of actions to improve the chemistry library. In a review of progress in the department by Professor C. Sanders in 1940 (Ind. Alumni Magazine, January 1940), Sanders was proudly informed by Briscoe that:

“Since 1937 the following important journals have been added: The Analyst (43 volumes), Chemical Age, Journal of Chemical Physics, Journal of Organic Chemistry, Kolloid Beihefte, Kolloid Zeitschrift, Liebig’s Annalen der Chemie (536 volumes), Mikrochemie, and the Transactions of the Faraday Society.”

Also, during that period some gaps were filled up in sets of journals already in the library.

By the time Shriner had arrived in late summer 1941 the chemistry library had been expanded to occupy the space vacated in moving the
offices for the department and the chairman to the second (now first) floor. This was to accommodate the bacteriology collection for that developing department and to meet the growing needs of chemistry. The offices were located in some of the space given up by the English Department when it moved to another building (now Lindley Hall) in 1940.

One of the actions to which Shriner gave special attention was the further development of the library. He soon appointed a faculty committee to guide the improvements. I chaired the committee. This was my first committee assignment at IU.

An immediate problem was to assess the appropriateness of the location of chemical resources in the different libraries on campus. This need was felt for bacteriology as well as chemistry. For example, at that time the *Biochemical Journal* was located in the main library. Obviously it was primarily needed in the chemistry library. At that time the journal subscription was paid for on a sharing basis by four departments: Anatomy, Home Economics, Physiology, and Zoology. One of my duties was to secure the approval of all for the transfer, but on the basis that the total cost would be charged to the library appropriation for chemistry. This was done. On 19 December 1941 I was able to write, in part, the following to Shriner:

"In accordance with your request I have contacted Dr. Kime of Anatomy, Dr. Harmon of Physiology, Dr. Geiger of Home Economics and Dean Payne of Zoology .... Each ... has approved the plan and agree to the transfer, provided that the Chemistry Department will assume the full cost of continuing the subscription...."

In requesting approval for this transfer my letters included the following:

"At present the Chemistry Library contains full sets of the *Journal of Biological Chemistry* and the *Zeitschrift für physiologische Chemie*. Last spring we secured all of the *Biochemische Zeitschrift* up to and including 1932. It is hoped that the remaining volumes of this set can be obtained as soon as the world situation permits."

As reported by Lyons in his *History of Chemistry at Indiana University* (p. 30), in 1931, the chemistry library contained only 2,044 volumes. This included 36 periodicals and multi-volume treatises, only 19 of which were complete sets.

A marked increase in acquisitions required more space or shelving and it increased the number of library users. Such increases required concerned action. This is illustrated in a letter by Shriner to Dean Payne
(Arts and Sciences) on 4 June 1943. In connection with other requests he stated:

"We also wish to start work in remodeling our Chemistry Library...

He pointed out that they included the incorporation of room 104 into the library and he

"would like to take care of these changes from the unused money in the present year's budget."

Room 104 had been Professor O. W Brown's office. Owing to his retirement he was preparing to move his office into his adjacent laboratory.

Even after the enrichment period from about 1937 to 1943 the number of volumes was only 6,271. Ten years later this number had gone to 13,445 bound volumes and 351 periodicals were being received regularly (Lowell, Indiana University Libraries, 1829-1942, Chicago 1957).

From the time the library and all the rest of the department were moved to the new building in 1931 until summer 1941 the departmental secretary served also as chemistry librarian. She had some help from part-time student assistants. For several years in the late 1930s and early 1940s this was made possible through the National Youth Administration program. To economize on the use of funds the small library was locked during evenings and holidays. Illustrative of the diligence of the student help, within a few days after I joined the faculty I was using the library near the posted closing time of 5 PM. The student attendant, Walter Raczynski, not knowing my connection with the department, kindly informed me that I would have to leave. I had not yet received a library key so I prepared to accept the order. In the brief discussion he learned that I was the new faculty member. He then broke the regulation by letting me stay even though we were both in technical violation. Raczynski received a PhD degree after three years. As far as I know he has always led an exemplary and productive life.

After my second year as chairman of the chemistry library committee I included the following in my annual faculty report for 1942-43:

"Much time has been spent in surveying the library needs of the Chemistry Department and the role that this library might play in strengthening the work of other departments of the university. Several recommendations have been made. The work has required almost daily attention to the problems of the library because decisions
have to be made concerning library management, book purchases, and other library affairs."

In the annual report for the following year I wrote that

``Considerable time has been spent in surveying the library needs ... and in consulting with the departmental librarian ...``

Major changes in 1941-42 were the assumption of further responsibility by the university library system for the administration and budgetary control of the library as a branch of the system and the appointment of the first full time chemistry-bacteriology librarian. This was Mary Olive Ballou. The development of the emerging Department of Bacteriology with its growing library needs made this action imperative. After a year Ballou left and Mrs. Ruby L. Reavis took her place for the year 1942-43. She was followed by Miss Norma Johnson, the first to have a degree in library science. After a year she returned to Minnesota, her home state, where she became an industrial librarian. From 1944 to 1946 the position was held by Miss Jewell Maurice who, like subsequent chemistry librarians, had a degree in library science. She also left to become an industrial librarian. The successor was Carl Kretzschmar who served from 1946 to 1950. He then transferred as librarian to the library of the School of Medicine at Indianapolis. Albrecht M. Kronenberger served from 1950 until his death in 1958. In addition to his recently acquired degree in library science he held the degree, Doctor Juris, which he had received at the University of Würzburg in Germany before World War II.

During these approximately fifteen years of management of the chemistry library by professional librarians and general monitoring by rotating chemistry committees, the library indeed became progressively improved. By this time it was always referred to with pride.

**Curricular Changes**

The exigencies of involvement in World War II and the concurrent extensive strengthening of teaching and research in the department are exemplified in a four-page letter plus a detailed revision of the graduate program written by Shriner to Dean Payne. The letter and attachment were dated August 16, 1943. Four days later Shriner sent a copy of the letter and a summary of the proposed revision to President Wells. On 2 December he wrote again to the president thanking him for his response and stating that Dean Payne "felt that the changes recommended should be approved by the Graduate Council or staff." The president's response stated
“I wish to commend the exhaustive nature of the report and the spirit which prompted it.”

The two major points of the letter were:

1. Revision of the content of our courses in order to bring them up to date.
2. Revision of the graduate program of study

It was pointed out that selective changes in the chemistry faculty

“...have permitted us to make changes in the content of courses so that most of them are now up to date and compare favorably with similar courses offered at other universities.”

The letter stated that in dealing with this problem a survey was made of 23 well recognized departments. The findings were used to plan the new program at Indiana University. The principal changes included the relinquishing of much more of the control, planning, and direction of individual graduate students programs to the Department of Chemistry. More emphasis was placed on the critical evaluation of ability and promise during the first year or two of graduate work, and the termination of students at the master’s degree level — or before — when there were doubts that they should proceed toward a doctorate degree. Emphasis was placed on taking comprehensive written examinations in the major and first minor subjects. It was pointed out that

“This enables a student to do most of his studying for his courses during the first two years and permits him to concentrate on his research problem and major field the last year of his graduate study.”

The striking deviation from the prevailing graduate school requirements was the allowance of the student in chemistry to limit all the graduate work to chemistry when that met with departmental approval. It was emphasized that

“This recommendation is in line with the developments of graduate programs at most of the other outstanding graduate schools.”

It was further stated that

“The second minor is relegated to a very subordinate position in the student’s program and is to serve only as a source of useful information related to the student’s field of research.”
This strongly emphasized part of the proposed changes was finally but reluctantly conceded by Payne, but only with doubts and on the basis that it was limited to the Department of Chemistry.

Among other recommendations one was not approved. This concerned the appointment of "Only one committee ... the Final Examination Committee." The understandably persistent move by Shriner and others to enhance the department's role in regulating graduate work in chemistry was worrisome to Payne. For good reason he had held a tight reign on this department and all others because that seemed necessary during much of his earlier tenure as dean. He had higher standards than those prevailing in some of the departments, thus making him slow to allow greater control at the departmental level. The misgivings between Payne and Shriner began to grow. It was probably a contributing factor in Shriner's decision in 1946 to leave the university.

Another measure of the salutary changes in graduate work during the Shriner years is shown in the teaching of chemistry. Owing to the selective increase in the number of chemistry faculty more specialization in important courses became possible. The listing of courses and chemistry faculty in the Graduate School catalogs for 1942 and 1944 are illuminating.

The following courses in 1942 were not listed in 1944:
224. Advanced Electrochemistry and Electrometallurgy.
229. Storage Batteries.
313. Seminar: Physical Chemistry and Electrochemistry.

Those that were changed in title and content were:
307. Seminar: Physical and Colloid Chemistry. The change was the dropping of "and Colloid."
308. Seminar: Analytical and Physical Chemistry. In dropping "and Physical" this contributed to the beginning of analytical chemistry as a strong field of specialization.
321. Electrochemistry of Solutions. This was changed to "Recent Developments in Analytical Chemistry."

The courses identified as Chemical Engineering (226a, 226b, 228) in 1942 became Industrial Chemistry in 1944.

The only strictly new course in 1944 was:
210. Selected Topics in Biological Chemistry.

The description stated that "The lectures deal with methods of isolation, assay and biological function of vitamins and hormones."

This course was first taught by Day and Thomas. Later Campagne replaced Thomas.

**THE ARMY SPECIALIZED TRAINING PROGRAM (ASTP)**

As reported by the IDS on 2 June 1943 that day marked the arrival of 206 army enlisted men for specialized training. More were to come. Ten days later (Saturday) a headline in the IDS stated in bold type:
ASTP Men to Begin Training Monday: Soldier-Students will Number Over 400.

Because many of the men were to take special courses in chemistry rapid adjustments had to be made to meet their needs. A letter by Shriner to Payne on 4 June indicates some aspects of the problem. Because newly appointed L. E. Marchi was delayed about eight months in joining the faculty the salaries and wages line in the 1942-43 budget had “a balance unallotted of about $1600.00.” The letter requested a transfer of $1000.00 to supplies and expenses because additional supplies and a revamping of lockers in Laboratory 307 were evidently necessary

“so that we can put sections of the (Army Specialized Training) students in Program II in this Laboratory.”

As usual this proposal had been discussed with Briscoe.

E. E. Campagne was the only faculty member who was appointed specifically to participate in teaching the soldiers. He came hurriedly from his appointment of 15 months in the new M. D. Anderson Hospital then at Galveston, Texas, and arrived here the first of October 1943. Although the appointment was temporary and the ASTP program proved to last only a few months, Campagne quickly gained the confidence of the department and university. Soon he was reappointed and he stayed for life.

Marchi finally arrived from Ohio State University and he began to participate in the ASTP work. Soon he was called into a top secret military chemical research project at Oak Ridge, Tennessee. After the War ended it turned out that the large project was atomic bomb research. On accepting the special assignment he was granted a leave of absence. After the ending of the war he left the laboratories of Oak Ridge and worked in industrial chemistry.

The following excerpt from my letter of 28 November 1943 to one of my former students is reflective of the effect of the War on thinking and activities on campus:

“Although I have the status of a civilian I might just as well be in uniform if work for the army means anything. Our campus is practically an army camp, or I should say military camp because we have lots of navy people there as well as army personnel. There are over 2000 ASTP men here and over 1000 WAVES (Women Accepted for Volunteer Emergency Service). In addition the medical and dental school enrollment is largely army and navy. This semester I am giving my dental biochemistry course. There are 53 enrolled. Most of them are in army or navy uniform. Starting December 13th I will begin a 12 week shift teaching Chemistry AST-205 (General Chemistry
for ASTP). That will involve giving a lecture at 11 every Mon, Wed, and Fri. There will be no Christmas vacation except for Christmas day. Seven other members of the chemistry staff will be teaching AST chemistry.”

During the war years the printed forms on which the faculty made their annual reports contained a page labeled Public Service Directly Connected With the War Effort. In my report for 1943-44 a copy shows that I wrote the following in June 1944:

“Taught sections (27-30 men in each) of AST Chemistry 205 from about Dec. 15, 1943 to March 1, 1944. This involved 3 lectures per week plus 2-4 hours of counseling each week. My regular teaching load plus research was carried on also. The latter was, of course, curtailed.”

In spite of extra teaching nearly all the chemistry faculty members devoted as much time as possible to research. That year I published four papers. All the work in those papers had been done before the beginning of the AST teaching. In 1944-45 there were three papers and most of the work was being done during the months of my involvement with the AST program.

To maximize efficiency in teaching chemistry to the soldiers it was decided that a laboratory manual specifically designed for the purpose was necessary. Nine members of the faculty were to be involved in such teaching. All participated in the crash planning and writing effort. They were J. H. Billman, E. E. Campagne, H. G. Day, J. H. Jones, C. E. Kaslow, L. E. Marchi, L. L. Merritt, Jr., Elijah Swift, Jr., and D. G. Thomas. All had joined the faculty during the previous four years.

Illustrative of the speedy action involved in planning, writing, and printing the special manual and accompanying notebook, the first action began on 10 November 1943, when Billman, acting for the group, wrote to Edwards Brothers, Inc. at Ann Arbor, Michigan. They were well respected lithoprinters and publishers. Arrangements were quickly made for the company to prepare and deliver up to 1000 copies by the time the course was to start in the middle of December. The manual-notebook, in two separately bound books, was to be planned, written, and delivered in manuscript form before the end of November. Progress was phenomenal. On 1 December the company notified Billman that the last of the master copy had been prepared and was being sent by express for proofreading. The manuals and notebooks, 640 copies of each, arrived on time for use in the new course.

The IU Bookstore handled the books. On 10 December the Office of the Coordinator of War Service Programs at IU, headed by Dean B. C.
Gavit, authorized purchase of the new AST manuals and agreed that the surplus of books not issued to soldiers in the course could be sold to civilians.

The arrangements provided for the bookstore to issue books for the soldiers under the AST contract and pay the printers for printing and transportation charges. It allowed the sale of such books to civilians. The printing charges were to include copyrighting costs and a modest amount of royalty to the nine faculty members. The bookstore was billed at $1.90 per manual-notebook combination less 20%. Billman and Day acted for the authors of the manuals and notebooks. Later, on 9 May 1944, it was agreed by the authors that royalty income should be handled through a checking account at the Bloomington First National Bank and that the account should be in the names of Day and Merritt.

In February 1944 it was apparent that in the continuation of the AST Program more books would be needed. The bookstore ordered 450 copies each of notebooks and manuals. Soon thereafter, but after the printing had been done, the AST Program was ordered to be discontinued effective 1 March 1944. The soldiers were sent abroad and many participated in the great D-day which soon started the Allied invasion of Europe. The AST soldiers helped liberate Europe from the enemy and in doing so some lost their lives.

The bookstore and the authors were left with a great surplus of books. Many were sold for civilian use. In the termination of this small part of the program a little royalty from the sales had to be distributed. This amounted to $45.79 for each of the authors.

The problem of teaching chemistry to a quickly assembled and massive body of young men under war-time tensions was tremendous. Some had completed several chemistry courses in college and many had pretty limited knowledge of the subject. Moreover, the soldiers were highly regimented and they were exceedingly overcrowded in the dormitories that served as living quarters. Nevertheless there was good interest in learning.

The special books were designed for use following the work in AST-205 in which lecture demonstrations were given as a substitute for individual laboratory work. As stated in the preface of the manual, the experiments were selected and arranged to illustrate the principles of chemistry and to provide a study of the common elements and their compounds taken up during the lecture periods. Under the constraints of two-hour laboratory periods, prescribed by the AST Program, and the large number of students involved, it was necessary to have multiple sections assigned to the same laboratory. The experiments were planned to be completed in one period, thus permitting the following user of each desk and locker to have all the equipment and supplies needed.
After the first five experiments, which were designed to introduce essential principles, most of the remaining 23 experiments were focused on a study of common elements and their compounds. Each experiment was preceded with appropriate descriptive information. One of the striking aspects of the program was the remarkable sense of cooperation that prevailed between the hard working soldier-students and the faculty. It was a memorable but short-lived event.

**The War and Research in the Department**

One of the notable aspects of Shriner’s move to the department was the talent and resourcefulness of the graduate students who transferred with him from the University of Illinois. They became quickly assimilated and in doing so favorably influenced the attitudes and quality of work throughout the department. Also other promising students were soon attracted in the years that followed. This telling effect, which never waned, was noted unequivocally from time to time by President Wells. It was succinctly expressed in his autobiography in 1980:

> "Under the leadership of Ralph Shriner and Frank Gucker, the chemistry research program blossomed and attracted scholars throughout the world."

A specific sign of increasing bonding between the department and national leadership in science was a request for research participation from the newly formed U.S. Office of Scientific Research and Development.

In identically the same letters, one to President Wells and one to Dean Briscoe, on 20 October 1941 Shriner reported that

> "A research project is to be set up and a definite contract entered into between the University of Indiana (sic) and the Office of Scientific Research and Development."

Preliminary information on a special budget was given if a "contract is approved." The approaching pattern concerning much of the arrangements for contracts under OSRD sponsorship was shown in the closing sentence of the letter:

> "It is requested that no publicity be given to this work."

Later it was revealed that the project was concerned with the synthesis of compounds important in the development of RDX explosives. Action was rapid. As shown in Shriner’s letter of 8 January 1942 to Mr. Biddle a contract was agreed to which
"...calls for the payment of $8000.00 to Indiana University for the period commencing November 1, 1941, and ending October 31, 1942. It provided for the following:

(a) Salary of assistant, Dr. Martin E. Synerholm, $3000.00
(b) Overhead to be used for the purchase of special apparatus and equipment by the Department of Chemistry, $1500.00
(c) General supplies and expenses of any type, $1000.00
(d) Special fund for summer work, $2500.00.

This contract broke new ground for the department. It marked the beginning of governmental grants in support of research. Also, the newness included the provision of overhead support. This was the second postdoctoral research appointment, the first being to R. D. Blue who received his PhD degree in 1932 under the direction of Mathers. The award, in 1932, was from a research grant to Mathers from the Electrochemical Society for the continuation of work by the young Dr. Blue.

As stated by W. G. Biddle, Comptroller (12 January 1942), the new OSRD grant was

"to take care of confidential research problems being carried on by the Chemistry Department."

Within a year another area of war-related research was started through Shriner with participation by J. H. Billman and D. G. Thomas. As pointed out in a letter of 1 February 1943 from Shriner to President Wells, he was a member of a panel of the National Research Council dealing with the chemistry of antimalarials. The NRC had requested assistance from the departments of chemistry at certain universities. The department at Indiana was invited to

"...cooperate with them in the synthesis of compounds to be tested as antimalarials."

This area of research was continued for the duration of the war.

In January 1946 IU was named as one of the universities which constructively participated in the studies to combat malaria. That month the IDS reported in a major article on the research at IU. Other universities participating in the cooperative chemical research were Minnesota, Illinois, Missouri, and Northwestern. Shriner directed and coordinated the research in these five institutions. The announcement was released by the National Board for the Coordination of Malarial Studies.

Graduate students and faculty at IU who received certificates of merit for their research work were: J. H. Billman, D. G. Thomas, D. K. Barnes, G. E. Ham, N. J. Kartinos, J. W. Nemec, R. R. Otter, J. M.
Robinson, G. H. Schrotenboer, and P. Trix. Elizabeth S. Cleland, wife of Professor Cleland in Botany, worked as a volunteer under the supervision of Billman. She also received a certificate.

Throughout his five years on the faculty here Shriner was notably diffident about salary matters for himself. He came to Indiana University at the rate of $7000 for the year. Owing to the attraction of research support from governmental agencies a portion of this was soon being paid for such support. This saved some of the general fund for other needs. For example, the budgeted salary for Shriner in 1943-44 was $7,000, with $4,900 from Indiana University and $2,100 "from U.S. Government" (Wells to Shriner 28 June 1943).

Shriner was meticulous in adhering to the terms concerning salaries. For example, on 17 May 1945 he wrote to J. W. Hicks in the Office of Vice President and Treasurer to remind him that:

"...for the months of May and June 30% of my salary is to be paid from the Malaria Contract OEMcmr-298..."

The World War and the various research grants attracted to the department produced various kinds of new administrative problems. At that time the chairman of chemistry had relatively little administrative assistance, but Shriner dealt with such matters as thoroughly as he prepared his classroom lectures or a research article. As an example, early in the war a Victory Tax was initiated and some of the graduate students were subject to the tax. On 18 September 1943 Shriner wrote to Mr. Hicks asking whether any of the four graduate students with research fellowships (Ham, Marshall, Proehl, and Robinson) should have victory tax deductions entered on the pay vouchers. On the basis that they were not performing services for the university it was ruled that the fellowships were gifts and a tax should not be assessed.

**Attraction and Use of New Research Grants**

Some of the younger chemistry faculty took steps to attract grants in support of research. This was strongly encouraged by Dean Payne and Dean Briscoe even before Shriner came to the department. My first grant, in addition to small grants-in-aid from the Graduate School, was from the American Medical Association.

On 15 January 1941 I submitted an application for $400 to continue my research on the nutritional significance of zinc. This had been successfully started while I was at Johns Hopkins University. Within two weeks the application was granted exactly as requested. The grant was used for chemicals and special equipment which the meager departmental resources could not adequately supply.
The new support facilitated the research of one of my first graduate students at Indiana University, B. Skidmore. She received an AM degree in 1942. Her research was an extension of my work at Johns Hopkins on the production and study of extreme zinc deficiency in the rat. The research was the first to establish the essentiality of zinc in the mouse and it showed some of the effects of zinc deficiency on catalase activity in the tissues. Owing to World War II and the impossibility of continuing some of the planned studies with a colleague in Baltimore, Dr. Richard Follis, the research was discontinued and the findings from completed experiments were published.

My first graduate student at this university to receive a doctoral degree was Phil H. Hidy whose degree was granted in 1944. The research was on a new problem concerning the enzymatic synthesis of polysaccharides from glucose-1-phosphate. At that time the very limited biochemical laboratory facilities had more promise of meeting our needs than in the study of the essentiality of trace inorganic elements such as zinc. Also, the problems concerning polysaccharides were challenging and promising to graduate students. An important factor was the awarding of a research grant to Shriner and me by the Corn Industries Research Foundation for basic research on polysaccharides. This was made possible owing to Shriner’s excellent reputation and the interest of the Foundation in supporting his efforts to strengthen the Department of Chemistry. The young Hidy was awarded a fellowship early in 1942-43. He had already completed a master’s degree in organic chemistry under J. H. Billman.

Hidy’s first publication with me was a preliminary report in the *Journal of Biological Chemistry* in February 1944. The definitive report was published in March 1945, in the same journal. Unfortunately for the research, war pressures required Hidy to accept either suitable employment or military service. In August 1943 he was appointed to the faculty of the new School of Medicine at Baylor University. Fortunately he was able to continue necessary aspects of the IU research at Baylor. Thus his doctoral work was completed in absentia. The exigencies of the war produced many such circumstances.

At that time the prevailing policy of draft boards was to exempt young men from the draft if they were productively engaged in certain areas of education—as students or faculty or in essential non-educational employment. Hidy, like many other draft age men, met deferment standards. His situation and that of many others in chemistry then is exemplified in the following excerpt from a letter I wrote on 23 June 1943 to the acting chairman of the Department of Biochemistry at Baylor:

"In the event that you should decide to offer Mr. Hidy an appointment I believe you should immediately inform his local draft board of your action, stating that his duties would be essential in the
training of physicians in accordance with the classification listed in Activity and Occupational Bulletin No. 33-5."

Other aspects of the phosphorylase problem in 1943 were investigated through the appointment of Elsa C. Proehl to the fellowship Hidy vacated in going to Baylor. Arrangements for Miss Proehl to come from the University of Illinois had been completed while Hidy was still at IU. She had been highly recommended by some of Shriner’s colleagues at Illinois. Her work here was productive, but owing to her plans to enter medical school after completing an AM degree she accepted industrial employment following the completion of the master’s work in 1945. This interim employment was to accumulate funding for medical school expenses. Later she completed an MD degree at the University of Minnesota.

The initial public news of the research support from the Corn Industries Research Foundation was reported by the IDS 16 September 1942. The first recipients of fellowships were P. Hidy, under my direction, Wm. LeSuer under the direction of J. H. Billman, and R. Otter under the direction of Shriner. The CIRF support was continued into the early 1950s. Joseph C. Leal held the fellowship in 1950, but by that time the research had turned to a study of the metabolic utilization of starch fractions and dextrins.

An aspect of particular interest in the CIRF program was the annual “Starch Round Table” held at different inviting places for several years. The first I attended, with Shriner, was at the commodious French Lick Hotel in 1943. Approximately 50 scientists from industrial and governmental laboratories, and universities in the United States and Canada attended. The seminars and discussions concerned polysaccharide chemistry and technology. It was most stimulating.

I attended the 1944 meeting held at Lake George, New York and the 1945 meeting at Nippersink, Wisconsin. Other meetings with the group were in 1948 at the fabulous Greenbrier Hotel, White Sulphur Springs, West Virginia, and in 1949 at a pleasant retreat near New Haven, Connecticut. Approximately seventy academic and industrial scientists were present at each of the latter meetings. The fellowship program here had been discontinued, but for some reason my presence at the round table meetings was desired. All the meetings had great value in promoting knowledge and understanding. I did not attend other meetings after 1949.

The same issue of the IDS that announced the first grant from CIRF continued news that in 1942 the grant from the Eli Lilly Company had been renewed and doubled to make possible the appointment of four Eli Lilly fellows. Two, J. L. Rendell and H. D. Marshall, were to be under the direction of J. H. Billman. The other two, J. M. Robinson and G. E. Ham, were to be directed by Shriner.
Also, in that issue (IDS 16 September 1942) the campus learned that the Smith, Kline and French Company had awarded fellowship support and that the recipient was C. H. Tilford.

The World War II years heightened the interests of some industries, especially the Seagram Company, in the greater utilization of fermentation processes for the production of new or improved food products, fuels, and other chemurgic materials. Fred Willkie (AB’12), for some time president of Seagrams and brother of Wendell Willkie, had high expectations that a cooperative arrangement in this area between his company and certain departments at IU would be mutually beneficial.

One of the first steps in developing the arrangement was a dinner held at the Union Building on 5 June 1942. This was requested by Fred Willkie and his brother Robert and it was organized by George F. Heighway, Secretary of the Indiana University Foundation. The Willkies were accompanied by several members of their research staff, including the director of research, Dr. Paul J. Kolachov. Several members of the faculty at IU attended. The possibility of cooperating in basic research was the focus of the serious conversation. Through Fred Willkie’s influence and that of some of the other administrators at Seagrams a proposal was made to IU to support two or three of their laboratory employees as graduate students in chemistry or related departments while on leave from the company to earn degrees at IU. The graduate research would be on basic subjects of interest to Seagrams, but there would be no restrictions on publication of the research.

Shriner in this department and Paul Harmon in the Department of Physiology were the local expediters of the program. The Seagram employee, Helen Merriam, came to this department in September 1944 and worked toward an AM degree under my direction. At the same time Max Brockmann entered Harmon’s department and started his doctoral work under T. J. B. Stier’s direction. Merriam received her degree in 1946 and Brockmann’s degree was in 1947. Merriam’s ambitious project was to learn how to make the amylases of cereal grains active in converting starches into fermentable sugars without utilizing the typical malting (germination) process. Some progress was made but not in the degree desired.

At the same time the Seagram Company was supporting research in the department, a small and independent producer of seed oils, the VioBin Corporation, asked me to accept a grant and conduct studies on the nutritional value of sunflower seed meal. I discussed this with Shriner who encouraged me to go ahead. At that time the facilities for the use of experimental animals were still exceedingly inadequate, but the owner of the company, Ezra Levin, was willing to trust my judgment. The grant supported the payment for all the necessary animals, supplies, and wages for students who helped. At the time little was known about the nutri-
tional qualities of sunflower seed meal. Through a type of biological assay procedure it was shown that the meal was superior to wheat germ, corn germ, and soybean meal as a non-animal protein supplement and that this was probably due to a higher concentration of lysine. Our first publication of the findings appeared in *Science*, in April 1945. Based on some tests in using sunflower seed meal as an enrichment supplement in baked goods the publication suggested that the meal could be a palatable human food supplement.

Naturally this stimulated nationwide media attention and some commercial interest. The IDS got into the discussion editorially. On 8 June 1945 in a three paragraph editorial it was concluded from the Day and Levin work:

"This is another example of the work of scientists to improve our daily living by adding nutritious new products to our present stock of food."

A year after the beginning of this surge of interest, in 1946, Avis Rector worked assiduously in the laboratories of chemistry and bacteriology during her summer vacation from teaching high school chemistry. The entire effort was on the microbiological assay of sunflower seed meal and related seed meals for two vitamins, nicotinic acid and pantothenic acid. This added to the interest in this relatively new foodstuff. Her work was published that year in the *Proceedings of the Society for Experimental Biology and Medicine*.

**MANPOWER DISTRIBUTION PROBLEMS AND EQUIPMENT AND SUPPLIES SHORTAGES**

Throughout the war the problems of meeting the military and industrial manpower needs were worrisome to all. In addition there were pressing academic needs concerning new research obligations and opportunities, a diversity of students to be taught, persistent problems in procuring necessary equipment and supplies, and an urgent need to strengthen resources in general. Besides these concerns there were mounting uncertainties regarding the draft status of the civilian male students.

One of the most trusted sources of information and advice was Briscoe. Also, for chemistry students the American Chemical Society was a constant and positive resource. Soon after this country entered the war the ACS became a source of information and sound advice on the issues of enlisting, being drafted for military service, or remaining in school long enough to become trained for professional work. One notable discussion appeared in the *Journal of Chemical Education*. This was reported in full to the campus by Briscoe in the IDS on 19 February 1942. Paraphrasing the dean it was stated in part:
"Chemistry students are advised that through the Selective Service System they have a chance to be deferred from the draft to complete their training because of the need in the nation's industries for chemists and chemical engineers. Local draft boards have been instructed to give a specially careful consideration to requests for deferment of trained personnel in the necessary industries and students trained for such work."

This principle guided this campus and others with some certainty for approximately two years. By that time the military needs had become pressing but the production of war materiel was proceeding well. Thus the overall need shifted toward a tightening of draft deferments. This occurred at the height of the responsibility for teaching Army Specialized Training personnel. Thus in a letter to P. Hidy (5 February 1944) I stated in part:

"The new regulations concerning draft deferments has us stirred up again. Graduate assistants apparently are going to have to work 15 hours per week instead of 12, and at that there is increasing difficulty to get deferments. Our enrollment in civilian chemistry keeps going down, as far as boys are concerned. About the only civilian boys on campus (other than deferred graduate assistants) are a few 4Fs and pimply adolescents who haven't seen 18 yet. The AST enrollment is high, over 2000. We have about 1200 in chemistry now."

The shifting information and directives on male chemistry students and their draft status continued to keep them unsettled. Finally on 11 April 1944 the IDS reported that "an order today from Washington (had) rescinded their deferments." The persons affected included "Ninety chemistry students and one lone physics student."

In addition to manpower problems there were others. For example air conditioning was highly important in my research requiring the use of experimental animals. At the request of Shriner on 20 May 1942 I wrote to C. J. Black, purchasing agent, asking for information, including cost estimates, on the procurement of a window air conditioner for the only available animal room. Two days later he responded in part:

"I regret to advise that Restriction Order L-381, issued on 15th of May, prohibits the manufacture and restricts orders with the exception of the Army, Navy, and Maritime Commission."

In my response it was pointed out that this did not seem to apply to equipment already in the possession of dealers. Mr. Black responded quickly that the order had been changed and dealers could "sell any equipment which they had on hand." A local dealer had a window unit
which seemed to be an acceptable size. The price was $149.75. Before long the equipment was purchased and installed. This was the first air conditioning for any part of the chemistry building. It was far from perfect, but through this action Mr. Black and others concerned had been instrumental in moving research to a higher level at Indiana University.

The governmental actions to regulate the distribution of innumerable kinds of equipment and supplies during the war years were felt constantly. This resulted in the establishment of different levels of priority. In the requisitioning of laboratory equipment and supplies it was generally necessary to provide information proving to the supplier that the intended use was justified in the wartime economy. In general, uses in chemical laboratories for research or teaching in war-related subjects had higher priority than in various other areas.

For example, when I requisitioned a Waring Blender in 1943-44 for use in some areas of research the order was given to the Central Scientific Company. Before it could fill the order, I had to prepare a letter of justification for the IU Purchasing Department. In turn it had to file the letter with the supplier thus complying with the regulation. A part of my justification included citations from the scientific literature which showed that “Waring Blenders were used in doing the research reported.” (My letter to C. J. Black 18 February 1944).

In another case, among the many that occurred, I had to provide justification for the purchase of powdered milk needed in an experimental ration. As my letter to the Purchasing Department stated,

> “The investigation is part of a program to study the synthesis of essential nutrients by microorganisms in the intestinal tract (of rats).”

At that time the government required the surrendering of ration points for such purchases and estimates of the number of points needed had to be provided. My letter, dated 2 June 1943, estimated that

> “about 40 points will be needed for June, and about 240 for July, August and September.”

**Activities and Interests Because of and in Spite of the War**

In spite of continuing concern with the horrors of war and the myriad aspects of the economy affected by the war many academic and civic events occurred apparently as in peace time. The tempo of teaching, studying, research, social activity, and other normal concerns was reflected in the IDS, as indicated in the following news items:

- On 8 January 1942 Shriner discussed his research on the structure of anthocyanins at the recent organic chemistry symposium of
the ACS meeting at the University of Michigan. Other members of the faculty in attendance included Professors May, Billman, Thomas and Kaslow.

- A month later the IDS reported at length an interview held with the newly appointed Elijah Swift, Jr. whose field was in physical chemistry. In response to a question concerning the university’s new war-time speed-up program, he responded,

  “Except for having to stay down here in the summer and except for getting up for what now amounts to a 7 o’clock class every Saturday morning (there were early classes throughout the week), I think it is a fine program.”

- Dean Briscoe continued to give some time to non-academic concerns on campus. On 12 February 1942 he lectured in Chemistry 200 under the sponsorship of the University Committee on Religion. In reporting his discussion of “The Scientific Approach to Religion” the IDS quoted him as stating “The purpose of science is to explain the ‘what’ and ‘how’ of life” and that “it has neither the technique nor the right to explain the ‘why’.”

- On 19 February AXE sponsored a lecture by J. T. Bryant, head microanalyst of the Eli Lilly Company on the topic “Microchemistry and its Application.” The lecture was preceded by a dinner for members of the department at the Union Building.

- Two months later the IDS named eight members of the faculty who planned to attend the national meeting of the American Chemical Society at Memphis, Tennessee, in April. They were Shriner, Billman, Thomas, Hartman, Day, Kanning, Swift, and Jones. Also, M. E. Synerholm, a postdoctoral worker, and five graduate students attended.

- The impact of the war was seen in the large headline and lengthy report in the IDS on 21 April 1942. It announced that owing to the absence of Dean A. Weimer for military service Briscoe would serve as acting dean of the School of Business.

- The 20 May issue of the IDS named eleven new graduates with AB or BS degrees in chemistry and five with AM or PhD degrees who were taking positions in major industries. It indicated that many of the May graduates were entering the US armed forces.

- On 28 May Day spoke in the Chemistry Auditorium on “Recent Developments in the Chemistry and Physiology of Vitamins.” This was sponsored by the Student Affiliates of the ACS.

- Three weeks later the IDS reported an interview with Shriner which focused on the role of the department in the war effort. He was quoted as stating that “The war against the Axis powers
is placing the greatest emphasis in the history of civilization on the man with the test tube.” Concerning the shortage of chemists at that time Shriner stated that every one of the last month’s graduates had chances at 2 or 3 jobs before he (sic) took his final examinations, and that appeals for men come in daily by telephone, telegraph, and mail.

- A long report in the IDS on 17 July 1942 was headed: Improved Synthetic Rubber Discovered by IU Chemist. The article accurately described the work of W. J. Sparks, ’26, in discovering “a substitute for rubber which can be made more quickly and cheaply than yet known.” The product was described at the time as butyl rubber. In its substantiation of the importance of the research the IDS wrote:

> “Drew Pearson’s syndicated Washington Merry-Go-Round column of July 13 quoted Frank Howard, head of Standard Oil of New Jersey Development Company as declaring Mr. Sparks to be his most valuable man.”

- Three weeks later the IDS reported that another IU graduate, H. F. Willkie, ’12, was much interested in the production of synthetic rubber. As vice president of Joseph E. Seagram and Sons, Inc. he announced to the IDS that the company proposed to make the starting materials from grain products through fermentation processes. However the cost of such production never became low enough to compete with petroleum.

- Further assurance that the appointment of Shriner to the faculty was a signal achievement could be seen in two items reported in the IDS on 14 October 1942. One was the news that he had been elected to the Board of Editors of Chemical Reviews. The other reported that he was one of the editors of a new volume of the prestigious Organic Syntheses which had been released by the publishers.

- The growing recognition of analytical chemistry in the department was emphasized through an address by Prof. G. F. Smith on 1 April 1943. He spoke on “New Reagents in Analytical Chemistry.”

- On 5 October 1943 the IDS reported the death five days before of William Degnan. He had been appointed to the faculty within several days after Briscoe became the chairman in 1938. Remarkably he was the first full time chemistry faculty appointee without prior connections with the university since the selection of T. C. Van Nüys to head chemistry in 1874. Van Nüys resigned
in 1895 owing to advanced tuberculosis, from which he died three years later. Dr. Degnan had been on leave since 1941. Tuberculosis also caused his death.

- The marked increase in chemical research productivity and national academic recognition during the Shriner years was matched by increasing prowess in intramural sports. Reflective of this was the item in the IDS on 17 November 1943 with the heading Chem honorary Wins I-M Final. The story reported in part that PLU:

"...won the 1943 intramural football championship Monday night in a thrilling game with Sigma Chi, social fraternity, which ended in a 13-13 tie and had to be decided by an extra period of yards gained. Both teams scored sporadically as Wittenbraker and LeSuer starred for Sigma Chi and PLU respectively. Scoring was done through aerial channels by both sides and PLU pushed a long pass over to tie the score late in the fourth quarter."

In the overtime play

"PLU was trailing the Sigs until their last down when a long pass connected and the blue ribbon went to the mix-and smell lads."

INTERNATIONAL ASSOCIATES AND STUDENTS

During World War II and before, very few chemists and students from other countries studied in the department; and few IU chemistry students and faculty went abroad. The most notable persons from elsewhere were from China.

Shih-hsien Yang was the first ranking chemist to enter following the end of the war. He arrived in Bloomington in October 1945. Before he had planned to do so he returned to Nankai University in Communist-held Tientsin in the winter of 1946-47. His financial sponsorship here was through the Eli Lilly Company and he devoted much of his time to chemical studies on a natural product from China known to have antimalarial properties. During the war Shriner, under federal support, directed several studies in the synthesis of compounds expected to be antimalarials. Of course during the brief time available he gave direction to Dr. Yang. In a letter from Shriner to me in 1980 he wrote "Rachel (his wife) and I both remember him as a very fine gentleman."

On the campus Yang worked diligently but he conversed freely with others and seemed to greatly appreciate warm acts of kindness. He was surely lonely much of the time. As reported in the IDS early in January 1946, he was the speaker at the January meeting of the Men’s Faculty
Club. The subject was “Experiences of a Teacher in China during the War.” At that time the club’s quarters were on the ground floor of the Memorial Union, with an entrance at the southwest corner.

In May 1946 Yang and three chemistry graduate students were made members of Phi Lambda Upsilon at the annual banquet of the society in Room E of the Memorial Union.

In addition to these friendly actions various members of the faculty were particularly hospitable. Yang was a guest in my home at least twelve times, six of these for dinner or picnic suppers. The first visit was within a month after he came to the university.

The record of Yang’s life is extraordinarily impressive. His principal link with Indiana University was through Dr. K. K. Chen with whom he came to the United States for the first time in 1918. After completing their doctoral training in this country each returned to professional duties in China. Later Chen came back to America. After further study he became a major research scientist at the Eli Lilly Company and Professor of Pharmacology at the IU School of Medicine.

When the war ended Yang was a professor of chemistry and Dean of Science at Nankai University, Tientsin. Soon after he arrived in Bloomington unrest in China rose dramatically. As he wrote to me in April 1979:

“I returned to my university in the winter of 1947 at the earnest request of my colleagues because the situation in North China became very critical ...”

Back at Nankai University he looked after its academic needs as well as possible. After 1949 he became vice president of the university. Other responsibilities came to him in the university and the Academy of Science. In 1957 he was made president. Other national responsibilities were thrust upon him. But the terrible reign of the “Gang of Four” swept over the country in 1966 and prevailed until 1977. During that time he was replaced in the presidency by a non-academic bureaucrat. As Yang stated to me in 1979:

“The eleven years (1966-1977) were the darkest days of our lives and the wreckages (sic) of universities (in China).”

In late 1978 he was reappointed the president. The Gang of Four had been overthrown and the country was beginning a return to far better socio-economic conditions and respect for academic and cultural values.

Before he died in 1985 Yang and President Ryan of IU had made arrangements for a limited level of faculty and student exchanges between Nankai and Indiana Universities.
Yang’s daughter Julie C. Yang was among the first chemistry students from China to take graduate work here following the war. She graduated from Nankai University in July 1949. In making the initial arrangements to leave China and gain admission at IU Miss Yang wrote to me in part on 29 September 1949:

“I left Tientsin recently and arrived in Hong Kong yesterday, so I am following father’s instructions in writing you.”

She received an AM degree here in 1952 and has remained in this country except for occasional brief trips back to China since 1979. A few other fellow Chinese students came to the department soon after the end of World War II. That relationship was slowly renewed beginning in 1979.

Three others in particular who came were Yun-Ti Chen, PhD ’52, and Mr. and Mrs. P. L. Ho who also received PhD's in 1952. All three eventually returned to Nankai University after completing their doctoral work here. The former spent a year in this country in the early 1980s and gave a seminar talk in this department while in the U.S. At about the same time Mrs. Ho was a member of a small delegation of Chinese scientists who visited the campus briefly. A son of the Ho family, Frank He, became a student in the department in the 1980s.

INDUSTRIAL CHEMISTRY PROGRAM

There were no substantial further changes in space or facilities throughout the department until approximately 1948, except that the area for Brown and his students on the first (ground) floor, after his retirement, was substantially remodeled in 1944-45. This was to accommodate changes from teaching and research in storage batteries and vapor phase catalysis to process and unit operations work in industrial chemistry. The intention in this change was to provide a balanced but small and challenging program in industrial chemistry which would complement teaching and research in other areas in the department. In 1944 O. J. Sweeting was appointed instructor to organize the operation and to teach some general chemistry along with the work in industrial chemistry. He had received his PhD degree at Cornell University in 1942. The report for 1944-45 to the ACS Committee on Professional Training of Chemists included the statement that equipment costing $13,727 had been purchased and it was being installed under the direction of Sweeting. Under his direction and enthusiasm the equipment and other facilities were systematically and neatly located in the available space. Students could take pride in their work. This program was continued until the late 1950s when it was discontinued.
THE BUDGET PROPOSAL FOR 1946-47

Dr. Shriner's last submission of a proposed annual budget for the department was on 25 March 1946. This year, for the first time, the proposal was submitted to J. W. Ashton who had recently succeeded F. Payne as Dean of the College of Arts and Sciences. The war had ended and much attention was being given to the extraordinary needs and opportunities that were immediately ahead. There was no indication that within a month the budgetary proposals would be followed by an announcement of Shriner's resignation effective within less than three months.

Two weeks before a general notice, with appropriate forms, had been submitted to the heads of all divisions by President Wells. It reminded all that "The fiscal year 1946-47 is the second year of this biennium." It stated that for this reason "there is no additional appropriation available." It made clear that "Funds for new staff or for salary adjustments can be secured only from additional fee income." The notice included the sobering if not surprising prediction that "an additional 2,500 or 3,000 students must be accommodated on the Bloomington campus at the beginning of the fall term."

Although Shriner had been here almost five years the problems implicit in the complexity of this situation must have been staggering. For the Department of Chemistry it was not enough to provide good teachers for the classrooms; there had to be many more laboratory sections, more space, much more supplies and equipment, more qualified graduate students to serve as laboratory assistants, and professional upgrading of the department as a whole had to be continued.

Shriner understood the situation in 1946 and he was quite aware of the developments near the end of the war when on 19 March 1945 he submitted the proposed budget for 1945-46. He recognized the difficult problem of attracting very promising faculty members to a developing department — with less prestige than those in many large universities — and at a time of nationwide increase in demand. In the transmittal letter to Dean Payne he wrote:

"The chemists available for university teaching positions are very few in number and it will be increasingly difficult to find (a) good man."

However the requests for salary increases were modest and funding for only one faculty addition was proposed. This was at the level of instructor.

It is notable that the need for significant capital improvements was strongly presented in the proposal for 1945-46. The focus was largely
on the need for greater safety in handling and storing flammable solvents and chemicals and it was made clear that at least some advancement was necessary in providing better experimental animal care facilities. Consequently, the proposal included a request for these improvements.

In the budgetary proposal for 1946-47 two special requests were made: One was for an "Assistant Director of Chemistry Laboratories and Assistant Purchasing Agent." The other was for a "Professor of General Chemistry" who would "Supervise all work in general chemistry." Supplemental to this position a position of stenographer was requested "to do the work for the General Chemistry Division." In addition funding was proposed for an additional instructor or assistant professor the "Teaching duties to be split between general chemistry and quantitative analysis." This was the beginning of fruitful changes toward the use of a business manager in the administration of the department and the focusing of responsibility on the proper coordination and implementation of instruction in general chemistry.

Shriner wrote expansively regarding the proposed new position of "assistant director... and assistant purchasing agent." He stated that the incumbent, "a well trained chemist" should have a connection "with Mr. Black's Purchasing Office." The person would be assistant to the chairman and he would "take charge of the ordering of all chemicals, supplies and equipment and keep all necessary records, inventories and location of equipment." Also, the assistant director would "take complete charge of the budget on supplies and expenses and ... serve as the person to whom the regular chemistry staff will go in order to request all items." Understandably Shriner wrote "the burden of doing all of this quickly and promptly (sic) is too much for the present organization."

Shriner also felt strongly that a basic change needed to be made in handling general chemistry. In essence coordination under a good teacher and efficient manager was needed. He wrote in part that the coordinator would give the lectures in one section (or course) of general chemistry

"...and spend the rest of his time in looking after the laboratory sections, supervising all assistants in general chemistry and see to it that the laboratory experiments and lecture demonstrations (in which he strongly believed) of the various members of the staff who are teaching other sections of general chemistry are brought up to date and coordinated together (sic)."

The budgetary proposal had greater focus on the organization and direction of the department than in any of the preceding proposals he had submitted. It emphasized that changes of the nature he recommended had to be made as soon as possible.
STAFFING AND BUDGETARY STATUS NEAR THE END OF THE WAR

Shriner's years as chairman coincided very closely with the time period that this country was in World War II. The major goal was in the steady enhancement of the departmental reputation for quality and productivity in teaching and research. Of course the emphasis was on war-time research and for a time the training of military personnel. But in every action by the chairman his delight in pure chemistry was so sincere and spontaneous that others were caught up in his enthusiasm. Thus the feeling for chemistry was reflected throughout the department, especially in the younger faculty. It was shown in Shriner's many communications to university administrators, in public lectures, and even in social conversation. Even so, the all-important staffing and budgeting actions were tempered and reasonable. If there was possibly a fault he did not press harder for larger budgets. Fortunately he was always supported as much as possible by Dean Briscoe. In Shriner's annual report to the Committee on Professional Training of the ACS for 1945-46 he could list twelve full time members of the chemistry faculty (J. H. Billman, E. E. Campaigne, H. G. Day, W. S. Horton, J. H. Jones, C. E. Kaslow, F. C. Mathers, C. E. May, L. L. Merritt, Jr., J. F. Suttle, O. J. Sweeting and R. L. Shriner). When he came to the department in 1941 there were nine. In 1945-46 there were six full time non-academic staff members (F. Eckels, G. Hepley, H. S. Roberts, R. Stuart, E. M. Greene, and J. Haywood). Only the first two were on a full time status in 1941.

OFF-CAMPUS ACTIVITIES AND PUBLICATIONS

The professional off-campus activities and publications of the chemistry faculty in 1945-46 reflect significantly on the standing of the department and the advancements made over the past five years:

Billman: Published three articles with others and he attended one national meeting of the ACS.

Campaigne: Published two articles with others, attended one out-of-state sectional meeting of the ACS, and he was the IU correspondent for the Accelerator - an ACS publication.

Day: Published four articles with others, attended the national meeting of the American Institute of Nutrition and lectured at five sectional meetings of the ACS (In Ohio, West Virginia, Indiana, and Illinois).

Horton: Published one article with a co-author and attended one sectional meeting of the ACS (He had replaced E. Swift, who had resigned in mid 1944-45.).

Jones: Published one article and attended one sectional meeting of the ACS.
Kaslow: Published two articles with others and attended three sectional meetings of the ACS.
Mathers: Published one article and attended two national meetings of the Electrochemical Society.
May: Attended one sectional meeting of the ACS.
Merritt: Attended two sectional meetings of the ACS.
Suttle: One publication with a coauthor. He was an instructor in 1944-45.
Sweeting: Attended one national and two sectional meetings of the ACS.
Shriner: Published three articles with others, attended a national meeting of the ACS, participated in monthly meetings of the national Panel on Synthesis of Antimalarials, lectured at four sectional meetings of the ACS in Indiana and Kentucky, and addressed three other organizations in New York, Illinois, and Philadelphia.
(Briscoe: Although he had no specific academic responsibilities in chemistry, Briscoe's book *College Chemistry* was published by Houghton-Mifflin in May 1945.)

**SUPPORTING NON-ACADEMIC STAFF**

In addition to his continuing concerns in the strengthening of the chemistry faculty, Shriner was thoughtful about the adequacy of support and recognition for the non-academic staff. In his comments on this in the budget request for 1946-47 he referred specifically to F. Eckels, E. Greene, J. Haywood, and G. Hepley. Regarding the first he wrote:

“As soon as the proper pension arrangements can be made Mr. Eckels should be retired in recognition of his long and faithful service to the university.”

On Mr. Hepley:

“He has helped us to work out a good inventory system... the increase recommended has been well earned.”

Concerning the secretary and stenographer he wrote:

“Both Miss Greene and Miss Haywood has (sic) done very good work. .. The increases recommended have been well earned.”

One well known figure on campus, George Siddons, served various departments well in the maintenance and even construction of some instruments and electronic devices. He reported to the Purchasing Department. Chemistry had a Repairs and Maintenance allotment that was
used to pay for the specific services rendered. The amount requested for 1946-47 was $800, but only $500 was approved. In commenting at length on Mr. Siddon's service to chemistry Shriner stated that he

"...has also learned to recondition analytical balances and does all our work on these items. Formerly we had to pay a traveling repair man $25.00 per day for such work."

**ACTIONS TO IMPROVE SAFETY AND PROCUREMENT OF MODERN EQUIPMENT AND SERVICES**

Better protection against the hazards of storing and using flammable solvents had been sought for several years. This led to the conclusion by Shriner and all concerned in the department that a good underground storage vault near the Chemistry Building would be central to the promotion of safety. (Recommendations to the IU Post War Planning Committee, 15 Dec. 1943.) A budgetary request for $20,000 to provide the vault was granted, but its approval did not occur until some time following Shriner's resignation in 1946. The thoughtfully designed storage place was built in an area immediately west of the chemistry auditorium. Connection with the storeroom occurred through a short tunnel. The fairly elaborate safety arrangements included means to avoid sparks from static electricity.

No mishaps ever occurred, but by the time the vault was removed about 15 years later — to make room for the chemistry addition of 1964 — the decision had been made that this mode of storage was even dangerous, and that probably we had been lucky in avoiding accidents through use of the vault.

In 1941 the report to the Committee on Professional Training made reference to several specific items of equipment that had been recently added. These included fractional distillation apparatus, vacuum pumps, centrifuges, polarimeter, x-ray diffraction equipment, infra-red spectrometer, and cold room and deep freeze for biological chemistry research. There was continuing concern by Shriner and the faculty for the procurement of better laboratory equipment, improvements in the physical facilities, provision for more secretarial help, better office equipment, and even for more telephones.

**POST WAR PLANS FOR THE DEPARTMENT**

As early as April 1943 the university began to consider how it could resume a peacetime status after the end of the war. This was in part a response to The American Council on Education, which made contacts with universities for the Science Committee of the National Resources Planning Board. The dean of the Graduate School, Ralph E. Cleland,
sent a questionnaire on this to certain departments, including chemistry. Within ten days Shriner returned a three-page response. This was followed in December with a much more extensive report which was addressed to the university's Post-War Planning Committee. It has been already stated that the report addressed the need felt at the time that an underground storage vault for flammable chemicals would enhance safety.

In beginning the definitive report for chemistry it was made clear that the department had been giving much thought to the post-war needs even from the beginning of the war. The introduction to the report was prophetic and realistic, stating in part:

"It is probable that immediately following, or simultaneous with, the demobilization of war industry requests for courses in chemistry at this university will increase, and by the time very extensive de-

mobilization of the army and navy has occurred, the demand will

be higher than at any time in our history ... Also, the ever widening

recognition of the large role chemistry now plays in the training of

men and women for nearly all walks of life makes it seem very

probable that the demand for chemistry courses will continue high

for many years."

Among the proposed changes to be seriously considered the greatest emphasis was placed on providing opportunity for senior research. It was stated that senior research directs

"individual attention to the best students who give promise of being

genuine contributors to the advancement of chemistry."

This marked a distinct advance in thinking about advances in the

department.

Special consideration was given to the need for more space and additional facilities. In addition to the emphasis on providing more space, facilities, personnel, and better counseling of beginning students, it was underscored that:

"The post war demand for graduate training will cause an unpre-

cedented demand for research laboratories in all fields of chemistry.

New construction is the only answer to this problem."

Suggestions were given including the construction of two additional wings each extending south from each of the original wings.

The report included a special section on biological chemistry which I had been asked to prepare. This section emphasized the need for much more space, including in particular suitably designed and properly located
animal room facilities. It deplored the continuing restriction to Room 116 which was "entirely inadequate."

One of the major changes that provided substantially more space for chemistry resulted from the move of the new Department of Bacteriology from the west end of the third (now second) floor to the fourth floor of Kirkwood Hall. This occurred in summer and early fall 1945. The vacated space was modestly remodeled, providing for the first time a fairly suitable laboratory for instruction in instrumental methods of analysis. Merritt was then exclusively responsible for such instruction. In his notes supporting the budgetary request for 1945-46 Shriner wrote.

"Dr. Merritt has proved especially valuable in reorganizing the quantitative analysis course for pre-medics and in developing an advanced course in physico-chemical methods of analysis. The work in this instrumental methods course is excellent."

Instruction in this program was continued here until bacteriology was able to move to the newly finished Jordan Hall in 1955. At that time the teaching and research programs in analytical chemistry were moved to the space vacated by bacteriology in Kirkwood Hall.

Postwar planning decidedly included Briscoe. In July 1944 he returned to full-time but as Academic Vice President after many months of part time service in Washington as Associate Director of the War Manpower Commission. While planning for the university's involvement in the postwar world he frequently made public addresses which were generally reported in the IDS and elsewhere.

On August 16, 1944 he addressed the Institute for Personnel and Guidance Work speaking on "The Functions of the University in a Veteran's Readjustment Program." In late September he spoke on the university's Sunday radio program in the series on "Careers for Scientists." His topic was "Indiana Looks Ahead." As quoted by the IDS on 3 October, he declared

"Never in the history of our country has the need for first rate scientists been greater, nor your opportunity more promising."

Three weeks later in the same series Shriner spoke on "Chemical Developments." In the same program a dramatization was given on "The Story of the Development of the Synthetic Tire." Of course the breakthrough research of an IU chemistry graduate W. J. Sparks, '26, had to be central to this story. The focus on science in planning for peace was also included in the meetings of various organizations on campus. For example, at the February 1945 meeting of the American Association of
University Professors Briscoe spoke on "Science and Technology in War and Peace."

Within a year after the ending of the war the university was launched on a massive building and enrichment program to meet the needs caused by burgeoning enrollments, public service demands, and unleashed creative forces. In June 1946 the program of the trustees was extensively announced in the IDS and newspapers in the state. The university was expecting an enrollment of 10,000 that fall. The announced building program called for $25,000,000. Central in the planning was a new life sciences facility, dormitories and apartments, and enhancement of library facilities. Included also were additions or refurbishing of certain existing buildings such as physics and chemistry.

**Examples of Chemistry Department News Reported by the IDS Near the End of the War: 1944-46**

By spring 1944 the mighty war efforts of this country had convinced nearly all that Germany and Japan would be defeated, but the heavy cost in lives and possessions would continue before victory could be experienced. The general feeling in the department was that teaching and research, with time for some recreation, were important to win the war and continue toward a new world order. Some selected specific events illustrate the status of the campus and the department:

- Dr. L. L. Merritt was the speaker at the inorganic and physical chemistry seminar on Friday, 24 March 1944, in room 200.
- On 10 May Sigma Xi "a national fraternity for men (sic) engaged in scientific research" held a banquet for initiates at Boxman's Restaurant which was followed by a meeting in Owen Hall.
- Also in May Phi Lambda Upsilon held a banquet at Boxman's restaurant in honor of eleven graduate students (P. Arvan, D. K. Barnes, W. O. Foye, R. Geckler, R. M. Hedrick, G. W. Leonard, H. Mulder, J. W. Nemec, G. W. Schrotenboer, N. B. Sommer, R. D. Stayner), one postdoctoral student under Shriner (W. Arendshorst) and two faculty members (C. E. Kaslow and J. F. Suttle). All were initiated into the honorary society. Dr. K. G. Wakim of the Department of Physiology related some of his medical experiences among the bedouin nomads. In November that year Hedrick, W. T. Smith, Schrotenboer, Stayner, and R. Otter were elected officers. I was elected faculty counselor.
• In November 1944 the national chemistry honorary for women in science, Iota Sigma Pi, held an initiation dinner as guests of Mrs. Shriner in her home. The chemistry initiates were Phyllis Fenn, Lenore Gentry, and Phyllis Rutan. There were four initiates from other departments. During 1945-46 Rebecca Elbinger was the president.

• Although the war was still far from ended in the latter part of 1944 state and national scientific meetings were receiving greater support. Early in September Shriner, E. Campaigne, H. G. Day, C. E. Kaslow, L. L. Merritt, Jr. and E. Swift, Jr. attended the American Chemical Society meeting in New York City. Kaslow gave a paper on the synthesis of lepidines and Merritt reported on “The Determination of Small amounts of Zinc by Measurement of Fluorescent Turbidities.”

• In November four papers were given from the department at the Indiana Academy of Science meeting in Indianapolis. They were by: E. Swift, Jr. and H. Philips Trix on “The Vapor Pressure of Diethylamine from 0 to 40°C”; J. H. Billman and F. H. Travis, Jr. on “The Reaction of Polyanhydrides with Thiophene”; C. E. Kaslow and R. D. Stayner on “Oxides of Nitrogen in Ozonized Air”; and F. C. Mathers on “Solubility of Tin Cans in Inhibited Acids.”

• The feeling of progress and improved standing in the scientific community was occurring throughout the department by late winter 1945. Some stimulation was given by the announcement in the IDS on 14 February that one of DuPont's 28 national fellowships in chemistry was being awarded to Indiana University. Also, the stipend was being raised from $750 to $1000.

• On 15 March 1945 one of the remarkably stimulating advancements of the decade — the development of widely useful silicone products — was vividly described by C. L. Moyle of the Dow Corning Corporation. The lecture, in the Chemistry Auditorium, was attended by many students and faculty. The amazing thermal resistance and other characteristics stimulated the imagination of all concerned regarding the myriad technological applications that were possible. Various products were shown and described, including different kinds of silicone rubber. The IDS gave the lecture extensive coverage.

• Another evidence of advancement in the department was the number of well qualified graduate students and one chemistry alumnus who were elected to membership in Sigma Xi in 1945. The graduate students were C. A. Discher, Rebecca Leah Elbinger, E. L. Martin, W. B. Reid, Jr., W. T. Smith, R. D. Stayner, and P. W. Vogel. The alumnus was E. B. Carter, AB’11, who
had achieved well in the pharmaceutical industry but had never been nominated for this honor. Six other persons from four other departments were elected.

- On a much different note Dean Briscoe suffered a cerebral hemorrhage at his home on 22 June 1945. By late September that year he had largely recovered and soon began to work in his office.
- Faculty promotions in rank effective in July 1945 included three in chemistry. They were J. H. Jones from instructor to assistant professor, and H. G. Day and F. J. Welcher from assistant professor to associate professor. The latter served in the chemistry division of the Indianapolis Extension Center.

UNEXPECTED RESIGNATION OF DR. SHRINER

On Saturday 27 April 1946 Shriner dictated a letter of resignation from his appointment. It was to President Wells with copies to Deans Briscoe (Faculties), J. W. Ashton (Arts and Sciences), and F. Payne (Graduate School). In addition, a separate letter was given to the President which made general suggestions on the selection of a successor. These were formally written. In a brief cordial letter to Briscoe his feeling of appreciation and high regard was expressed by stating

"I think it would be a very fine thing if you would decide to return to the Chemistry Department and take over the supervision of general chemistry."

Concerning the reason for resigning he wrote,

"I have thought over the situation and have finally decided that the Chemistry Department would be better off with a new, vigorous executive at its head."

Essentially the same statement was made to President Wells, but he also stated,

"It is clear that I have done all that can be done to advance the Chemistry Department at Indiana."

Clearly Shriner was deeply interested in the further development of the department. Because he felt that his effectiveness was essentially at a standstill it was, as he stated, his "desire to quietly drop out of the picture." It is fruitless to speculate on other reasons for his decision, but he probably was continuously uncomfortable with the strong opinions of Dean Payne on Graduate School policies as they affected chemistry.
He apparently felt that some others did not genuinely appreciate and understand him as did Dean Briscoe.

Dean Payne intervened in the attempt to retain Shriner. In response to my letter of concern he wrote on 14 May

"As soon as I had a copy of his letter to the President, I wrote to him immediately asking him to reconsider, but to date I have had no reply."

Dean Payne wrote further,

"I do know that President Wells, Dean Briscoe and Dean Ashton are equally concerned about his retention."

Shriner possibly felt uncomfortable about the prospects of recruiting outstanding chemistry faculty in the postwar period and in other administrative actions needed to promote solid but rapid growth. Moving toward the goal of outstanding appointments was urged throughout the University Administration. In a memo to Briscoe in September 1945 the President expressed his feeling that Shriner should quickly work toward the appointing of 'perhaps two, top-flight 'starred' men as soon as possible' The President expected that there would be "a tremendous amount of (federal) money available for research." In writing to Dean Payne concerning this Briscoe stated:

"During the war, of course, Dr. Shriner has been handicapped even in finding young men without much experience. I should think, however, that he would be happy to know that the Administration is willing to add one or two experienced and higher priced men."

The salaries paid to Shriner over the five years is of interest. On his appointment effective in 1941-42 the salary was $7000 on a twelve month basis. In 1943-44 the same total salary was paid but $2,100 was "from U.S. Government," thus saving this amount for the university. The next year the total salary was raised to $7500; in 1945-46 it was $7650. However, during most of his tenure on the faculty a substantial part of the salary was paid from federal research contracts under his direction. Before his resignation became effective the Trustees at the June 1946 meeting fixed his salary at $8,150 for the year 1946-47.

The resigning chairman was unquestionably conscientious and unselfish. This is made perfectly clear in separate and different letters he wrote on 1 July 1946 to President Wells, Dean Briscoe, and Erle M. Billings, secretary of the ACS Committee on Professional Training of Chemists. In the first he expressed his
“appreciation for all of the things which you and the Board of Trustees have done for the development of the Chemistry Department.”

He expressed his confidence

“that the Department will grow and go ahead under the leadership of a new, vigorous leader.”

Concerning the invitation of Dean Ashton and others for him to stay on the faculty, but not as chairman, he wrote

“I do not feel that this would be a good procedure for the Department.”

In the particularly cordial and appreciative letter to Dean Briscoe he wrote in part,

“Even though I shall not be connected with Indiana you may be sure that I shall always take an interest in the future growth and development of the department since we need all the good, strong chemistry departments that it is possible to develop for the future good not only of chemistry in this country but also for the general welfare and safety of everyone.”

Dr. Shriner’s continuing loyalty to Indiana University was also made clear in his last report to Mr. Billings. He assured Billings that his action

“should not in any way jeopardize the standing of the department as far as certification of undergraduate chemists is concerned.”

He stated that

“Our building is well equipped, in fact it is one of the best departments for its size and staff that I know.”

He strongly recommended the continuation of its accreditation status.

The resignation caused genuine sorrow on the part of many. The President cordially wrote

“We deeply regret to have you go, and we wish that we might be able to persuade you to stay.”
The same day, 16 July, he expressed the disappointment of the Board of Trustees and added that they accepted the resignation

"with great reluctance, after asking many questions as to the reasons for your departure."

The most impressive response was from Briscoe. He wrote:

"During the time that I have been in this office I have seen several members of our staff come and go. In no other case have I felt the same disappointment as I feel now as you leave us."

The cordiality between Briscoe and Shriner did not wane. Others, including Dean Ashton and President Wells, kept the latch string out for Shriner's return to the faculty. But his mind had been made up to leave. On 21 February 1947 he wrote to the President that he had just then written Dean Ashton:

"I think it best for me to go elsewhere and make a fresh start... That will also be best so that the new chairman will not be worried about having me around."

This attitude of protecting the welfare of the department was reflected in other ways. He was reluctant to make reference to his resignation with others until progress had been made toward the selection of an excellent replacement. For example, about that time a consulting firm requested him to suggest a candidate for director of research in the food field. He asked me to respond for him and explain that he (Shriner) was "on vacation."

During his last years in the department Shriner's national stature continued to rise. On 3 January 1947 Briscoe took the opportunity to inform the President that "Dr. Shriner has been named one of a committee of three to administer the research funds of the American Chemical Society." The memo included the information that the funds had been augmented tremendously by the gift to the ACS of the holdings and assets of the Universal Oil Products Company. This elicited a hearty letter of congratulations from the President to Shriner. The IDS that week also ran a story on the selection and referred to Shriner as one of the "leaders in chemistry."

The younger members of the faculty were shaken by Shriner's announcement that he had resigned. All the faculty were concerned. My wife, Marie, wrote in her diary on 28 April 1946 "Shriners are leaving. Such a blow." Some were fearful that an effective replacement would not be made and the gains of recent years would be lost. Also, some
feared that they might not get along satisfactorily with the new replacement. James H. Jones and John F. Suttle, having promising opportunities elsewhere, did promptly leave the department.

Shriner’s assurances to the department regarding its future helped as much or more than any other action in allaying the fears. This is reflected in part by a memo he addressed to the faculty on 20 May 1946. He wrote:

“Will each of you kindly turn in by Thursday May 23 your nominations for the new chairman of the Chemistry Department. We will then copy their training from AMERICAN MEN OF SCIENCE and forward the list to Deans Ashton and Payne. I shall then suggest that they call a meeting of the members of the staff to consider the next step.”

The Shriners remained in Bloomington during 1946-47, but he conducted his affairs from his home, at 1211 Maxwell Lane. He remained cordial to the department and especially to Dean Briscoe. He devoted much time to the preparation of research papers and reports, and he maintained his professional and consulting contacts.

An illustration of his productivity working at home is shown in his long letter of 21 February 1947 to Briscoe:

“I’ve finished the revision of our (Shriner and Fuson) book on Identification of Org. Cpd and also the stereo chapter in Gilman. Last week I sent Vol. 27 of Org. Syntheses to the printers and this week sent off two write-ups of our OSRD work on explosives — RDX — which will be part of a monograph on the Chem. of RDX.”

He continued by stating that he still had about four more papers on OSRD work “and a good many papers from theses to write.” He expressed the hope that the writing would be finished by the middle of 1947. He commented that all of the papers and other publications would be from Indiana University, thus “it will help the dept.”

**APPOINTMENT OF DR. SHRINER ELSEWHERE**

By February 1947 Shriner had accepted appointment as Professor of Organic Chemistry and head of the division at the State University of Iowa. This became effective in Summer 1947. After five years he was made head of the Department of Chemistry there and served in that capacity until 1962 when he retired at age 63. He then accepted appointment at Southern Methodist University as Visiting Professor of Chemistry. Before the Shriner family moved from Bloomington the last week of June 1947 my wife wrote in her diary “Shriners stopped a few
minutes this eve." The next day (moving day) she wrote "Took lunch to Rachel and Joan."

RETIREE AND HONORS

Soon after his retirement several of Shriner's former graduate students contributed to a fund which was used to hold a large party in his honor. This was in connection with the traditional biannual alumni luncheon of the University of Illinois, this time at the New York City meeting of American Chemical Society on 13 September 1966. The affair was organized by W. O. Teeters who received his PhD degree under Shriner in 1935. A representative of each of the universities where Shriner had served was an assistant in the "Shriner Project." They were H. E. Carter at Illinois, myself at Indiana, and S. Wawzonek at Iowa.

Central to the luncheon honoring the Shriners was the presentation of a "Book of Letters" from about 80 per cent of the former graduate students and postdoctoral students for whom there were addresses. Following the impressive introductory section, there were three sections, each devoted to the letters from workers at the institution. For each section there was an appropriate introduction by a representative of that institution. I represented Indiana University. In addition there were letters from some of Shriner's colleagues at Southern Methodist University and at the Rohm and Haas Company. Finally there was a beautiful letter from Rachel.

In addition to the book of letters, there were oral tributes, a television set, a substantial cash gift, and most appropriately for the inveterate cigar smoker — a box of favorite cigars. It was a well deserved and hearty tribute to a widely respected chemist and his wife.

Indirectly the achievements of Shriner at Indiana University and elsewhere were much influenced by his talented and inseparable Rachel who he married in 1929. Her talents even before their marriage included expertise in the use of biological stains, especially on staining chromosomes in plants. This led her to publish several papers. Throughout their years together she was always an active participant in ceramic crafts and other arts, Girl Scouts, university and community women's clubs, church affairs, and hospital services. Also, her scholarly work included active cooperation with her husband in compiling and publishing a volume in 1976 entitled "Cumulative Indices of Organic Synthesis." The Shriners' extraordinarily well organized and compact Cumulative Indices is still of great benefit to innumerable chemists. It represents an enormous "labor of love" by a remarkable marital team who devoted most of their years to the advancement of chemistry and chemists and the enhancement of lives around them wherever they lived.
The Shriner's only child Joan and her husband, Edward Palincsar, both have doctoral degrees and three children.

Dr. Shriner with the wise backing of Dean Briscoe contributed markedly to the elevation of this department.

References

Much of the factual background was taken from letters, reports, and other such records in the University Archives, Chemistry Archives/Alumni files, personal records, and information gleaned from extensive scanning of the *Indiana Daily Student* files. Other important sources included the following:


Cumulative Indices of Organic Syntheses Collective Volumes I, II, III, IV, V. Edited by R. L. Shriner and Rachel H. Shriner. 432 pages. John Wiley and Sons, New York, 1976. (As stated by the editors: "This volume is to recognize and express appreciation to the organic chemists who have edited the *Collective Volumes of Organic Syntheses* and served as secretaries to the Board of Editors. These altruistic labors have benefited thousands of chemists.")


Chapter VII

Frank C. Mathers, the Interim Chairman in 1946-47, and His Research in the Midforties

When R. L. Shriner resigned, Frank C. Mathers had been a full time and notably productive member of the Department of Chemistry faculty 39 years. He lacked less than eight months of being 65 years of age. Even so it was logical for him to serve as interim chairman until a successor could be selected to fill the vacancy. It turned out that the successor could not serve before September 1947 and Mathers could not continue actively during the summer of 1947. The brief gap was filled by Harry G. Day.

Mathers' direct connections with the department began when he enrolled as a freshman in 1899. His parental home was less than five miles from the campus. He was away from the university for an extended period only during 1905-1907 while he was completing his PhD degree at Cornell University. From about 1930 he was nationally recognized, particularly in The Electrochemical Society. He had been a member since
1909, and in 1940-41 he was president. This was the highest professional recognition that any member of the chemistry faculty had ever received.

In 1946 most if not all the chemistry faculty believed Mathers should serve during the interim. This was expressed in various ways soon after Shriner's resignation was announced. A letter to Dean Briscoe by the faculty supporters of this action stated in part:

"Dr. Mathers' excellent reputation in his field does not need to be detailed. He has given many years of faithful service to the University and Department of Chemistry. He understands the needs ... and he would be energetic and resourceful in meeting those needs."

Dr. Mathers was promptly designated. It was publicly announced after its confirmation by the board 13 July 1946. In effect he was in charge from 1 July to the following 30 June 1947. The new chairman made it very clear that he intended to support the efforts of the past several years to strengthen the department, but he planned to take no actions that could be reasonably deferred for a short time.

Probably the first administrative action based on this principle was his refusal to approve the appointment of one of Professor T. Sonneborn's incoming advanced research associates, a biochemist, as a member of the chemistry faculty. As an alternative the associate received the title associate professor of zoology. At that time Sonneborn's research program was temporarily assigned to the space in the Chemistry building vacated by the move of the new Bacteriology Department to Kirkwood Hall. Thus the new member of the Sonneborn group worked in the chemistry building.

**Promotions, Retirements, and Death of Dr. Lyons**

One of the first university announcements of special interest to the department was the promotion of E. E. Campaigne and C. E. Kaslow from instructor to assistant professor. These were effective 1 July 1946. The former had been on the faculty three years and the latter five years. Seven other instructors in the university were so promoted. At that time instructor was normally the beginning rank for faculty appointed on the track that could lead to tenure status. Mathers had no particular responsibility for initiating and supporting the chemistry promotions but they met with his unequivocal approval.

Another change in status at the same time was the retirement of Frank Eckels who had served the university 38 years, most of which were spent in chemistry as storeroom keeper. In the last year of his appointment the salary was $1,500, which was $180 higher than it had been two years before and $304 higher than he was receiving when Lyons resigned.
in 1938. "Dad" Eckels was the first of the retiring chemistry non-academic staff to have the benefit of the new State retirement plan for university employees. The plan became effective 1 July 1946. Twelve other university employees retired at that time. As extensively reported in the IDS 2 July 1946, a party for all the retirees was held in Alumni Hall with President Wells and University Treasurer J. A. Franklin serving as hosts.

Coincidentally the 61 year connection of R. E. Lyons with the university totally ended in his death on 25 November 1946, while Mathers was serving as interim chairman. These two were the most prominent members of the chemistry faculty during more than the first third of the century. When Lyons resigned in 1938 he was the last active member of the university faculty appointed by David Starr Jordan. After receiving his AB degree here in 1889, under Dr. T. C. Van Nüys, the next year he received an AM degree, the first in chemistry at Indiana University.

At the funeral, held at the First Methodist Church, it is notable that there were more than thirty honorary and active pallbearers. These included H. T. Briscoe, F. Eckels, O. W Brown, F. C. Mathers, and C. E. May.

**Postwar Adjustments**

During the year under Mathers the university and the department were deeply involved in myriad postwar adjustments, not to the status quo but to new opportunities and needs. The avalanche of doubling enrollments — caused largely by returning war veterans — excessively overtaxed the housing and teaching resources. But in the chemistry faculty such problems did not overshadow the concern for attracting and selecting the right person to chair the department. The faculty and Mathers functioned harmoniously in all the responsibilities, but the degree of his intrusion in decision making only sufficed to look after the immediate needs. He continued to spend as much time as possible in his customary office-laboratory, room 125, and in conducting his electroplating research, teaching, and business interests. In addition, he continued his broad scale attendance at various lectures, athletic games, and cultural events.

Becoming the interim chairman of the department increased Mathers’ visibility, but for years he had been sought out locally to comment and advise on different matters. With notable frequency he was interviewed by the IDS and his responses were generally reported. For example, in February 1947, following a chemical explosion in Los Angeles, both Mathers and the new storeroom keeper, Glen Hepley, were quoted. The explosion had involved the use of acetic anhydride and perchloric acid for an electroplating process. Presumably the quoted comments from
both men contributed to the continuance of adequate safety practices in the department, as they were perceived at that time. In the more than 65 years that Mathers and his students dealt with such compounds and many others in electroplating and other research, there were no major accidents. The entire department was lucky because the rapid and large postwar adjustments compromised safety requirements.

PRIDE IN HARRY C. GATOS

The most notable student to develop through Mathers’ guidance during those early post war years was Harry C. Gatos. This 25-year-old graduate from the University of Athens came to the department for graduate work in 1946. He soon began to be influenced and befriended by Mathers. Quickly he learned English well and soon he was forging ahead in chemistry and in the respect and appreciation of fellow students and others. As he neared the completion of his AM degree early in 1948 Mathers arranged for him to transfer to MIT where he continued his research under the direction of Mathers’ admired friend in electrochemistry, Professor H. H. Uhlig. While in Bloomington Gatos was pleased to learn that public elections here are not characterized by riots.

In the many years of correspondence between Mathers and Uhlig the former several times affirmed as stated on 10 April 1952,

“I must confess to you that I did not send him to you for any other reason than that I thought he should have experience in more than one university while in the United States.”

After 33 years of notable accomplishments and recognitions in solid state science elsewhere, Gatos was invited back to Indiana University in 1983 to be awarded an honorary ScD degree. The occasion was the dedication of the new William Hammond Mathers Museum. The Mathers Museum was provided through a bequest by Mathers as a memorial to his son who received an AB degree in chemistry with “High Honors” in 1938. Tragically the son died from cancer three months later. There is some reason to believe that Harry Gatos became a fulfillment of the dream Dr. and Mrs. Mathers had for their son William.

Following the dedication of the museum Gatos gave the Frank C. Mathers Lecture in the Department of Chemistry, speaking on “Composition - Structure - Electronic Property Relationships in Semiconductors.”

FACULTY AND TEACHING IN 1946-47

Mathers closely adhered to his intention of maintaining the status quo of the department until his successor chairman had taken charge. Thus the only faculty appointments were those necessitated by immediate needs. Also, changes in teaching assignments were minimal.
However, on the day he became responsible, on 1 July 1946, he made inquiry concerning the selection of a person with a doctoral degree whose main responsibility would be the teaching of general chemistry and coordination of all the teaching and laboratory instruction in this area. Dr. Leslie J. Todd was finally chosen. He had been on the faculty at Marshall College since 1931. At the time of his selection he was head of the chemistry department at Marshall. He came to Indiana as associate professor in 1946 and remained here until 1949 when he became professor at Kent State University. His successor here, F. C. Schmidt, was extraordinarily dynamic and resourceful. All of Todd's teaching was limited to general chemistry. He did not engage in any research.

Because in part J. H. Billman was on sabbatical leave during 1946-47 Dr. G. Dana Johnson was appointed instructor. He remained until 1952 when he joined the faculty at Kansas State University. Billman did research and served as visiting lecturer at Yale during his sabbatical leave.

Dr. Charles S. Rohrer was also appointed in 1946 to teach general chemistry and physical chemistry. He came from Purdue where he had been assistant professor. The appointment continued until 1958 when he became head of the department at East Texas State Teachers College. At Indiana he engaged in some research with graduate students and published a few papers.

During 1946-47 Mathers had considerable correspondence concerning L. E. Marchi and O. J. Sweeting. The former had joined the faculty here in 1943. After a year he left to join the Monsanto Unit III project at Dayton, Ohio. The latter chemist was a member of the faculty here from 1944 to 1946. There was a strong affinity between Mathers and Marchi, but evidently it was not very strong with Sweeting.

Following the dropping of two atomic bombs in Japan early in August 1945 Marchi promptly informed Mathers that his mysterious work after leaving Indiana was in connection with the development and production of the bomb. This greatly sharpened Mathers’ interest. After the war had ended Marchi joined the faculty at the University of Pittsburgh but he maintained interest in Indiana.

Sweeting was the only faculty member to resign during Mathers’ short chairmanship. Within a year after the appointment here as instructor he sought an appointment elsewhere at a higher salary and rank. It irritated him that Shriner did not promptly support him for promotion and a substantially higher salary. In August 1946 he was given what he wanted at the University of Colorado. In response to the resignation and the continuing lower levels of salaries at Indiana, Mathers promptly besieged Dean J. W. Ashton stating in part,

“You can see what a serious handicap we are under trying to pay these people $3500 when the country is full of jobs paying $4000.”
Among the several ultimately very fruitful research projects started in the department near the time of Mathers' leadership probably none was more significant than the work by E. Campagne and his students. Near that time there developed great interest in discovering and investigating metabolic antagonists, substances that interfered with metabolic processes through structural displacements of essential metabolites. This became a major development by which progress was made in chemotherapy and in the understanding of intermediary metabolism. This was made possible through intelligent and persistent work in synthetic organic chemistry. The Campagne group enthusiastically and resourcefully focused on thiophene analogs of certain biologically significant aromatic compounds. Among their contributions was the development of a convenient synthesis of 3-substituted thiophenes (Campaigne, J. Am. Pharm. Assn., 46, 129, 1957). The principal contributor was W. M. LeSuer. The beginning of success followed a year of discouraging but diligent effort. Ingeniously he and Campagne applied a new method for brominating a side-chain by N-bromosuccinimide. The new reagent worked beautifully. Thus they could synthesize 3-bromomethylthiophene and various analogues in abundance.

At that time antihistamines had gained prominence in medicinal chemistry and the pharmaceutical industry. Campagne contacted one of his former teachers who was director of research in a pharmaceutical company. He received a supply of an intermediate compound which he and LeSuer coupled with their new thiophene derivative. The coupled product proved to have very desirable antihistaminic properties for pharmaceutical application. The process was patented and in the early 1950s commercialization as Thenfadil was begun by the supportive pharmaceutical firm. The patent rights were assigned to the Indiana University Foundation.

Over the next few decades the work of Campagne and many students and postdoctoral workers led to scores of publications and about 15 patents. The latter were on a variety of compounds such as herbicides and insecticides, polymers, and drugs. Thenfadil proved to be significant commercially.

Another area of research was in the synthesis and metabolic study of the coupled product β-3-thienylalanine. This masters' work by graduate student R. G. Garst was also started during Mathers' year as Interim Chairman. At that time there was much interest in determining the degree and nature of the metabolic antagonism of phenylalanine and tyrosine analogues. The β-3-thienyl isomer of phenylalanine was of special interest. Campagne directed the chemical work and Day was responsible for the metabolic studies. The three workers reported the study in the Journal
of Biological Chemistry in 1949. A method for the synthesis of β-3-thienylalanine was described and it was shown that the structural analogue dramatically inhibits the growth of rats on a diet containing little if any excess of phenylalanine. The effect was readily reversed with phenylalanine but not with tyrosine. The work was widely cited in the extensive literature that quickly developed concerning biochemical antagonism.

A memorable aspect of some of the research by the Campaigne group was the horrible odors that were generated from some of the sulfur-containing compounds. Many were thioketones and mercaptans. It started with Bradley Reid who was Campaigne's first doctoral student. Bradley received his PhD degree in 1946. The odoriferous work was initiated and pursued with full knowledge that the smells would be offensive. In his exhaustive review of the earliest literature on organic sulfur compounds Campaigne had read a report on research on thioacetone conducted at the University of Freiburg. The workers admitted that streets in the neighborhood of the laboratory became almost unbearably odoriferous.

An incident concerning Bradley illustrates how offensive the odors became in Campaigne's laboratories. Bradley frequently wore a heavy woolen sweater. There was a particularly notable affinity between it and the thioketones Reid worked with. Some complained that the sweater reeked of offensive chemical odors. An attendant in the cafeteria of the Memorial Union, where Bradley frequently ate lunch, pointedly suggested that he should either sit apart from other patrons or come for his lunch when the patronage was low.

The situation was emphatically noted by the IDS. On 28 March 1947 a good humored interview with Campaigne was published under the title "Chem. Prof has Research that Makes Nose Turn Up." The IDS concluded that

"What Dr. Campaigne needs is a quonset hut all his own so he won't have to waste his precious odors on some of us who only go to the Chemistry Building for Psychology or English Composition classes."

By that time the campus had become dotted with quonset huts brought here as surplus from military installations.

An illustration of interdepartmental research during the Mathers' year was the cooperative arrangement between the Department of Chemistry and the Department of Bacteriology. This was concerned with the concentration and characterization of the toxins of clostridial organisms. Through a grant to Dr. L. S. McClung and H. G. Day from the National Institute(s) of Health, Charles Russell, PhD'46, was appointed research
associate. Russell did the biochemical work in space and with facilities provided by chemistry. The bacteriological work was carried out in the Department of Bacteriology then in the upper levels of Kirkwood Hall. Day participated only slightly in the scientific aspects of the project. This was primarily the work of McClung and Russell.

One aspect of the research in which Day gave advice was in a study of the effect of different kinds of carbohydrates in the media on the production of toxin. For example, certain dextrins produced more toxin than glucose or lactose. The A. E. Staley Manufacturing Company furnished several carbohydrates including Schardinger dextrins, amylose, and amyllopectin.

Faculty research activities during 1946-47 included the publication of five articles by Campaigne; four by Kaslow; three each by Billman, Day, and Mathers; and one each by Jones and Merritt.

**RESEARCH AND PATENTS BY DR. MATHERS AND HIS STUDENTS IN THE 1940s**

World War II and the immediately following years continued the focus of much of Mathers’ attention on electrodeposition research. The responsibility of heading the department during 1946-47 was not a major deterrent. Several of his students were keys to his productivity. These included C. A. Discher, H. C. Gatos, L. M. Magner, E. L. Martin, and P. S. Visher. Also, among the former students of Mathers, L. B. Storms was particularly significant in one study.

**MAGNESIUM FLUORIDE**

One of the projects was the preparation of magnesium fluoride of suitable quality for the filming of glass used in binoculars and various other kinds of optical equipment. The filming increased light transmission by removing extraneous light reflections from the glass surface. This project apparently began through a letter to Mathers by Ensign Lee B. Storms dated 12 June 1943 from the Optical Shop, U.S. Navy Yard, Washington, D.C. Storms had received a BS degree in chemistry in 1936. Following his service in the Navy he became engaged in paint manufacturing in Evansville, Indiana.

The extensive involvement of Mathers in this project illustrates well the abilities, attitudes, and persistence of this remarkable man. Thus the illuminating project, among many, is presented in some detail.

Ensign Storms knew well that Mathers had worked extensively with fluorine and fluorides. He believed that the problem of producing suitable magnesium fluoride could be solved by this former teacher. Thus he encouraged Mathers to offer his expertise and some of his time, and
suggested that some financial support could be given through the National Defense Research Council.

This quickly led to a small program of laboratory work but it unexpectedly developed into a mountainous level of correspondence over several years between Mathers and various individuals in Washington offices and in scattered industrial companies. Included in the latter actions were prolonged and extensive discussions on the development of a patent and the ownership and licensing of the patent. Initially Mathers believed this would involve the then new Indiana University Foundation, the Navy, and certain companies, particularly the Harshaw Chemical Company.

Mathers responded four days after Storms had written and stated

"I shall be glad to do anything possible in the way of research to aid with the defense problems."

Enclosed in the letter was a small sample of magnesium fluoride which he had

"...put together hurriedly without any special precautions to obtain great purity."

This was obviously intended to be followed with other samples prepared in different ways until the desired method had been found.

Mathers' confidence in the utility of trial and error methods in research, and the excitement of combining secretiveness in advancing practical knowledge and military applications are reflected in his response, "Of course, I shall keep all of it a secret."

He added

"If I undertook any extensive research on this problem it would be necessary to have enough financial aid to supply an assistant."

A report on the first sample was received in a letter from Ensign Storms dated 21 July 1943. He suggested that Mathers should promptly write a personal letter to Lt. Comdr. S. S. Ballard of the Navy Department

"informing him exactly what you need to carry out this research project."

Mathers' long self-typed letter to Ballard was dated 23 July which further reflects his enthusiasm and patriotism. It also is a measure of the swiftness of the postal system in handling mail at that time. Of course most of Mathers' innumerable letters were typed in the chemistry office, and nearly all the typing was by E. M. Greene.
Soon the involved bureaucracy of the process for handling such projects became evident. But some simplification was sought by representatives of the Navy Department and the National Defense Research Committee. The former referred the project to the latter, as stated in a response to Mathers by Ballard in an official letter dated 2 September.

During the remainder of 1943 the very extensive correspondence on this project alone involved at least eight letters by Mathers to Storms, seven to others in Washington, Boston (NDRC), and locally at least to C. J. Black in the Purchasing Department. At least 17 letters were received by Mathers and President Wells. The volume of correspondence was greater in 1944 and it continued at a high level even through the first half of 1948. Strangely, there were only a few copies of letters which were designated for the chairman, Shriner. However, Shriner knew about the project and it had his full approval.

Finally on 27 October the National Defense Research Committee's Office of Scientific Research and Development outlined the budget for the project with the stipulation that the investigation was to be "for the period from October 15, 1943 to April 15, 1944." In effect four months at $625 per month were allowed for the research and an extension of two months were given

"...to provide for the legal collection of outstanding bills which may be late in coming in after the work has been completed."

The anticipated budget per month was: materials $100, assistants $225, supervision (portion of Mathers' salary corresponding to the estimated but not real proportion of his time devoted to the project), and overhead $175.

Having received a budget on 1 November Mathers wrote to P. S. Visher, AB'42, inviting him to defer his plan to enlist in the military forces and serve as an assistant in the project at $225 per month. He stated "I am writing in the hopes that you would like to do something important and badly needed right NOW"(sic).

He meticulously refrained from giving any information on the research except that "It is inorganic." Visher immediately accepted by wire and began planning on starting the work without delay. Even in his quick response to the acceptance, dated 7 November, Mathers repeated again that he would "not divulge the nature of the work until we are more sure of it all." Looking at it decades later the circumstances were indeed whimsical. Visher was then employed at the Navy Research Laboratory, presumably on a project of military importance. After working for Mathers a few months in Bloomington, the military needs for men were increased and Visher's deferment status was withdrawn. He then entered the Navy.
Virtually at the same time that Mathers asked Visher to aid in the project he wrote a two-page letter to Dr. T. K. Sherwood of the NDRC and expressed complete satisfaction with the proposed budget. He included many questions regarding the availability of technical information which he would like to use in solving the research problems. These included questions on impurities that were known to be harmful, why magnesium fluoride was "considered better than calcium or barium or perhaps cerium." The questions were referred to Ensign Storm for a response because he was "probably in the best position to answer these questions."

A contract for the project was completed in late December 1943 and acknowledged by President Wells. It, like many contracts at that time, was classified as Restricted, thus requiring some limitations on the handling of documents and some degree of clearance for those involved in the research. Some degree of aggrandizement seemed to envelop Mathers by the security restrictions on the project and the necessity for him to pass a Personal Security inquiry (his letter of 10 December '42 to R. C. Wilcox).

In addition to the very frequent and sometimes long letters by Mathers to officials in Washington, as well as to suppliers of chemicals, he submitted monthly reports to Washington. These were comprehensive, informative, and well prepared. The 15-page report for the period ending 15 February 1944 was accompanied by a two-page letter by Mathers. The letter concluded that

"...this problem is perhaps 80-85% completed. All that remains is finding the most satisfactory source of raw materials."

After Visher joined the project in November 1943 the general pattern of the work became the preparation of magnesium fluoride samples in Bloomington and the testing of effectiveness in filming of optical glass in the Navy Yard at Washington. Ensign Storms was primarily responsible for the testing but eventually others at the Navy Yard became involved since Storms had other pressing responsibilities.

Almost from the beginning, the rate of testing and reporting to Mathers quickly became the limiting factor in completing the project. The delays stimulated Mathers to urge frequently the acceleration of the program in Washington, but in spite of his irritation and impatience all the letters were polite and diplomatic.

By 30 March 1944 Commander R. M. Nixon (not the President-to-be), in charge of the Optical Shop, directed a summation report to the Chief of the Bureau of Ordnance in the Navy Department. It stated
Dr. Mathers has submitted a large number of samples of magnesium fluoride to the Naval Gun Factory for testing, some of which have proved to be highly satisfactory.

The report suggested that

"...the objective of the present project has already been attained and all that remains is a crystallization of present data into usable form."

It proposed that Mathers should be requested

"...to select the three or more...samples which seem most appropriate for practical production and submit a substantial sample...for extensive test and analysis."

Four days later Mathers wrote to Commander Nixon that the report

"...is an excellent statement of the results of our research on magnesium fluoride."

In the meantime, during the action to induct many deferred young scientists, Visher was drafted into the Navy. Thus Mathers had no help to assist in finishing the project. That did not deter him from moving toward a definitive resolution of the problem. The contract was to expire 15 April 1944, but he was assured that there would be an extension of time.

On 22 April in a three-page letter he wrote to the OSRD and outlined his plan to resolve, as he stated, the "three variables that need checking." Also he stated that he would soon prepare and submit a comprehensive report. Within three weeks the report was finished and submitted. On 1 August he mailed 15 additional samples for testing, but the continuing problem of delay in the Optical Shop plagued him. He could not knowledgeably conduct other experiments without dependable and prompt reports on his samples.

Finally on 21 September Mathers wrote to the OSRD that he had not received any test results on samples mailed many weeks before. The reply dated 23 September expressed regret and stated that the equipment had been out of order, but the samples would be tested "in about ten days." The reply, by R. C. Wilcox, suggested that in view of the testing delays and the virtual completion of the project the work should be discontinued after receiving the test results on the last 15 samples. It was suggested that any further work "would be merely refinements," and that these "could be easily carried out by the Navy, itself."
Finally on 31 October Wilcox wrote that the tests on the 15 samples mailed 1 August had been completed and that the results would be received by Mathers "in a day or two." The letter transmitting the results was dated 11 November. Mathers replied on 14 November and stated that

"There are variations that so far as I can see are explainable only by assuming variations in the testing methods."

The response on 17 November did not refer to Mathers' concern about the testing method and analysis of results. In his letter on 21 November he asked

"that certain samples at least be retested until check (verification) results are obtained."

It was his firm opinion

"that when check tests are made all of the samples will be found satisfactory."

**EFFORTS TO OBTAIN A PATENT AND PATENT AGREEMENTS**

Of course, as Mathers had made clear many months before, he desired all along to have the basic process patented by the government, a collaborating industrial company, Indiana University, or himself with Visher. Thus he wanted the research to be thorough and agreements made between all concerned.

By this time, as indicated by the correspondence, the representatives of the Navy were satisfied with the degree of progress that had been made, but they wanted the project quickly terminated. However, in the letter of 31 October Wilcox volunteered that he had himself requested a two month extension of the contract beyond the 31 October termination. From about that time onward Mathers' attention on magnesium fluoride was focused primarily on the preparation of the final report to the Navy and the pursuit of a patent.

Mathers asked various questions about the testing procedures and suggested some alterations. He noted in a letter on 7 December 1944 to Wilcox that following the termination of the contract there would be 120 days for making final reports. Persistently he wrote,

"There will be no difficulty in making the final report quite promptly after receiving the results on the retested material on these new samples which I shall send very soon."
Thus he continued and the Navy personnel did not stop him.

On 20 December he wrote to Wilcox that he had “a speaking engagement in Baltimore for February 3.” He expressed his desire to make the trip to Washington at his own expense.

Of course Mathers was welcomed. In a response Wilcox admitted that in testing the samples the Optical School had not ground the samples as Mathers had suggested and that this was probably the reason for the unsatisfactory results. Thus the visit was mutually beneficial.

Although Mathers desired further improvements in the process it was clear that very good progress had been made. In May 1944 Visher, now an Ensign in the Navy, informed Mathers that he had talked with Storms. Storms, in confirmation of official reports, had informed Visher that the product from Indiana University was much better than the magnesium fluoride they had been using. About the same time Visher sent Mathers a clipping from the New York Times of 27 February 1944. It reported that H. R. Moulton of the American Optical Company claimed “A 35 percent increase in the light transmission of binoculars” when the glass was treated “by a new method of removing light reflections from glass.” The article stated that “The new reflection remover is a military secret.” Of course this referred to magnesium fluoride.

After his volunteered visit to Washington on Friday afternoon on 2 February, and after subsequent testing had been done, the superiority of the Mathers’ process became unquestioned. Nevertheless he continued to prepare magnesium fluoride under different conditions and samples were forwarded to Storms who by this time had become Lt(jg) USNR. The last sample in which Mathers had high hopes was mailed to Storms on 10 July 1945. By that time all of the final report had been prepared except for the inclusion of conclusions from the testing of this sample, number 98, in the long series. This was more than seven months after Wilcox had informed Mathers that the Navy was satisfied with his work and desired to have his final report so that the project could be actually terminated. The last test results were disappointing, but they only confirmed that the results from one test were not adequate. Mathers’ “stencils for the final report” were submitted on 3 August 1945. In doing so he offered to do any additional work or make any suggestions that might be desired.

The 17-page final duplicated report, prepared in Washington, showed that the methods developed for the

“Fusing of magnesium fluoride and keeping it molten for 15 to 20 minutes greatly improved its lens coating characteristics....”

Receipt of the report and the preparation and distribution of copies by the OSRD was acknowledged 22 August 1945. This was approxi-
mately two years after Mathers had been encouraged to work on the project. The original contract had anticipated a duration of six months. The delays had been caused primarily by slowness in the testing program carried out by the Navy.

The prolonged process of completing the work for the final report to the Navy and the interminable delays in reaching a decision within the Indiana University Foundation were the major factors in delaying the application for a patent. There was no problem in getting the Navy to issue a security clearance for this action. Finally on 18 May 1948 a U.S. patent was issued to Mathers and Paul Visher on Processes for the Purification of Magnesium Fluoride for Use as Lens Coating.

**PATENT FUMBLING IN THE NEW IU FOUNDATION**

Mathers' interest in patenting the process is best revealed in his letter of 11 June 1945 to R. C. Wilcox at the OSRD:

"I have been trying to think how this method of making magnesium fluoride can be commercially exploited for the benefit of the Indiana University Foundation of course, subject to the usual rights of the United States Government. I have advised the Foundation to make a contract and business agreement with some optical company whereby the University shall receive a royalty."

Some of the actions and facts in pursuit of the patent illuminate the long path to the development of a workable patent procedure and policy in the University, and they reveal more of interest concerning Mathers.

One of the most revealing summations of Mathers' views and experiences is stated in a letter on 2 February 1940. It was in response to the inquiry of a fellow electrochemist, C. J. Brockman, at the University of Georgia. Concerning Indiana University Mathers wrote:

"The University pays no attention whatever to patents taken out by members of the faculty although the University does have a so-called Foundation. It apparently is not pushed very hard, and I have never heard of its accomplishing anything in the way of patent development."

Further on Mathers stated:

"It seems to me theoretically correct for the University to be given patents, and I presume it will ultimately be done in all the universities. Most patents are of very little value and I have had more fun than money out of the ones I have bothered with. I think, in general,
it pays to take patents because, on the average, they can be sold for more than the cost."

By 1940 Mathers had been granted fourteen US patents. All of the supporting research, except some concerning the fluorine, isolation of fluorine, had been done in his laboratory at Indiana University. The exception involved his work in a government-managed laboratory in Washington during World War I. The Indiana University Foundation, organized in 1936, did not exist when any of the fourteen patents were issued. The patent on magnesium fluoride was the only one granted to him following the creation of the Foundation, and it turned out to be his last.

Mathers' first written expression of interest in a patent was in the response of 1 May 1944 to an inquiry by a patent adviser in the OSRD who had just before that time inquired about "Possible inventions made during work under (the) Contract." The inquiry stated that in the OSRD it was believed the development "possibly should be given some consideration from a patent point of view." Mathers' response was accompanied by a Record of Invention form he had completed. On the form he indicated his desire for assignment of the patent, if granted, to Indiana University. He specified that the co-inventor was Paul S. Visher and that the conception of the invention was on 14 January 1944. Neither he nor those he corresponded with in the OSRD seemed to realize that delays in the completion of tests on magnesium fluoride preparations in Washington, uncertainties and ineptness in the undeveloped Indiana University Foundation, and some difficulties in gaining approval of some claims by the Patent Office were going to take four years before a patent could be issued. Virtually all of the initiative and know how from Bloomington were the contributions of Mathers. The other major contributor was W. H. Brown, Resident Attorney of the Harshaw Chemical Company. Through Mathers' urging and actions the expertise of a likely licensee was sought to pursue the application process. Mathers selected the Harshaw Company. This had to occur only after necessary releases were granted by the Government, but with the understanding that it would receive a nonexclusive, royalty-free license.

The first record of possible interest by the University was in Mathers' letter to the OSRD on 28 June 1944. In part he wrote,

"it seems to be their (University authorities) desire to give the invention to the Indiana University Foundation."

But excessive delays in Washington and in the Foundation were to continue. Illustrative of some of the correspondence, in October Mathers
wrote to the NDRC that "the final samples which I submitted on August 1 have (not) yet been tested." On 4 April 1945 he replied to a telegram:

"We are unable to make a decision whether or not the University desires to apply for the patents until we can get some additional reports of tests on samples..."

Five days later a two-page letter by the NDRC gave instructions and commitments which made it feasible for the university to initiate an application for a patent. Eleven days later the Foundation through Lawrence Wheeler vaguely decided that Mathers

"should file the papers ... in such a way that you (Mathers) would protect the University and the Foundation in any possible patent which further investigation might seem worthwhile."

Thus he was to become the patent specialist as well as the scientist-inventor. A sense of direction, understanding, and decisiveness concerning patents was badly needed. For example, on 23 August 1945 Mathers wrote in part to W. G. Biddle:

"It has been my suggestion that I attempt some contract with some of the optical companies ... whereby they would do all the patenting and give some royalty to our foundation. I suggested this at a meeting of the Foundation Committee last summer but the opinion was expressed that the Foundation should do its own patenting. I still disapprove of that course."

Further on in the letter the feeling was reiterated:

"I wish you would have the board or someone make a decision in this matter so I can know what to do."

Mathers' persistence and logic prevailed. Sixty two days later Biddle replied that he had "secured a decision from the Foundation." He reported that the Foundation did not desire "to enter into a patent agreement directly," and that Mathers should follow his suggestion of making arrangements with an industrial company

"whereby they would take care of the patenting details (These of course are the heart of successful patents) and give the royalty to the Foundation."

This optimistic response did not anticipate the serious difficulties that were going to be encountered in getting a strong patent or the very
limited demand that would occur for magnesium fluoride. Mathers was also overly optimistic and he proceeded at once to find a favorable industrial response.

Finally on 17 December 1945 the Harshaw Chemical Company indicated that it would be interested in receiving an exclusive license and it anticipated reaching an agreement whereby royalty would be paid on some percentage of net sales and the company would aid much in getting the process comprehensively patented. However, Mathers was still uncertain regarding the freedom he would have in dealing with Harshaw. He wanted authorization "to handle this matter as I see fit."

Mr. Wheeler's response, on 14 January, was that the Foundation Board was agreeable and he should proceed with the Harshaw Company as he proposed; also "The Foundation will pay the Government fees."

The next significant step occurred in April when Mathers received from the Harshaw Resident Attorney (Mr. Brown) a draft patent application. However, during the preceding several months there had been much correspondence between Mathers and the patent adviser of the NDRC to assure that full governmental clearance had been given on the "Restricted" status of the research and that only the Government's usual licensing rights would be retained.

In Mathers' response two weeks later he recognized in the patent application the need for "only a few minor corrections and changes." His realism is reflected in his statement:

"I have turned the (draft) contract from your company over to the University authorities and they have referred it to their attorney. You can expect plenty of delay before they get this attended to."

The next and final delaying problem concerned the discovery that another patent (Sabine) issued in 1942 seemed to anticipate the Mathers' procedure so closely that much of its apparent novelty had been removed. The patent was held by the Eastman Company. When informed about this by Brown Mathers replied on 19 February 1947,

"I doubt very much whether we can show patentable novelty but it is worth considering."

In the two-page response he presented plausible arguments that the Sabine process was significantly different and without question the Mathers' process was much simpler, "considerably cheaper," and more dependable. Two weeks later he wrote "Every time I read the Sabine patent it means a different thing to me." He urged Brown to continue searching for patentable novelty. Three days later he sent him further comments
that focused on the presumed novelty of his process in carrying out the fusion in graphite crucibles.

Finally on 7 July Brown sent Mathers a copy of an amendment to the patent application. He stated that the new claims defined differences,

"...but it is somewhat doubtful whether these are of sufficient importance to justify allowance."

On 20 October the Patent Office gave a final rejection to a major claim in the patent. This did not cause Brown and Mathers to give up. At Brown's suggestion a request was made for an interview with the Examiner. This was the only recourse they had to a continuance of the application. Within a few weeks Brown succeeded in getting a conference with the Principal Examiner and Assistant Examiner. This placed the requested amendment in condition for allowance. On 8 December 1947 Brown wrote that the meeting "had a satisfactory outcome, and the two claims ... have been allowed."

The next delay came when Brown wrote to Mathers on 9 January 1948 that

"In checking up this matter, we note that the agreement between Harshaw and the University of Indiana has never been executed ... and we were under the impression that it would be signed by the University long ago."

This precipitated another series of written exchanges between Mathers, Wheeler of the IU Foundation, and others. Again there was a fumbling and wavering response of uncertainty. After a week Wheeler in effect responded that no one in the university seemed to be paying any attention to the matter. The next day in some apparent disgust Mathers wrote,

"I shall be glad if you will have Mr. Franklin and Mr. Henley send me a waiver from the University and I will pay the fees (modest patent application and issuance fees) and take control of the patent myself."

At the same time he wrote to Brown asking him to

"delay doing anything until I can get things a little better arranged here."

Again, after more than seven weeks without learning more from the Foundation or else where in the University, Mathers wrote to Wheeler for a
"...final decision regarding the Foundation or University, releasing their rights to the patent..."

The prompt and revealing response concluded that he (Wheeler)

"do(es) not want to lose any potential asset of the University's, but I am at a loss to suggest procedure."

Mathers' very prompt response was

"The fact remains that some decision must be made."

Ten days later the response was repeated, with greater emphasis. The next day Mathers was given a definite and succinct response, which at long last was precisely what he had been asking for:

1. The University had no objection to the completion of patent arrangements by the Foundation.
2. The Foundation would support the completion of arrangements on the terms he had proposed, i.e., the patent should be issued to Mathers and Paul Visher.
3. The Foundation would pay the fees for the search and patent if granted.

The next day Mathers accepted the terms and responded in part:

"Everything has been done that is necessary and the patent will be issued as soon as the fees are paid. I hope the Foundation can attend to this at once as the Harshaw man (Brown) seems to be rather 'out of fix' due to our delay."

Mathers gave further assurance to Wheeler that he would act in the best interest of the University. He expressed the hope that there would be sufficient commercial use of the process to produce substantial royalties for the Foundation.

Shortly after receiving this full commitment Mathers transmitted a copy of the letter to Brown. This was with his statement that compliance (payment of the small fee "will be attended to in due time.") His true feelings were made clear in his additional comment.

"As you know these institutions never are very prompt in attending to these matters and therefore, I have no idea when this will be finally settled."
The years of pressing effort by Mathers on a significant but basically simple matter were about to end. Five weeks after the commitment letter was received by Mathers, Wheeler sent $30.00 to Brown for transmittal to the Patent Office in payment for issuance of the patent. Six weeks later the check had been sent to Washington by Brown, the Patent Office had transmitted the patent to Brown, and Brown had then transmitted the patent to Mathers in Bloomington. The owners of the patent were Mathers and Paul S. Visher. Surely the process involved far more letter writing, prodding, and delays than he had ever experienced with any other patent.

Not all of the delays and equivocations were attributable to the new foundation and university officials, but the halting timidity and inexperience were followed by constructive remedies. When in March 1951 the opportunity came to the Foundation to participate in formal agreements that were to lead to the development and extensive commercialization of CREST toothpaste there was immediate eagerness to take on responsibility. The participation this time was knowledgeable, prompt, and cooperative. The process patented by Mathers and Visher was sound and useful but its applicability was decidedly limited, thus having virtually no value to the foundation. The patents that supported the CREST dentifrice proved to be exceedingly valuable to the foundation and university. The principal participants of the Department of Chemistry were W. H. Nebergall, J. C. Muhler, and H. G. Day.

But strange coincidences linked the two research projects together. Without him being aware of it, the second as well as the first had a connection with Mathers. It was linked to him indirectly in two ways: (1) Some of the fluoride compounds used in the initial studies leading to the development of a fluoridized toothpaste (CREST) were furnished from his large stock of chemicals and used by Muhler in the initial phases of the fluoride research.

(2) The idea for the successful treatment of the abrasive in toothpaste, calcium phosphate, to make it unreactive with added fluoride, came to Nebergall when he attended a lecture by Mathers in which he referred to his research involving the calcination of limestone and related materials. Nebergall at once began to study the effect of controlled heating of calcium phosphate. His work led to the first patents, in his name, that constituted a novel feature of CREST. This work became a key to further research developments and the commercialization of the eventual dental caries preventive dentifrice.

"PLATIN-NIG"

Another illustration of Mathers' thinking and activity in commercially applicable research concerns the heightening of his interest in his process for the production of an oxidized finish on table silverware. He
and his student J. Papish had patented the process in 1919. In the same year they were issued a trademark "Platin-nig" to identify the product. The process involved the use of a tellurium preparation which could be conveniently used "to produce an oxidized finish on table silverware and marking brass articles" (Renewal of Certification of Registration, 4 April 1939).

On 27 August 1946, Mathers resumed an earlier discussion he had with van Winkel Todd in a national firm specialized in electroplating and polishing equipment and supplies. His purpose was to firm up and conclude a tentative agreement for the company to package and market the product and pay Mathers a stipulated percentage of the gross sales income. The response was prompt and agreeable. Mathers quickly agreed to the terms and wrote in part in his self-typed letter,

"All I expect is that you (the firm) do your best and, if either of us become dissatisfied, the agreement can be cancelled after, say, a six months notice."

The copy of this letter from his files, like virtually all that he typed, was on the back of used paper.

About five months later the president of the company wrote to Mathers,

"We are glad to note that you are pleased with our handling of 'Platin-nig,' and they tell me there has been a reasonable volume of business developed."

It is not known how long the arrangement continued.

**COPPER STRIPPING FROM SCRAP METAL**

A research project sponsored by the American Electroplaters' Society near the time of Mathers' interim chairmanship illustrates further his independence, attitudes concerning university responsibilities, and the nature of his research interests. In 1945 the American Electroplaters' Society began the sponsorship of several industry-related research projects. There were project directors for each. Mathers accepted sponsorship of a project on the stripping of copper from various base metals. The director for the Mathers' project was L. E. Weeg of C. G. Conn Ltd., Elkhart, Indiana, manufacturers of band instruments. Occasionally Weeg came to Bloomington to confer on the progress of the work. More than by coincidence the meetings occurred immediately before or following football and/or basketball games.

The terms of the Society's support included the submission of a monthly progress report to Mr. Weeg and a bill to the Executive-Sec-
retary, in Pennsylvania, "on the first of each month for (itemized) services of the preceding month." For Mathers the billing apparently was essentially the listing of the modest monthly consulting fee for himself and a stipend for his graduate research assistant on the project, E. L. Martin, whose doctoral thesis was on the subject. This close "over-the-shoulder" level of control did not seem to disturb Mathers. As in virtually all other of his university-related activities copies of his voluminous correspondence did not give indication that he sought to keep the chairman of the department or others informed. He was simply independent, and he came and went as he pleased, but he never abused his connections with the department.

Mathers' active research on the stripping of copper was terminated in February 1946 when Martin completed the laboratory work toward his degree and returned to his faculty position at the University of New Mexico. However, as in other research projects, Mathers continued to be interested and devote some attention to the project. For instance, in a two-page letter to Mr. Weeg on 27 May 1947 he made several apparently valuable comments. The letter was accompanied by, as he stated

"...a very interesting photostat from one of the Bureaus in Washington concerning information obtained in Germany concerning methods of depleting copper-iron scrap developed by the Germans."

Much of the Martin-Mathers research was published. At the meeting of the Electroplaters' Society in June 1946, Mathers gave a paper on the research in a session that included the reports of ten other groups whose work was being supported through the Society.

**Salvaging Selenium and Aluminum from Scrap**

In dealing with industrial companies and their technical personnel on matters pertaining to technical processes Mathers was characteristically forthright and willing to share his knowledge and experience. His attitude and mode of expression are reflected in copies of innumerable letters and other documents he wrote. The World War II period and the following decade were especially notable in the degree of his involvement.

This is illustrated in correspondence he had with the United States Metals and Refining Company of New Jersey in 1954. The company had experienced difficulty in salvaging selenium and aluminum from scrap rectifiers. It requested an opportunity to work out an arrangement whereby Mathers' help might be contracted for. In the response on 15 March, when he was 73 years of age, he wrote

"I believe more might be accomplished by experimentation on my part ... as well as whatever consulting ... was deemed necessary."
He added:

"I am doing work for other nationally known companies and have for several years. The payment varies widely and is generally on a monthly basis."

For good reasons the company did not continue this research. Soon because of age and lack of students, Mathers' activities gradually declined but he continued to keep in touch.

SERVING ON AN ADVISORY PANEL OF THE NATIONAL RESEARCH COUNCIL

Mathers was fair and trusting in the good faith of companies and investigators with whom he dealt, but he was not naive. When he felt that a company had used his information or advice unfairly and without giving him and his colleagues satisfactory credit and remuneration he was strongly resentful. Concerning one incident in dealing with a company he believed had been unfair, on 12 May 1955 he wrote,

"I shall always think that we may have been 'double crossed'."

One of the final areas of Mathers' active participation in giving advice was in late 1954 and throughout most of 1955 when he served on an Advisory Panel in Electrochemistry of the National Research Council. This was for the Advisory Committee on International Technologie Assistance. The project turned out to be primarily on electrochemical aid for India. After several months of correspondence between Mathers and the other 32 panel members with the project manager in Washington, a meeting was held at the National Academy of Sciences on 25-26 October 1955.

In August before the meeting the project manager, Dr. C. S. Piggot, sent Mathers that portion of the draft report he was preparing "which deals with the Central Electro-chemical Research Institute." Mathers' advice had been sought all along but on this advanced stage of the program his considered evaluations were particularly needed. In less than three weeks Mathers responded. The value of his analysis is expressed in Piggot's reply. He stated in part that it:

"...was just the sort of help I need from our Panel of Advisers. Because of the wealth of your experience you are able to evaluate these requests in much greater detail certainly than I could."

In part the comments focused on the importance of planning on the basis of what was established in the literature and in the experience of others. Mathers wrote
"After all it is not the splendid apparatus that really counts but it is the men (sic) themselves."

Of course in this sexist expression there is no evidence that sexism was intended. Immediately following this he wrote

"Just consider the meager things Madam Curie had to work with!"

In the invitation to attend the expenses-paid panel meeting Mathers was cordially invited to suggest a hotel where a room reservation would be made, as Piggot asked, "at the Cosmos Club where I will be glad to provide you with a Guest Card?" Mathers' prompt response was typical of his frugal nature. He asked for a "smaller hotel near the middle of things" and specified "a small room, with bath, at the back part away from the elevators..." Piggot quickly replied and stated that exactly the kind of room requested had been reserved. However, he wrote,

"The charge will be $7.00 a night, which I consider terrible but which is actually moderate for present-day Washington hotel prices."

Soon after the panel meeting Mathers expressed his appreciation to Piggot for the quality of the planning and conduct of the meeting. The large dinner indeed elevated his self-regard and caused him to write

"I was especially glad to be a guest at the dinner at the Cosmos Club. I had been in the old club in 1908!... This one is beyond all expectations."

Mathers' comments and cogent recommendations on the panel discussion and the report in its advanced state filled two pages. In particular he recommended the elimination of major overlapping of work and responsibilities in the emerging metallurgical and electrochemical activities in India. Of course this was a sensitive matter because implementation of it would significantly affect various vested interests. Also, in the interest of efficiency and the minimization of cost to the United States, he emphasized that the industry and government of India should adapt existing technology and research findings rather than trying again to discover and develop everything.

**Addition Agents**

A final measure of Mathers' research and mode of thinking and dealing with others is in his never-ending search for "addition agents" to improve the quality of plating in the electroplating industry. Desirable agents promoted smooth plating.
During 1946-47, as he had done for years before and as he was to continue, he sought for almost any kind of material he thought might be worth testing in his lead plating baths and in other plating tests. There seemed to be no guiding scientific principles, just trial and error procedures and results, a type of Edisonian research. Indeed a shared birthday—11 February—was one of several likenesses between Mathers and Edison.

The standard of comparison was goulac, a by-product material from the sulfite paper industry. Apple syrup, citrus fruit peel, and gelatin were among the scores of materials tested. Almost with the zeal of the medieval knights in search of the Holy Grail he searched for something far better than goulac. As he wrote to the Marathon Chemical Company (a supplier of goulac) in January 1940,

"...there is a possibility that some of the products (of the company) will be very superior to the crude sulfite residue (goulac)."

Like the knights of old he never found the object of his searches, but as long as he could work he never stopped looking.

Mathers' personal involvement in conducting laboratory studies on addition agents, and on other electroplating problems, were continued almost to the year of his death, in 1973.

**PROCUREMENT OF WAR SURPLUS EQUIPMENT AND SUPPLIES**

One of the major problems in the department during the first approximately two years following the end of the war was the procurement and management of useful war surplus chemicals, laboratory supplies, and equipment from certain commercial laboratories with government contracts and from some military bases. During the war there were various difficulties in procuring many needed items, but suddenly in some cases there was an overabundance. This occurred primarily in 1946 and 1947, but some surplus items were obtained over a period of several years. Two of the principals at Indiana University who played direct roles were George F. Siddons, Electronics Services, and Branch McCracken, head basketball coach, then on leave. The former in background and duties was naturally qualified for his special assignment. The latter had no special qualifications, but the exiguous circumstances of transition from wartime duty to peacetime pursuits made the assignment rational. The coach had been on leave from the university to give wartime military service. That assignment ended before the contract with the substitute coach had terminated. Both Siddons and McCracken proved to be good choices in meeting the needs of the Department of Chemistry.

In addition to the collections of enormous quantities of standard and useful kinds of Pyrex glassware and chemicals some of the special...
acquisitions included an RCA electron microscope, valuable tools and machines for the fledgling machine shop, a great abundance of wooden filing cabinets and desks, and a fighter airplane that had not been fully built.

Siddons was uniquely responsible for finding and assuring the transfer of the highly desired electron microscope to the university.

**Electron Microscope in Chemistry**

After it had been finally brought to the campus in 1946, the electron microscope was first installed on the ground floor of Biology Hall (now Swain Hall East). Perhaps this was in part because Dean Payne was chairman of the electron microscope committee and it was presumed that biologists would be the principal users of the equipment. By fall 1948 Robert B. Fischer, a specialist in electron microscopy, had joined the chemistry faculty. The equipment was moved to the Chemistry Building. The combination of a powerful new research tool and a faculty member skilled in its use was a great step forward in the program of developing the department. In addition, the electron microscope was the first equipment here that clearly had to be maintained under relatively good temperature and humidity controls. Thus its installation marked the beginning of temperature and humidity control for equipment.

By 1948 the Chemistry Building was becoming exceedingly crowded, but it was necessary to wait several more years before some relief occurred. After the completion of Jordan Hall in 1955 the Bacteriology Department moved to Jordan from the upper floors of Kirkwood Hall. The analytical chemistry group moved to the space vacated by bacteriology. This included a move of the electron microscope, primarily because it was under the supervision of Fischer, and he needed it in his work and teaching. The move was indeed a task because there was no elevator in Kirkwood.

The electron microscopy laboratory and its services quickly became important to the department as well as elsewhere in the university. This was prominently noted in various ways. In the 1954 issue of a brochure on “Chemistry at Indiana University” it was stated that:

> “There is one laboratory for electron microscopy. The research in various areas of the Department, as well as in certain other departments of the University, is enhanced through the service rendered by this laboratory. The faculty member in charge is assisted by a graduate student with special training in electron microscopy.”

**Efforts to Procure a Planetarium for IU**

Not all the efforts to procure useful war surplus equipment were successful. In summer 1946 information was obtained that a large variety and quantity of equipment, laboratory supplies, and various chemicals
had been "liberated" from Jena and other parts of East Germany immediately before the area became occupied by the Soviet Forces. Through the US Air Force the material was brought to America and housed at Wright Field, near Dayton, Ohio. Procedures had been set up through which educational institutions could examine the stores and file claim for items that could be effectively used.

Four faculty members from this university spent almost two full days at Wright Field early in July 1946. They were H. G. Day, F. K. Edmondson, P. A. Nicoll, and T. W. Torrey. Three weeks later a return trip was made for almost two days of examining material. Much of the huge variety of collected items was judged by the representatives to be of little if any use to Indiana University, but there were some exceptions. The most notable item was an apparently complete but disassembled Zeiss planetarium. Indiana University was not alone in recognizing and desiring this treasure. I believe that after some time the planetarium was given to the Air Force Academy. Little if anything of value was obtained by the university through the visits.

**Fighter Airplane**

An unfinished surplus airplane and an abundance of metal stock came from the Whirlpool plant in Evansville, Indiana, which during the war had become a manufacturer of small military airplanes. In the process of disposing of the surplus products and stocks of supplies the plant's military personnel dealt with representatives of various institutions. Branch McCracken's background and personality were effective in making the necessary contacts for IU. J. H. Billman and E. Campaigne represented the Department of Chemistry in the inspection of the plant to identify and make claims for items that would be useful and justifiable. Their selection of the airplane and metal stock was granted.

Before trucking the small airplane to Bloomington it was filled with a variety of aluminum bars and other metallic parts used in the manufacture and assembling of airplanes. On campus the airplane was parked in a corner of the Jordan baseball field which is now a parking lot for the Memorial Union. The metal stock and other salvaged materials were taken to the Chemistry Building. Various instruments and parts of the airplane were disassembled and used in various ways in the department. Some of the plexiglass cowling was converted to portable safety shields that were to serve for many years in some of the laboratories. The metal stock was of great value in the work of the new machine shop.

**War Surplus Equipment, Tools, and Stock for the Machine Shop**

Equipment, tools, and stock for the machine shop was for several years a product of war surplus disposal actions. Much of this came from plants in Indianapolis and Plainfield as well as from nearby Camp At-
terbury. Because there was not enough room to store it in the machine shop the excess that did not need to be locked up was placed on racks in the nearby hallway. Eventually there was some trading of surplus material for more desirable equipment. For example, a surplus Cincinnati Milling machine was kept about a year and then traded for a new and much more useful Cincinnati Universal machine. The first machinist, Jack Baird, devoted some of his time during the first few years to the procurement of surplus machinery, tools, and stock for the machine shop.

For some time great numbers of cartons of new surplus glassware of considerable variety were temporarily stored along one side of the long first (ground) floor hallway of the Chemistry Building. Gradually the storerooms, teaching laboratory lockers, and research laboratories became well stocked with several kinds of glassware and other supplies. Probably this was for the first time in the department.

For many years following the war nearly all the offices and storerooms contained wooden four drawer filing cabinets and stools that had been declared surplus in war-related industries soon after the war ended. Thus Indiana University obtained its fair share. Initially the surplus items were a highly welcomed asset. However the non-gliding drawers of the cabinets gradually became more unwieldy and some of the stools practically fell apart. They served a useful purpose but it was probably about 25 years before virtually all had been replaced by convenient and safer equipment.

**Emergency Housing for Students Following the War**

The Department of Chemistry was greatly affected by the housing shortage that extended approximately from early 1946 to late 1949. Almost instant doubling of student enrollments occurred in 1946-47 and the increase in numbers of students was to continue for several decades. Clark (III, 197-225) referred to the housing situation on campus as “The Rise of an Academic Metropolis.” He wrote that

“Wells and his administrative staff in 1945-48 viewed the housing situation as the major challenge facing Indiana University.”

Delays in the preparation of essential additional student housing forced the university to defer the beginning of the 1946-47 year until 11 October with classes beginning 18 October.

The most notable of the quickly developed and temporary housing facilities was Woodlawn Courts. Others of importance to chemistry included Hoosier Courts, Cottage Grove Apartments, and Smithwood Center. Several of our chemistry students and young faculty who later became notable made their start here in such housing.
During these anxious years of providing housing and for at least fifteen years prior to his appointment as interim chairman, Mathers was personally involved in renting many of his apartments and houses to students and young faculty. He did not contribute significantly to the provision of additional housing but his rental rates were relatively modest. Such rates were possible because the property was generally rundown and he did not refurbish or even maintain the property or furnishings any more than was urgently necessary. Mathers felt that he was conferring favors on students by keeping the rental charges low. He believed this was preferable to the provision of more attractive and better furnished apartments which, of course, would require higher rental charges.

CORRESPONDENCE WITH ALUMNI

Throughout much of his life Mathers kept in contact with many of the students and alumni. For example, Max Marsh has commented to me concerning the letters Mathers wrote to Marsh’s coworker at Eli Lilly, Maxine Rowe, AB’40. They were both impressed by the pungent nature of Mathers’ remarks.

SOCIAL LIFE

During the chairmanship years of Shriner and Mathers faculty bridge parties within the department were frequent and congenial. Nearly all the faculty participated. Frequently guests were included. A diary kept by Mrs. H. G. Day showed that from September 1945 through June 1947 the Days attended fifteen chemistry faculty bridge parties. Three were given by the Shriners. The Mathers, C. E. Mays, L. L. Merritts, and Days each gave two parties and several others gave at least one party each. There was always dinner or dessert. Generally there were three tables but occasionally there were five or six.

The occasional periods of relaxation for the faculty were also matched by graduate students and others. This was illustrated by an item on “the second duplicate bridge tournament” in the IDS on 11 October 1947. The news was that two chemistry graduates, Paul Rylander and Edward Howard, had earned first place in the tournament. Each of the winners received a free dinner at the new Indiana Union Club, a temporary “annex” to the Memorial Union made necessary by the rapid growth of the university and the marked need for guest housing.

In addition to bridge, a considerable number of both faculty and students played chess and some were participants in chess tournaments. For example, in November 1947 a faculty chess team competed against a student team. The faculty team of five members included E. E. Campagne and D. W. Beaumont. The latter had joined the chemistry faculty that fall.
There was always an annual family-type picnic sponsored by one of the chemistry organizations, Phi Lambda Upsilon or Alpha Chi Sigma. These were attended primarily by graduate students and faculty but a few non-academic staff persons and undergraduate chemistry majors participated. The site was always a park or other public place, generally Brown County State Park, Yellowwood State Forest, or the McCormick's Creek State Park. There were various activities but the big features were a soft ball game and a huge picnic supper. The picnics were continued well into the 1970s.

**SOME EVENTS IN THE NEWS DURING 1946-47**

Over many years the Indiana Daily Student was the major source of public information concerning virtually all areas of the university, including the Department of Chemistry and other departments. Thus currently as well as retrospectively many of the news items provided a good basis for knowing what was going on. The 1946-47 issues constituted a good window on some aspects of the department during Mathers' year at the helm.

The academic standing of the department, stimulated by Shriner, was continuing to become stronger. The prestigious DuPont fellowship in chemistry was made available each year during his tenure. As announced in the IDS on 1 February 1947 IU and 41 other institutions were to have such an award. An announcement ten months later referred to a renewal at IU and the addition of three more institutions to this chemistry fellowship program.

A new fellowship, furnished by Standard Brands, Inc., was started in 1946-47. Barbara Kelley, PhD'48, was the first recipient (IDS 18 Jan.'47). The annual stipend was $800 and there were no restrictions on the kind of research or the publication of findings.

There was no change in the number and standing of visiting lecturers in the department following the Shriner resignation. These were generally sponsored by Alpha Chi Sigma or some other local scientific organization. For example, a noted colleague of Shriner's at Illinois, Dr. Wm. C. Rose, lectured on "The role of amino acids in nutrition" on 2 May 1947.

Two weeks later Alpha Chi Sigma again hosted the lecturer. This time it was R. M. Harger, then Professor and Chairman of the Department of Biochemistry and Toxicology at the School of Medicine in Indianapolis. His realist topic, "Poisons and poisoners in Indiana," and his reputation attracted an unusually large audience. As usual the lecture was in the evening in the Chemistry Auditorium. Dr. Harger was noted for his development of the "drunkometer" and his studies on the quantitative determination of alcohol in body tissues, blood, and breath.
Three days before that lecture the national organization of Sigma Xi sponsored a popular lecture by Raymond M. Fuoss on the physical chemistry of polymers. In the typical mode of the IDS it was reported in part:

"Stretching a rubber band is like pulling out a loosely-coiled ball of twine ... The molecules of the naturally occurring polymer, which is rubber, are actually linked end to end in the form of long chains fastened together by pairs of atoms, Dr. Fuoss said."

On 26, 27, 28 June 1947, which was near the end of Mathers' chairmanship, there was one lecture per day each by a different speaker. The IDS referred to the lectures as a "Chemistry Department Conference." The first and second lecturers, Davis W. Beaumont and John S. Peake, were soon to be appointed to the faculty. The third was Dallas T. Hurd of the General Electric Company. Beaumont was from the Massachusetts Institute of Technology and Peake was from the Dow Chemical Company.

The membership and activities of Alpha Chi Sigma, Phi Lambda Upsilon, and Iota Sigma Pi, increased for several years following the war. When Mathers became interim chairman of the department one of his very competent graduate students Clarence Discher was the master alchemist (president) of AXE. On 26 May 1946 the fraternity initiated seventeen into membership. These included ten graduate students and seven undergraduates. The former were: Dale Stayner, Ray Boucher, Walter Budde, George Butter, Robert Boyer, Harold Price, B. W. Mundy, William Lawton, Spencer Baird, and Rev. Norman Heckman. The undergraduates were: Richard Ray, Ancil Keys, Max Marsh, Richard Doerr, Wesley Tharp, Joseph Brown, and John Hamblem.

At the following initiation, on 25 January 1947, seven undergraduates, three graduate students, and one faculty member were inducted. They were respectively: John Craig, Philip Ferguson, Charles O'Bannon, Delbert Philpott, Albert Sabol, Paul Sollman, and G. L. Eschenbrenner; James Diedrich, Marshall Mead, and Edwin Mertz. The faculty member was L. L. Merritt, Jr.

The trend toward a totally undergraduate AXE organization was in clear evidence at the next initiation, which was on 31 May 1947. Two graduate students, Walter McCarthy and Sydney Nix, Jr. became members. The undergraduates were: Wayne Thompson, Marvin Bothwell, John Ricketts, William Crane, Joe James, William Key, John Masters, Robert Weeks, Billie Crane, Bradley Gage, and William Partenheimer. The newly appointed faculty member Leslie J. Todd was inducted.

Four days later the IDS reported that the fraternity had selected Max Marsh "as the most representative senior majoring in chemistry."
Soon after graduating the outstanding student, who had been in military service during the war, returned to employment at the Eli Lilly Company. During the next several decades he attained high recognition there in research, especially as a Research Adviser.

Also in May 1947 Iota Sigma Pi initiated three undergraduates: Shirley Beldon, Lucille Reininga, and Margaret Young. Their banquet was at Boxman's, the most popular restaurant in Bloomington at that time.

Earlier in May 1947 Sigma Xi elected new members and officers. The election of E. E. Campaigne to treasurer was the beginning of that young faculty member's rise to leadership in several areas of science. Three men completing doctoral degrees in chemistry — David Barnes, Ross Hedrick, and Gordon Schrottenboer — were made full members. The new associate members from chemistry were: Raymond Boucher, Walter Budde, James Diedrich, Paden Dismore, William Foye, Robert Froning, John Griess, Mason Hayek, Nicholas Kartinos, Barbara Kelley, William LeSuer, Max Magner, J. P. Philips, Phyllis Rutan, and Paul Rylander. All these students and many others had been attracted to the department while Shriner was the chairman. Several eventually received notable national recognition.

As customary in that period, during the last week of April junior and senior chemistry majors were taken to Indianapolis where they were guests of the Indiana section of the American Chemical Society. They were given conducted tours at the Eli Lilly Company and elsewhere. At the sectional dinner, held at the Lincoln Hotel they heard Charles Allen Thomas, president-elect of the ACS who spoke on "Peace Time Applications of Atomic Energy." Approximately 50 students attended. They were directed by C. E. Kaslow, then assistant professor.

One of the last significant news items in the IDS before Mathers' term ended was on 15 June 1947. The president's list of 46 faculty promotions in rank, effective 1 July, included the elevation of L. L. Merritt, Jr. to associate professor and Ernest Gerkin (South Bend Center) to assistant professor.

The most touching report in the IDS during 1946-47, as viewed by Mathers, was on 24 July 1947. He had received a long and "enlightening" letter from the distinguished graduate Dr. Fusanobu (Paul) Isobe, '09. Owing to his great admiration of Paul Isobe and the high regard in which he was held by all on campus who knew him, Mathers proudly shared the letter with the IDS. Especially he wanted the public to know about Isobe's spirit and that of his family concerning the great war that erupted between Japan and the United States in 1941. As stated by the IDS, quoting from the emotional letter:

"It was entirely our own fault that we Japanese public were not strong enough to resist against tyrannical military group who forced
the public opinion toward anti-America and finally dragged this nation into war. I tried to promote better feeling and friendly atmosphere among Japanese public against America, but it was in vain because the military power was too strong.”

In spite of the detailed and graphic description of bombing and suffering in Japan provided through the letter and publicity given to it, not a word was revealed regarding Mathers’ humanitarian actions immediately at the end of the war. Through some ingenuity he managed to send some assistance to the Isobe family and another former Japanese student, Kauro Ando, who graduated from the School of Business in 1936. The Ando family was indeed in desperate lack of food and other necessities. Both families became close friends of the Mathers family. In 1980 Ando received an honorary degree from Indiana University in recognition of his high achievements in Economics.

THE CHEMISTRY BUDGET FOR 1947-48

Although Mathers headed the department on an interim basis and the new chairman was not designated until several months before the end of 1946-47, he planned wisely and responsibly for the 1947-48 budget. Also he was diligent and understanding in administering the current budget which had been established before he took responsibility. His perceptions, forthrightness, and objective representation of departmental needs are reflected well in a two-page letter he sent to Dean Ashton on 16 January 1947. He wrote particularly concerning the status of the budget for the second semester. This began the time-consuming process of presenting and defending a proposed budget.

Mathers persuasively made clear that the practice of providing relatively low stipends for graduate assistants was having a dramatically adverse effect on the recruitment of clearly promising new graduate students. Undoubtedly a pressing deterrent in recruiting was the uncertainty regarding the selection of a new chairman and the further strengthening of the department. Mathers wrote that:

“The most serious situation concerns the senior faculty of the department. The demand by industry for superior trained chemists is so great that our faculty is in great danger of being taken away from us.”

In his defense of the proposed increases in the amounts for nearly all categories of the budget he repeated and expanded on the additions proposed the year before by Shriner. The requests included specifically the following:
• Instructor or Assistant Professor whose teaching responsibilities would be in general chemistry and quantitative analysis.
• Assistant Director of Chemistry Laboratories and Assistant Purchasing Agent. He proposed that this person would be directly connected with the “Purchasing Agent” but a member of the chemistry staff. The person would be “In charge of all chemicals, supplies, and equipment, keep records, budget, etc.”
• Stenographer to do the work for the General Chemistry Division
• “Associate Professor in Biochemistry.” He believed the “Background should be Biophysical to round out our Biochemical Division.”

Although the development of these proposals involved much interaction with other persons in the department the final opinions were Mathers. His convictions were firm that all the budgetary requests should be soundly justified and in the best interests of the department and university. In the light of his personal practices of conservation and extreme frugality they were indeed forward looking and reflective of departmental desires.

Of considerable importance, the approved budget, which the succeeding chairman would administer, was apparently as favorable to the department as a sound administration could allow. The approved rate for instructional (graduate) assistants was 21 per cent higher than for 1946-47. This allowed some increase in the size of each stipend as well as an increase in the number of assistants.

The increase in individual salaries for faculty and staff were also substantially increased. For the faculty this ranged about 11 per cent for some to more than 25 per cent for others; for staff members it was from about 8 to 15 per cent.

Also, two net increases in faculty appointments were allowed in the approved budget but no other new positions were approved.

The approved budget for Supplies and Expenses was changed from $23,665 to $30,000. The capital and substantial equipment changes made or authorized during 1947-48 were left entirely to negotiation with Mathers’ successor after he had become chairman.

Of course a significant factor in finalizing the 1947-48 budget must have been the expected enrollment for that year. In March 1947 President Wells reported to the heads of all the divisions in the university that the enrollment at Bloomington was expected to go from 10,245 to 11,500. Another factor was surely the need to satisfy the basic requests of the new chairman, who by that time had been selected.

Overall, the interim chairman held to the policies of his predecessor and constructively prepared the way for his successor.
References

As in all other chapters the sources of information included many issues of the Indiana Daily Student, the Indiana Alumni Magazine, and many letters and reports in the University Archives and the Archives of the Department of Chemistry.

Anon. (1949) Chemistry at Indiana University Manual of Information for Prospective Students of Chemistry. Indiana University Bulletin Vol. XLVII, No. 17. [This was the first publication for prospective students that gave specific and comprehensive information about the department.]


Chapter VIII

The Gucker Years as Chairman: 1947-51

Frank T. Gucker's four years as chairman of the Department of Chemistry (1947-51) can be characterized by his notably systematic and efficient teamwork with the faculty and university administration. But there was much more. He had high standards and strong desire for the achievement of excellence. World War II had recently ended and under thoughtful and trustworthy leadership great development was clearly possible in the burgeoning academic climate that surrounded the universities. This university under President H. B. Wells was moving forward. Both he and the new chairman desired to take advantage of every good and sound opportunity.

The increasing respect for this department and dependence on some of its faculty for university-wide leadership began to surge forward in 1938 after H. T. Briscoe became its first chairman. His predecessor, R. E. Lyons, had been the continuous head and almost exclusive chemistry spokesman for 43 years. In less than ten years Briscoe and his successor R. L. Shriner greatly stimulated constructive change. Then within a decade after the Gucker appointment a few other chemistry faculty members began to become involved in general administration. This is illustrated in H. B. Wells’ autobiography in which three chemistry faculty members were included in the list of 26 persons he concluded were “the most amazing team of general administrative officers assembled.” The three were Briscoe, Gucker, and L. L. Merritt. Sometime following the end of the Wells’ presidency in 1962 the listing of chemistry faculty members
in substantive university administration could have included also at least W. B. Schaap, V. J. Shiner, and H. Shull.

THE SEARCH LEADING TO F. T. GUCKER

The resignation from the chairmanship by R. L. Shriner in 1946 was disappointing to nearly all the faculty and administrators who knew him. But all concerned were resolved to build on the improvements he had effected. The search was primarily the responsibility of J. W. Ashton, the new Dean of the College of Arts and Sciences. This was under the guidance of Dean Briscoe and the active involvement of several members of the chemistry faculty. At this level, as reviewed by E. E. Campaigne in his biography of Gucker in 1983 (Chemistry Archives), a faculty committee “consisting of H. G. Day, chairman, with Campaigne and Merritt, solicited and evaluated candidates for the chairmanship.”

Early in the search Campaigne wrote that the committee “called on Frank Gucker at Northwestern during the fall (1946) meeting of the American Chemical Society in Chicago to get his ideas...” Soon the names of several nominees, including Gucker’s, were submitted to Ashton. Each nominee was invited to the campus to meet with members of the faculty and administration. Nearly all presented seminars on their research. Within a few months it became clear that Gucker was the firm choice of the faculty.

In writing to Ashton in late January 1947 Day stated, “Dr. Gucker .... would be skillful and wise in the development of the important functions of the department.” By the latter part of March both Dr. and Mrs. Gucker and their high school age daughter Katharine visited the campus. On Saturday 22 March Dr. and Mrs. F. C. Mathers held a reception in their home to enable all the chemistry faculty to meet the three visitors. Son Frank could not be with the family because he was away at college. The evening with the Mathers was delightful.

On Monday following Day wrote to Gucker stating in part “my hope is that you and your family will find it possible to come to Indiana.” The letter also expressed the opinion that with him “as the leader this Department can grow impressively in reputation and in the quality of its research and teaching.”

On 28 March Gucker wrote to Mathers thanking him and Mrs. Mathers and informing him that he had notified Dean Ashton of his willingness to accept the appointment. He stated that “The unanimity of the faculty in wishing me to come was an important factor in helping me reach the decision.” This was quickly communicated to Briscoe and others who needed to know.

Four days later T. A. Cookson, Secretary of the Board of Trustees, sent to them biographical information and terms of the appointment
provided by Briscoe. He wrote that “Action is needed immediately” and requested the filing of “your vote as early as possible.” The basic terms were that Gucker was to be

“Professor of Chemistry with indefinite tenure and chairman of the Department of Chemistry, effective September 1, 1947, at a salary of $8,500 on a 10 months’ basis.”

In the information supporting the selection Briscoe stated that

“we have consulted many leaders in chemistry throughout the country, all of whom have recommended him most highly.”

The statement included the assertion

“that he is the best man available for our position, and that he will be especially strong in building the department and getting the best efforts from members of his staff.”

Following rapid approval by the board President Wells on 7 April informed Gucker. The public was notified in an extensive article in the IDS and other newspapers about four weeks later.

The general announcement decidedly lifted feelings of concern about the department on campus and elsewhere, thus bolstering the confidence that wavered when Shriner resigned almost a year earlier. The Gucker appointment, as had the Shriner appointment, strongly reinforced the belief that the Department was really going forward. It is notable that both were from other institutions. Since 1951 the several chairmen (Day, V. J. Shiner, R. Schaeffer, A. Allerhand, E. H. Cordes, P. A. Grieco) were already members of the chemistry faculty at IU when each was selected.

THE GUCKER CREDENTIALS

In nearly every way the new chairman and his family had exceptional credentials. He was starred in American Men of Science and both he and his wife (Eleonore) were from well respected families in Philadelphia. Theophilus Wylie — who taught chemistry, physics, and other subjects from 1837 to 1886 — was also a native of Philadelphia. Gucker was a graduate of Haverford and his graduate work — at Harvard — was under the prestigious T. W. Richards with whom he maintained close connections. Following his graduate work he received a prized National Research Council Fellowship which he held from 1925 to 1927 at California Institute of Technology. The strong and highly influential forces
there in his development as a physical chemist included A. A. Noyes, R. A. Millikan, Linus Pauling, and Lee DuBridge.

At the end of the fellowship Gucker accepted a research appointment in the Ammonia Division of the DuPont Company. The experience, accomplishments, and acquaintances were satisfying, but the beginner decided that academia would be more satisfying. After two years he joined the chemistry faculty at Northwestern University. By 1942 he had become professor of chemistry and he had attained distinction in several ways.

For more than a decade he and his students had published research on the thermodynamic properties of solutions. This experimental work supplied appropriate data by which to judge theories of solutions and on which further theoretical developments could be based.

Gucker's deep interest in aerosols, which was to become lifelong, started in 1941 at Northwestern on gas mask adsorbents and aerosols. The research was largely supported by the new National Defense Research Committee. For more than 30 years he was to be a major contributor in breakthrough instrumental developments, theoretical discoveries, practical applications in gas mask designs, and in protection against possible airborne microbiological war agents.

**Preparation for the Gucker Years**

Less than two weeks after notifying the university of his acceptance the new chairman-elect began the process of selecting needed new faculty members and planning for the courses and teaching schedule for 1947-48. Mathers was generous in providing information and guarded advice. Influenced by this source and his discussions with Ashton, Gucker wrote to Mathers on 8 April:

"It looks as though we would want to get a couple of young instructors in organic chemistry, someone to take Dr. Jones' place in physical, someone for the industrial chemistry and an instructor in analytical chemistry."

Within a few months four new chemistry faculty members had been appointed, all effective in September 1947.

From the time of his appointment until September 1947, when the family moved to Bloomington, Gucker made a few trips to the university and he maintained a constructive level of correspondence with officials in preparation for his assumption of full responsibility.

**H. G. Day and the Summer of 1947**

In the mean time it was important to have a current member of the chemistry faculty actively in charge of the department during the summer of 1947. Mathers had reached the administrative age for retire-
ment about the time that Gucker was chosen for chairman, and neither of the two was available to serve through the summer. Day was selected.

His responsibilities included help in facilitating planned changes and in conducting the normal business of the department. This included the implementation of moderate remodeling changes in certain rooms and other areas which Gucker and the faculty had agreed upon by that time. In part the changes were to minimize fire hazards and other dangers to life and property.

Also, a major problem was the coordination of actions to accommodate to the tremendous post-war influx of students, many of them veterans of the war. The rapidly increasing enrollments taxed all the resources including space, faculty and teaching assistants’ time, chemical supplies, laboratory equipment, and staff.

**APPOINTMENT OF FELIX HAUROWITZ**

It turned out that the most important action during the summer was the recruitment of Professor Felix Haurowitz (1896-1987). Discovering him and seeking his appointment was exciting and indeed rewarding. The distinguished biochemist was born and educated in Prague which, during his early years, was a part of the Austro-Hungarian Empire. He remained there until 1939 and during that time he became prominent in research on hemoglobin and its derivatives. Of greater importance, through his work at the German University in Prague his creative template concept of antibody formation was conceived and partially developed. As he later wrote in his autobiography for the National Academy of Sciences, in 1975,

"I concluded that the antibody must be serum globulin and suggested therefore that the antigen interferes with the process of globulin biosynthesis in such a way that globulins complementarily adjusted to the antigen are formed."

In the mid 1930s, while Day was a postdoctoral worker at Yale University, he began to read some of the Haurowitz publications on hemoglobin and antibody formation. After leaving Yale his attention to that work became dormant and remained so until the fall of 1946 when it came back strikingly and in a surprising way. He knew nothing personally about Haurowitz or his family. He presumed that the biochemist was still in Prague. However, that fall, Alice Haurowitz, a daughter of a biochemist reportedly well established at the University of Istanbul, Turkey, had enrolled at Indiana University. In Istanbul her family knew the parents of Mrs. H. J. Mueller who was a neighbor of the Day family. Through the request of Mrs. Mueller, the Days gladly accepted the daugh-
ter Alice to live with them during her first year of orientation in college life in America.

They quickly learned that Alice’s father was the notable Haurowitz presumed to be still in Prague and that he and his wife and two children had gone to Istanbul in 1939 thus escaping the upheavals and terror created by the Hitler regime. Before going he had accepted the headship of the Department of Biological and Medical Chemistry at the University of Istanbul.

Because World War II was over and Indiana University was making serious attempts to strengthen chemistry, including biological chemistry, Day quickly took steps to learn whether it would be in the best interests of the university to at least consider Haurowitz for appointment in the department. As soon as it became definite that Gucker would become the new chairman Day’s thoughts and the information he had gathered were presented to Gucker. He agreed at once and encouraged Day to extend his inquiry not only concerning Haurowitz’s impressive qualifications in research, but in other important ways as a major faculty member. All the responses received were decidedly promising. These included strong endorsements from J. B. Conant, L. Michaelis, L. Pauling, and several other distinguished chemists.

While the daughter Alice was a freshman and taking steps to major in chemistry the wife Gina and high school son Martin had become established with relatives in New York City. Early in the year Haurowitz began to make arrangements to visit the family during the summer of 1947. Even before he went to New York it was arranged for him to come to Bloomington for a lecture on his work.

The lecture was on 12 August in the chemistry auditorium. There was no air conditioning and it was one of the hottest and most humid days of the month. The traditionally correct speaker disdained the gentle urging to shed his woolen suit coat and speak to the audience as comfortably as possible. His lecture met the high expectations of all who knew about him and all were pleased.

That evening an informal reception for the speaker was held in Day’s home. About twenty scientists in chemistry and biology attended, thus giving many further opportunity to assess the guest’s qualifications for a faculty appointment. Their opinions and recommendations were quickly solicited.

Clearly it was felt that an appointment should be sought. Day gave a full report to Gucker by telephone. As customary in August, he and his family were at their summer home at Melvin Village, New Hampshire. Day recommended an offer of appointment while Haurowitz was still with his family in New York. Gucker acted promptly and with effectiveness.
Soon after Haurowitz had returned to Istanbul for his last year there Day wrote to him concerning many things, including the pleasure of his future colleagues on his acceptance. He elaborated some on a graduate course on proteins and nucleic acids being planned for him to give during his first semester in Indiana. The course remained his as long as he taught. He participated broadly in the biochemistry program on campus. Quickly he became a valuable bridge between the different areas involving biochemistry at the Bloomington and Indianapolis campuses.

Notably Haurowitz was the first foreign national to become a faculty member in chemistry at this university. His orientation and that of his family in the values and ways of America developed rapidly. As soon as the law would permit, in 1952 the family became naturalized citizens of the United States. Day and his wife gave witness to their suitability for U.S. citizenship.

Through several decades Haurowitz was to be seen everyday in his office, laboratory or chemistry library, colloquium, or in a seminar in chemistry or elsewhere on campus. His stature as the respected patriarchal scientist of the campus grew and it continued long after he officially retired in 1966, as Distinguished Professor Emeritus of Chemistry. Among his many recognitions, Haurowitz received the Paul Ehrlich prize, membership in the German Academy of Sciences and the National Academy of Sciences. He also received honorary degrees from the University of Istanbul and Indiana University.

**DAY’S INTERACTION WITH NEW FACULTY AND OTHER DUTIES**

Before Frank Gucker and his family moved to Bloomington in early fall Day, as interim chairman, had much interaction with new faculty and staff making plans to move into the department or being considered for appointment. This was in addition to the problems of making plans for the accommodation of markedly increasing numbers of new students, providing for better machine shop facilities and related services, and encouragement of improved funding for research.

In some degree the contacts with new and prospective personnel involved informal luncheon or dinner meetings in the Day’s home in addition to such meetings on campus or elsewhere. For example, on the first day that prospective faculty appointee John S. Peake visited the department in June 1947 ten persons, including Peake and Gucker, were at the Day home for lunch. This was a get-acquainted meeting for nearly all who attended. Although Peake had received his baccalaureate and doctoral degrees in the department more than a decade before, he knew only a few of the current faculty in chemistry and elsewhere. Soon he accepted an appointment intended to give focus to the small industrial chemistry program. Later the Peake family came to Bloomington briefly
to look for housing. That day they had dinner with the Day family. And so it went.

One of Day’s responsibilities was the search for a machinist with good technical skills and ability to manage a shop for the department. The Gucker research program was highly dependent on the ready availability of a good machinist and machine shop. The goal was to have the machinist in place by the time the small Gucker group was scheduled to move into the department in September. Day learned that Jack Baird was available and interested. He had gained capability as a “machinist” in several places including the stone mills of the area. Although his experience was markedly different from the needs envisioned for this department, the first contacts with him were promising. On 9 August 1947 Day visited him at Bedford, Indiana, and discussed with him the department’s expectations and his abilities and interests. Based on Day’s conclusion that he was probably more promising than any other available person — and with Gucker’s concurrence — Baird was appointed. He soon began the work that was to last until his retirement 22 years later.

The action of providing a suitable laboratory for the Gucker group and a larger area for a better machine shop was promptly started. The new shop was located in a first floor (now ground floor) classroom at the southeast end of the 1931 building. This was across the corridor from the room then being used for a shop. The latter space was then prepared for conversion to the first laboratory used by Gucker and his students. As Baird wrote 31 years later concerning the shop for which he became responsible:

“There was not much money available at that time but there was one good lathe, a few hand tools, an old Atlas milling machine, and a very small amount of raw material. So with that I had to make do.”

EMERGENCE OF THE NATIONAL SCIENCE FOUNDATION

During World War II major scientists in many research oriented universities were sought out for very active participation in basic and applied research on problems closely related to the comprehensive war effort. At Indiana University Shriner, with the support of a few other faculty members and several students, contributed actively to the program. The principal financial support was from the National Defense Research Committee (NDRC). At Northwestern University Gucker’s research was being supported by the same agency. Shortly following the war it was recognized that the country had to establish a sound and broad system for federal support of research in all basic areas of inquiry, and this should be independent from national defense needs.
During Day's brief time as interim chairman all research oriented institutions were focusing attention on the congressional action in progress to create a National Science Foundation. As a representative of the department Day felt it was incumbent on him to act alertly in support of the enabling legislation (S.526) then under consideration. He was doubly obligated because in 1946-47 he was president of the local chapter of Sigma Xi. In high degree the chapter desired the development of a comprehensive national program of science to help formulate, prioritize, direct, and support research and education in such matters as seemed to be appropriate and provided for in the emerging legislation.

Reflecting his concern, on 7 July 1947 Day wrote to the representative of this congressional district, Gerald K. Landis, stating in part,

"In the interest of the national welfare, and perhaps of world democracy, I hope you will exert your influence to the utmost in obtaining (favorable) action on S.526 before the end of the session."

Two days later Landis responded,

"This legislation which passed the Senate May 20 was favorably reported from the House.... yesterday, and is expected to successfully pass the house before the end of the week."

Finally, after some delays the enabling legislation and a very modest initial appropriation of $151,000 was approved and the NSF was established in 1950. Great numbers of scientists and others urged its adoption.

Of course there were some persons and groups who had misgivings not only concerning costs but understandably at that time they feared that such movements in effect would compromise the independence of scientists and institutions affected. For example, a prominent and widely respected officer in the local section of the American Association of University Professors, Ralph F. Fuchs, wrote to Day on 8 November 1949 concerning the NSF and related movements. As the leader of the local chapter of AAUP and a gifted thinker regarding academic freedom, he wanted to help Day consider the possible consequences of "The Impact of Federally-Sponsored Research upon the University." Day had promised to participate in a discussion on this topic at a forthcoming meeting of the local chapter. The letter presented various promising as well as worrisome aspects of the development. It reflected much of the thinking of scientists and non-scientists at that time. Day also had concerns, but his conclusion was that our country had to utilize the advantages that NSF and related arms of government could provide. He concluded that through the use of wisely conceived controls and fair administration the advantages would far exceed the impediments that might occur.
It turned out that the establishment of this key research funding arm of the government began near the start of the Gucker years as chairman of the department. It did not become significantly operational until about the time that he was elevated to the deanship of the College of Arts and Sciences. The NSF and the National Institutes of Health became the principal federal arms of support for research in chemistry and other areas of basic science.

Although Day's efforts were of minuscule importance, it is not known that any other contacts with congressmen were made through the Department of Chemistry.

Throughout the years since 1950 notable features of the NSF have been its nonpartisan character and the firm recognition of it as the central bulwark of support for advancement in scientific knowledge and its applications. From the beginning the director has been appointed by the president of the U.S. for a six-year term. Two of the directors have been IU graduates. They are L. J. Haworth - AB'25, AM'26 (Physics), hon ScD'61 — and R. C. Atkinson - PhD '55 (Psychology), hon ScD '79. In a recent editorial in Science (7 October 1988) the latter emphasized the delicate balance between effective science advocacy and partisan politics in maintaining the very constructive nature of the NSF.

GUCKER'S APPOINTMENTS TO THE FACULTY (1947-51)

Faculty and staff appointments were recognized as fundamentally important. In addition, the hallmark of the Gucker years as chairman was in the assessment of needs and purposes, planning, and further development of a suitable organizational structure for the department. These changes included the development of a supportive non-academic structure and substantial remodeling of various areas in the Chemistry Building. A comprehensive review and further restructuring of the chemistry curriculum was carried out and systematically implemented as soon as feasible. Also, greater attention was given to instruction in the freshman level chemistry courses and the introduction of discussion and/or recitation sections in courses with large enrollments. A strong consensus was soon articulated for the dissemination of substantial information about the department and in the maintenance of supportive contact with the chemistry alumni. Aspects of such changes had been considered before the Gucker years, but the opportunities for effective implementation were slow in developing. In essence the administrative mode was open discussion, exchange of opinion, and delegation of responsibility within reasonable limits.

The most important actions were in the faculty and special staff appointments.

The faculty appointments activated in the first year (1947-48) were:
Davis W. Beaumont, Assistant Professor. His PhD degree was in physical chemistry in 1942 from M.I.T. He died from a meningitic infection just one year after joining the faculty.

LeRoy H. Klemm, Instructor. His PhD degree was in organic chemistry in 1945 from the University of Michigan. He came here from Harvard and resigned in 1952 to join the faculty at the University of Oregon.

John S. Peake, Associate Professor. After receiving a PhD degree in physical chemistry in 1935, at this university, he was employed at Dow Chemical before joining the faculty here for responsibilities in industrial and inorganic chemistry. He resigned in 1957 and became a scientist at the 3M Company.

Frederic C. Schmidt, Associate Professor. After receiving a PhD degree in physical chemistry in 1931, from Brown University, most of his years were at Union College in Schenectady, N.Y. until he joined the faculty here. The service, largely in general chemistry, continued until 1969 when he retired. He died in 1974.

In the second year three other faculty appointments were made or activated:

Felix Haurowitz, Professor. His active duty started in July 1948 as Professor of Chemistry (Biological Chemistry). His MD and ScD degrees in 1922 and 1923 respectively were from the German University in Prague. His fruitful research, leadership in his field, and teaching officially ended with his retirement in 1966 but he continued to be productive in research and writing more than fifteen years. He died at 91 years of age in 1987.

Robert B. Fischer, Assistant Professor. The PhD degree was completed in 1946 at the University of Illinois. At Indiana he was notably productive in analytical chemistry, particularly in electron microscopy. During his last ten years in the department he was also Director of Laboratories. He resigned in 1963 and became a college administrator in California.

Kenneth J. Radimer, Assistant Professor. He received his PhD degree in 1947 at M.I.T. His major teaching responsibility here was in inorganic chemistry. Soon after coming to the university, one night while driving outside the city, his car struck and killed a deer. Thus his nickname became "the deer slayer." After two years he resigned and was employed by the Allied Chemical and Dye Company.

In the 1949-50 year three other faculty appointments became effective:

William H. Nebergall, Assistant Professor. He came directly from the University of Minnesota after receiving his PhD degree in inorganic chemistry in 1949. Most of his teaching was in this field and in general chemistry. Two distinctive achievements were: (1) his role
in discovering a process that made calcium phosphate abrasives in
dentifrices compatible with fluoride added to retard dental caries,
thus contributing to the development of the first successful anti­
caries dentifrice, and (2) with F. C. Schmidt he introduced widely
used textbooks in general chemistry. After becoming Associate Pro­
fessor, illness forced him to retire early. He died in 1978.

Ralph Seifert, Associate Professor. His doctoral degree was completed in
1937 at the University of Illinois. After more than ten years of
college teaching and significant research in the war time Manhattan
Project at the University of Chicago he gave up the chairmanship
of chemistry at Carleton College to join the faculty here. His me­
ticulous research involving the electrochemistry of molten salts was
notable and his teaching was equally thorough. In 1966 he became
Professor. The occurrence of Alzheimer's disease caused him to take
early retirement. He died in 1987.

Henry C. Thacher, Assistant Professor. He joined the faculty directly
from Yale University where his PhD degree was earned in statistical
mechanics in 1949. He was the first appointee in theoretical chem­
istry at this university. After five years he resigned and was ap­
pointed at the University of Notre Dame.

In the fourth year, 1950-51, one faculty appointment was made
effective and a second was initiated but not activated until 1951-52:

Ward B. Schaap, Instructor. This "boy chemist," as he was soon dubbed,
was the youngest faculty appointee brought to the department by
Gucker. This appellation was based on that fact as well as his
appearance, but in performance he had unusual maturity and pro­
ductivity. He came to the university immediately after completing
his PhD degree at the University of Illinois in 1950. Although his
training was largely in inorganic chemistry his broad area of teach­
ing included both analytical and inorganic chemistry. After passing
through the different academic ranks he became professor in 1963.
His different academic administrative roles started as Associate
Dean in the College of Arts and Sciences in 1966. In 1976 he was
made Dean of Administration and Budgetary Planning, from which
he retired in 1988.

Walter J. Moore, Professor. This was made effective in 1951-52 (See Day
Years: 1951-62).

SPECIAL STAFF APPOINTMENTS (1947-51)

The creation and development of new faculty support positions
and facilities were also key elements in the advancements during the
Gucker chairmanship. In particular these included (1) the appointment
of a machinist to serve, develop, and direct the emerging machine shop;
and (2) the appointment of a staff assistant to the chairman to function essentially in helping with the myriad business and management responsibilities.

In August 1947, before Gucker moved to Bloomington, but in consultation with him, Day conducted the search and development of arrangements which led to the appointment of Jack Baird as the first machinist and director of the machine shop.

In 1948 a second machinist, Maurice Williams, was added since the Gucker group had received sufficient research funding from federal sources and it was imperative to have more skilled shop manpower. Williams retired in 1976.

Also, in 1948 Eugene M. Seidel became the first administrative assistant to the chairman. He had received a BS degree in Business at this University in 1944 and he had completed courses in chemistry. His background of experience had included employment in the Eberbach and Son Company, manufacturers of scientific instruments and supplies. The appointment was announced in the IDS on 30 April 1948. It required considerable time to evolve an efficient working relationship which saved the chairman's time while establishing an effective meshwork with the stores services, purchasing and other business offices on campus, and the faculty. To aid in becoming more effective in liaison relationships the faculty voted in November 1948 for the assistant to attend chemistry faculty meetings during discussion and action on matters in which he had responsibility. He resigned in 1953 to accept an industrial position. He was succeeded by Associate Professor R. B. Fischer as Director of Laboratories, who was the first to combine academic duties with part time responsibilities as administrative assistant to the chairman.

The development of improved technical services requiring skilled staff personnel was a notable feature of the Gucker years as chairman. This is succinctly described in certain subsequent sections of this chapter.

**Chemistry Faculty Meetings**

The frequency of chemistry faculty meetings, and the reliance on committees to study and make recommendations on many matters of importance, were greater under Gucker than the department had ever known. The committees and the committee chairmen were appointed by Gucker. All committees studied the areas of concern to which they were assigned and they made timely reports to the faculty in the faculty meetings. At least annually each committee prepared written reports which were distributed prior to faculty action on the recommendations.

The general order of business was: action on the minutes of the previous meeting; announcements by the chairman and circulation of letters and memos he had received which he believed might be informative
and/or useful in faculty-decision making; and reports and recommendations of committees and/or individuals with matters for consideration. Generally the chairman contributed little that was not related to presentations by committees or individuals. There was always opportunity to present relevant information and views.

Gucker's actions on departmental matters were based on faculty views as expressed in discussion and voting in faculty meetings. Throughout his four years as chairman, in faculty meetings the faculty sat at a long rectangular conference table in his office. The large table and surrounding chairs occupied about three-fourths of the office space. The chairman's double desk was between the large table and the two windows which were on the east side of the office. At one side of the desk was a sturdy revolving book rack with four sides. On one wall of the room there were two large book shelves with glass doors covering the upper and lower shelves. Two steel 4-drawer filing cabinets near one window and the connecting door to the departmental office held a variety of correspondence and other papers most of which concerned departmental matters. There were also glass-doored bookcases on the south wall which Gucker had brought with him. A walk-in storage room contained many records pertaining to the department. The office was always neat and functional, but there was nothing suggestive of expensive and unnecessary comfort.

The degree of reliance on faculty meetings and committees to promote collective action and advance the department can be measured in part by their frequency. During Gucker’s first academic year there were 23, and three during the following summer (1948). In the following year there were 18. In the remaining two years of his chairmanship the number declined slightly, but the nature and purpose never changed. The first faculty meeting was on 9 October 1947 and the last was on 27 June 1951. By 12 November the first year there had been three meetings and three committees had made reports.

Chemistry faculty meetings and committee actions were central to departmental decision making throughout the four Gucker years and for many years afterwards. A factor in this was good record keeping of faculty meetings and the prompt distribution of well prepared committee reports. Always a younger faculty member was designated to serve as secretary. The successive appointees were: L. Klemm, 1947-48; R. Fischer, 1948-49; W. Nebergall, 1949-50; W. Schaap, 1950-51. The general format of the meetings was similar throughout the four years.

The meeting on 24 January 1951 is typical. It was, as recorded, from 2:30 to 4:05. All the faculty members (18) except one were present. The minutes of the last meeting (20 December 1950) “were approved as circulated.” The chairman circulated letters recently received that included: a DuPont release on a continuous process for the manufacture
of lead tetraethyl; a letter from Bryn Mawr reporting a position in physical chemistry; an inquiry from a layperson requesting information on “repelling radiation with heavy metal salts”; a notification from J. H. Howard of the ACS with respect to a possible visit by the Committee on Professional Training which at that time was looking into the possible accreditation of institutions for graduate training at the PhD level; and an inquiry from the Atlas Powder Company interested in talking with organic chemistry faculty members.

Several committees gave reports, including some with recommendations. The Space Committee report made reference to several areas in the building where structural alterations might be made to provide improved locations for hydrogenation services, better use of physical chemistry teaching laboratory, transfer of the electron microscope to the chemistry building, and whether or not a “Coke” vending machine should be installed in the building. The latter stimulated the greatest amount of discussion. Finally a motion to allow such an installation was tabled. Considerable time was devoted to the reporting and discussion of safety problems.

So many management and other administrative matters were brought to the attention of the entire faculty, it was helpful to have occasional bits of humor. Chairman Gucker delighted in reporting jokes on himself. For example, in the first week after classes started during his first semester at Indiana he was in the corridor near the chemistry auditorium just as class periods were changing. A student with an arm load of books hastily asked him “What is CH203?” She meant “where is classroom 203 in the Chemistry Building?” Absentmindedly Gucker thought she wanted to know the chemical name of CH2O3. Not being an organic chemist he could not remember the name. So he quickly responded that he did not know. Of course he soon learned there was a classroom numbered 203 not far from the auditorium. He frequently retold the joke on himself.

**DEPARTMENTAL COMMITTEES IN 1947-48**

Early in his tenure as chairman Gucker announced the appointment of twelve committees each with a designated chairman and written statement of purpose. Several committees were new and the agendas reflected both the recognition of advantages to be derived from focused surveillance and the importance of searching systematically in solving departmental needs. The following summaries of the purposes and memberships of the committees illustrate the division of responsibilities and the intent to move forward through team action:

**General Chemistry**
Schmidt (chr), Campagne, Johnson, Kaslow, Klemm, Peake, Rohrer, Todd.
Survey the content of the courses, consider possible modifications such as the use of semimicro qualitative analysis, use of discussion sessions, and use of lecture demonstrations.

Shops
Campagne (chr), Peake, and Presidents of Alpha Chi Sigma and Phi Lambda Upsilon.

Survey equipment and needs and consider how to accommodate to the needs of students in using shop facilities.

Seminars
Analytical: Merritt (chr), Beaumont, Mathers.
Biochemical: Day (chr), Campagne.
Inorganic: Mathers (chr), Peake.
Organic: Billman (chr), Campagne, Johnson, Kaslow, Klemm, May.
Physical: Gucker (chr), Beaumont, Peake, Rohrer, Schmidt.

Each group is to plan and conduct the type of seminars deemed to be the most useful.

Colloquium
Campagne (chr), Mathers, Merritt.

This was introduced by Gucker primarily to select and schedule speakers from outside the university. The duties included suitable announcement of the programs, handle financial arrangements, and provide appropriate hospitality including refreshments at the lectures. A small budget was made available.

Sigma Xi Nominations
Billman (chr), Kaslow.

Collect nominations for membership from members in the department.

Safety
Peake (chr), Merritt, Rohrer.

Identify fire, chemical, and health hazards. Establish regulations and encourage student cooperation and safety practices.

Graduate Admission and Assistantships
Kaslow (chr), Beaumont, Day, Mathers, Schmidt.

Canvas institutions for best possible candidates, evaluate applications, make recommendations on admission and for assistantships and fellowships, and arrange schedules of assistants.
Microanalytical (services)
Merritt (chr), Kaslow, Klemm.

Have charge of hiring and training analyst(s), financing, scheduling of analyses, space for the laboratory, apparatus, and air conditioning.

Library
May (chr), Merritt, Schmidt, Librarian.

Survey of library needs and approval of orders for books and periodicals.

Curriculum
Day (chr), Analytical - Beaumont, Merritt; Biochemical - Campaigne, Day; Inorganic - Mathers, Peake; Organic - Billman, Kaslow; Physical - Rohrer, Schmidt.

Recommend courses for Summer 1948. Study comprehensively course needs, improve system for numbering courses, courses needed to meet degree requirements, kind of qualifying examinations for graduate students, and make recommendations on advising chemistry majors.

Laboratory Space
Mathers (chr), Day, Schmidt, Campaigne, Billman.

Survey use of space and make recommendations on achieving better use of space; also consider making use of some space adjacent to the Chemistry Building.

Electrical Needs
Johnson.

Survey the distribution of D.C. and A.C. throughout the building and consider the conversion of D.C. to A.C. for better service; also consider the addition of more electrical service.

At the second faculty meeting, on 29 October, all the committees were readily approved, but with the addition of two more by Gucker as follows:

Enrollment
Todd (chr), Billman, Beaumont.

“Decide on (how to achieve) more efficient handling of the mechanics of enrollment.”

Stockroom Cataloging
Johnson (chr), Klemm
"Investigate (the beginning of) temporary and immediate improvements (until such time as an 'Assistant Director' could take over) in keeping records in the stockroom."

All fourteen of the committees functioned and several took their responsibilities very seriously. Whenever a committee had anything to report or recommend it was heard promptly in a faculty meeting. Always the faculty had opportunity to discuss the reports and vote on all matters that logically should have faculty action.

**COMPREHENSIVE RESTRUCTURING OF CHEMISTRY CURRICULUM**

During the first years of the Shriner chairmanship the entire chemistry curriculum was reviewed and many changes were made in relation to departmental and university objectives. Under his leadership a number of progressive changes were made. They were consistent with the Wells' postwar era of change toward a more international outlook. Also, many more students were being enrolled and financial support of research was reaching a higher level.

When Gucker's 1947-48 chemistry curriculum committee was announced its agenda was quickly rounded out including the following:

1. Plan courses for the 1948 Summer Session, but give special focus to the coordination of offerings in summer and academic year semesters. Include some consideration of the offerings for subsequent summer sessions. At that time many students, particularly War Veterans, were anxious to remain in school continuously until they could be graduated.
2. Study the undergraduate curricula and recommend such changes as seem to be necessary to provide good training for chemistry majors and fulfill the needs of other students requiring work in chemistry.
3. Study the graduate curricula, with particular reference to university regulations, and make recommendations.
4. Give attention to new fields of significance which might be added to the work of the department.
5. Explore the problem of devising and adopting more systematic course numbers.
6. Develop a program of advising for chemistry majors.

This was by far the largest chemistry committee ever appointed. It included a majority of the faculty. The projected work included investigations of the curricula in several other universities; consideration of the requirements for accreditation for professional training by the American Chemical Society; and solicitation of opinions by recognized leaders,
through personal contacts and as published in the *Journal of Chemical Education, Chemical and Engineering News*, and other journals. It was soon concluded that extensive changes should be made in both undergraduate and graduate programs. In order to meet copy deadlines for the publication of the next university catalog and college bulletin the urgently needed changes were quickly identified by the committee, discussed and adopted by the chemistry faculty, and temporarily approved by the appropriate deans. This deadline was in early January 1948. Even these changes represented considerable alteration of the curricula and regulations that existed prior to 1948-49, as shown by a comparison of the 1948-49 College Bulletin with the issue of 1947-48.

Before the end of the second semester the committee had devoted much time to the study. As stated in the final report for 1947-48, the comprehensively revised chemistry curriculum and regulations were adopted by the Faculty of the College of Arts and Sciences 20 May 1948. Some of the major changes were:

**Undergraduate**

1. Abolition of the “General Science Curriculum for A.B. Degree”
2. Revision of the requirement for the A.B. in Chemistry:
   a. Requiring a minimum of 25 hours in chemistry, provided that not more than 5 hours of general chemistry was offered to meet this requirement.
   b. Requiring of such “25 hour” students the completion of one course in physical chemistry, in addition to other courses already required.
   c. For A.B. degree students to qualify for recommendation for accreditation by the American Chemical Society require five hours each of general chemistry, qualitative analysis, quantitative analysis, ten hours each of organic chemistry and physical chemistry, and a minimum of six hours of advanced chemistry (advanced inorganic chemistry, instrumental methods of analysis, biological chemistry, etc.).
3. Revision of the requirements for the B.S. in Chemistry:
   b. Elimination of French as a required subject, but continuation of thirteen hours of German.

**Graduate**

The committee's very substantial curricular changes for the graduate program were approved by the chemistry faculty and the Dean of the Graduate School late in 1947-48. Some of the changes were:

1. Maintain a standing chemistry committee on graduate students with basic responsibility for the admission of all graduate students in chemistry, the selection of graduate (teaching) assis-
tants, and the unequivocal satisfaction of general admission and retention standards of the Graduate School.

2. For admission, pass satisfactorily a Graduate Record Examination, or the equivalent.

3. Require of Ph.D. candidates a minimum of six hours of graduate work or the equivalent, in each of the four major divisions of chemistry.

4. Require of master's candidates a minimum of six hours of graduate work in each of two major divisions and at least three hours in each of the other two major divisions.

5. Allow Ph.D. candidates to take both minors in chemistry when special permission is granted by the Dean of the Graduate School.

Other Changes
A wide variety of other modifications were considered by the committee and several were adopted by the chemistry faculty. Some included the following:

1. Course additions
   a. An advanced organic preparations laboratory with sound prerequisites was started in place of certain related courses that were dropped.
   b. History of Chemistry. Two one-hour courses were started. The major advocates of this valuable addition were Gucker and Schmidt who at different times taught the course until 1962. From that time until Day's retirement in 1976 he taught it. Campagne was the teacher until he retired in 1979. Unfortunately the course was not continued. For a long time Briscoe had encouraged the inclusion of history in teaching in general as well as in an exclusively history course.

2. Courses dropped

3. Combination courses
   Several closely related lecture and laboratory courses were combined.

4. Changes in credit
   The changes in course credits included a decrease in credit for a one semester organic chemistry course from 6 to 5 credits.

5. Other changes
Five courses were changed to strictly graduate level courses and given the appropriate new numbers. Plans were developed and implemented for the establishment of a few new graduate courses. Various other changes were made.

6. Identifying research divisions by numbers
A new system of identifying the divisions of research in which graduate students could enroll was introduced. The second digit in the three-digit numbers employed was established as the division identifiers. All students to be enrolled for research in the same division were to be assigned the number with that identifying digit. The digit for analytical chemistry became 1, for inorganic chemistry 3, organic chemistry 4, physical chemistry 6, biological chemistry 8, and industrial chemistry 9.

7. Comprehensive system of numbering courses.
During the Committee’s deliberations a convincing and logical system for the identification of all present and future courses was devised and proposed by a member, D. W. Beaumont. Tragically the young faculty member died of a meningitic infection. The numbering system was quickly adopted by the committee, approved by the chemistry faculty, and soon presented informally to the College (Arts and Sciences) Curriculum Committee. That committee soon requested permission to present the proposal to the University Council (At that time this was the only faculty council in the University). Permission was readily granted. Within a short time the proposal, with some refinements, was adopted and has remained in use. It is not recalled that any such broad action ever occurred so swiftly and with virtually no opposition.

The first use of the new system was in the university catalog and related publications in 1950. Each school called attention to the change in all the relevant publications. For example, the first page of “Courses in the College of Arts and Sciences, 1950-51” includes the declaration:

“Courses are numbered according to a new system, to go into effect in the autumn of 1950. Old numbers are given in parentheses following the new numbers.”

The importance of the changes in chemistry courses and curriculum, started in the first year of the Gucker chairmanship, was illustrated by the extensive coverage on chemistry given in the Indiana Daily Student on 22 May 1948. The article reported the approval action taken by the faculty of the College of Arts and Sciences in a general meeting on 21 May. (It was quite a few years later when such meetings were discontinued and superseded by actions of a faculty council.) The article described all
the changes and pointed out new differences between the AB and BS degrees in chemistry.

During 1948-49 the problems for the Chemistry Curriculum Committee were much smaller and there were fewer members. It was chaired by Billman. The other members were Day, Merritt, Peake and Rohrer.

One of the major concerns in 1948-49 was the determination of the proper place, if any, of qualitative analysis in the curriculum. A second was the content and level of preparation for enrollment in different general — or freshman level — chemistry courses. In general the recognized problems required the consideration of both the Curriculum Committee and the General Chemistry Committee. During the remainder of the Gucker years the latter committee was chaired by Schmidt.

At the faculty meeting on 9 December 1948 the two committees proposed the discontinuance of qualitative analysis as an independent course and the incorporation of its relevant aspects in the second semester level of general chemistry. The new course would be “Inorganic Chemistry and Qualitative Analysis.” There was considerable discussion but the proposed change was firmly supported. Soon it was implemented. Within a few semesters semimicroqualitative analysis became the leading component of the course. In subsequent years other changes were made in the general chemistry program, which will be considered later.

The cooperative relationships of the department with the university at Indianapolis was extended in 1940. From that year to 1958 in alternate semesters Day taught biological chemistry to the dental students whose first year in the School of Dentistry was in the program at the Bloomington campus. By request this cooperation was extended in 1949 to include the provision of a course in Clinical Biological Chemistry laboratory for the university’s Medical Center and program in public health at the Indianapolis campus. The course was primarily for students in Medical Technology. The training was started on the Bloomington campus and finished at the Medical Center. Dr. Joseph Arbogast directed the professional aspects of the program.

IMPROVING THE TEACHING OF GENERAL CHEMISTRY

Attention to the teaching of the beginning courses in chemistry was heightened by Gucker and the growing chemistry faculty. This was made clear in some of the faculty appointments beginning in 1947, especially the selection of Schmidt. The composition and large size of the newly appointed General Chemistry Committee and the charge given to it underscored its importance.

The perennial problem of suitable high school preparation for the different general chemistry courses was worrisome. A large factor was the low level of skill in mathematics and the quality of attainment in any
chemistry or physics taken in high school. Finally in December 1948 the chemistry faculty approved the strengthening of proficiency requirements in mathematics for admission to general chemistry courses. Also the lecture and laboratory aspects of the courses were divided in such degree that separate grading was introduced. A year earlier recitation and discussion sections were started in all the general chemistry courses.

Several members of the faculty were already experienced in the use of discussion sessions. The program started in 1947-48.

In addition to enrolling in the lecture and laboratory parts of a general chemistry course each student was assigned to a recitation-discussion section. Not more than 25 were allowed to be in any one section. The sections met together for one period per week. Advanced teaching assistants and some faculty members were the leaders of the sections. In the meetings an effort was made to help students articulate concepts and basic facts under current consideration in the course. Both students and section leaders asked questions and these were discussed. Also, leaders were expected to expound on matters that needed clarification.

In addition, the restructuring of instruction in beginning chemistry courses included a reemphasis on the provision of consultation or office hours set aside for the express purpose of answering questions and giving personalized help in studying chemistry.

The rapid increase in enrollments, with attendant shortages in space and resources soon after the end of World War II, led to some misunderstandings and unhappiness. Many of the students during the first few years were veterans with much more experience and maturity than students directly from high schools. All of this led to considerable heterogeneity in the classes.

The manifestation of frustration and dissatisfaction in some of the beginning students is reflected in the following letter to the editor of the IDS and published 16 December 1947 along with a part of the response written by Schmidt. The unnamed student was probably a war veteran receiving a deserved Federal subsidy. Schmidt had joined the faculty only a few months prior to the incident.

Student:

"This is my first letter to the editor of any newspaper and this one only because I have such a strong head of steam that I know of no other way to ease the pressure. My problem concerns the Department of Chemistry, or more specifically, that part of the department which, according to the bulletins and the schedules, is supposed to teach general chemistry. To my way of thinking, the whole set up is lousy from organization through instructors and I use that term loosely."
"The course is divided into three parts: lecture, recitation, and laboratory, each with a different teacher. There is, I assume, supposed to be coordination between these sections, but in fact there is very little. The lecture is given by a man who despite his doctor's degree, manages to make everyone so nervous with confused, unprepared, and sometimes non-factual explanations that a good percent of the 200 at lecture are forced to sleep or stay away in self defense.

"To clear up some of the confusion, the Department of Chemistry, has generously provided the recitation hour once a week manned usually by a graduate student who because he is a student is not prepared to teach, or does not have the time to learn the art of teaching, or simply does not have the conscience of a teacher.

"The laboratory periods, thank God, are somewhat self-explanatory. But here again they are manned by graduate students who are not immune to the evils of the disorganization of the department.

"These problems are major and yet they effect (sic) all those who need chemistry as a requirement or as a major. Surely we are supposed to learn what is required else it would not be required. I think it is fair for us to demand better organization and better teachers for we are paying for both directly or through the State and Federal government taxes. I for one, am ashamed to waste my Government's money on inferiority and mediocrity. Let's get on the ball someone. (Just for the record, I am not flunking Chemistry 103a.)"

Professor:

"General chemistry is at present undergoing a reorganization with the idea of aiding the student to the utmost. In previous years the student attended only three lectures a week and was more or less left to shift for himself. We are now trying to give as much personal attention as possible to the members of unusually large groups....

"Our critic also says that the recitation sections are "manned usually by a graduate student who, because he is a student, is not prepared to teach." I should like to point out that this accusation is unjustified, since one half the instructors of these sections are members of the permanent staff, all of whom have had at least three years of teaching experience. The remaining instructors, it is true are graduate students. Just because a man is himself a student, however, does not necessarily prevent him from being also a teacher. Frequent staff conferences coordinate the methods of the various instructors. Nevertheless the instructors realize, whether our critic knows it or not, that success or failure of the recitation sections depends entirely upon the preparation and interest of the students. They should come to them adequately prepared and use them to clear up points they missed in the lectures or assigned readings. For the most part, I am
sorry to say, the students do not use these opportunities. It is up to the student. It would be interesting to know whether our critic comes to these recitations with a minimum of two hours preparation since the last lecture. The student must take the chief responsibility in the learning process and cannot be a mere intellectual hitch-hiker. By the way, I should like to point out to our critic that both lecturers in Chemistry 103a carefully prepare their lectures and there is no reason for confusion in the minds of the students. We have not at any time noticed a terrific drop in attendance.

"Now to mention a point that our critic ignored. The Department of Chemistry has "generously provided" eight consultation hours per week staffed entirely by instructors and professors in a room set aside for that purpose. Students who are having trouble and are REALLY in earnest can surely attend at one of these hours more or less periodically..."

The program continued and it underwent various modifications until finally after about two decades the scheduled recitations and discussion sections were discontinued, in part because the enrollments in beginning courses became extraordinarily large. The major purposes of the sections were presumed to be met in the laboratories through person-to-person contact between students and graduate laboratory assistants. But an important element of good instruction was lost and not replaced when organized recitation and discussion sections were discontinued.

LECTURE DEMONSTRATIONS

The traditions of chemistry teaching that excites the imagination through demonstrations goes back at least as far as the Royal Institution of London. One of the most notable of the many great lecture programs were the ones by Michael Faraday at the Institution from 1826 to 1860. The last in the series, and the most notable, was "The Chemical History of a Candle." Like all in the series, and in keeping with the standards of the Institution, it was thoughtfully "illustrated by carefully handled experiments, which would seek to guide scientific thinking" (William Crookes in preface to The Chemical History of a Candle The Viking Press, 1960). Such demonstrations served as models in this department and others in America.

In its first annual report to the department at I.U. in June 1948 the new General Chemistry Committee emphasized the importance of close correlation between the lectures, recitations, lecture demonstrations, exhibits, and student laboratory experiences in teaching general chemistry. It stated in part that during the year
"The demonstrations and exhibits were well done by Mrs. Raymond (Patricia Rutan) Boucher. New demonstrations have been added and will be continually added to the repertoire."

Lecture demonstrations were an integral part of Schmidt’s program for general chemistry. Others who taught such courses here during that period of more than two decades also used demonstrations. The lecture assistants (demonstrators) at different times included Mrs. Boucher, Lenore Gentry Smith, and Fred Hardy, a member of the storerooms staff. Starting with Mrs. Boucher and Mrs. Smith these assistants were paid from the allocation for teaching assistants, but this was discontinued when the service was assigned to Hardy.

CHEMISTRY COLLOQUIA

The numerous committees appointed by Gucker in his first year included a colloquium committee. Campaigne enthusiastically became the chairman. As stated in the brief annual report for 1947-48, the original purpose was to bring "to the Campus outstanding or promising men (sic) in the field of chemistry." Notable chemists had come to the department before to speak under different sponsorships but this program was to be in particular a broadly-enriching and consistent development with sponsorship by the entire department.

During the first academic year, beginning on 30 October 1947, seventeen persons spoke; three were on-campus faculty members (F. C. Schmidt, R. B. Fischer, I. C. Gunsalus), one (William LeSuer) was an advanced graduate student; one (K. J. Radimer) was a prospective faculty member; and twelve were not connected with the department in any specific way. The latter were: C. M. Suter, C. E. Crouthamel, L. B. Gordon (of historic interest now, because his topic was "Improvements in Gravimetric Precipitation Methods"), L. B. Rogers, B. Riegel, R. D. Johnson, R. M. Garrels, G. B. Bachman, C. R. Addinall, F. Schlenk, T. Taribara, and A. E. Remick.

The speakers in the next academic year, 1948-1949, were all from other institutions: A. E. Finholt, G. E. Boyd, A. W. Laubengayer, F. A. Matson, Mary Willard, Farrington Daniels, Bruno Zwolinski, Sam MacCutchen, Raymond Fuoss, Gene Carpenter, Charles Tanford, Alvin Cohen, Milton Burton, Earl T. McBee, and Herbert C. Brown (later a Nobel Laureate). Three other speakers, who became members of the faculty in 1949, were Henry C. Thacher, Ralph Seifert, and William H. Nebergall. In addition, during 1948-49 there were several significant chemists from other institutions who spoke here under other sponsorships such as the local section of the American Chemical Society created in 1948.
During the last two years of the Gucker chairmanship the total number and impact of speakers from elsewhere increased. Both the colloquium program and the local section of the ACS contributed to this development. The topics of the former especially reflect the foci of attention at that time. The speakers, topics, and dates for most of the colloquia during 1949-50 and 1950-51 were as follows:


H. E. Carter. "From Penicillin to Chloromycetin." Nov. '49


L. L. Quill. "Recent Advances in Rare Earth Chemistry." Jan. '50

M. L. Moore. "The Recent Advances in Medicinal Chemistry." Mar. '50

R. P. Bell. He lectured on 7 and 8 July '50 and included discussions on acid-base catalysis, reaction kinetics, and thermodynamics.


G. L. Clark. "X-Rays - Fifty five Years Later." Nov. '50

R. T. Arnold. "The Rearrangement of Alkyl and Aryl Groups as Anions." Nov. '50


J. L. Magee. "Elementary Processes in Radiation Chemistry." Feb. '51

D. J. Cram. "Three Problems in Molecular Structure in Organic Chemistry." April '51

A. Szent-Gyorgyi. "Contractile Proteins." May '51

H. C. van de Hulst. "Recent Progress in the Theory of Interstellar Particles." May '51. This was a combined Astronomy-Chemistry Colloquium.

C. Walling. "Competitive Oxidation of Benzaldehydes." May '51

M. S. Newman. "Reactions Involving 3-Nitroso-2-oxazlidenes." June '51

W. J. Moore. This was a discussion of some of his research on solid-state chemistry at Catholic University prior to spending 1951-52 at the University of Bristol as a Guggenheim and Fulbright Fellow. July '51


Perhaps for the first time in the history of the department invitations to attend the colloquia were regularly sent to other departments of chemistry in neighboring institutions and directors of research in nearby industrial concerns.

Campagne was resourceful in securing support from the University's Administrative Travel Funds. This support, plus some funding from departmental resources, enabled the committee to initiate the payment of very modest honoraria for speakers. The direct costs for the first year was $395 and in the second year it was $1338. After two years, and
with the establishment of the Southern Indiana section of the ACS, the costs per occasion were decreased and stabilized for several years. But after one or two decades the program had diversified and financial support had become so large that several thousand dollars were expended annually on special lectures, lecturerships, and visiting professors.

A feature of the colloquia was the gracious serving of tea and other refreshments during a 15-30 minute social period preceding the lectures. An inviting tea table was the center of the "social hour." It was presided over by two women members of the staff each time and efforts were made to help students and others meet the speaker while all visited with each other in a relaxing atmosphere. This custom continued at least a decade or two when the occurrences were approximately monthly and then were regarded as special events, but finally they became quite frequent and were reduced to a hurried hand out of coffee in plastic cups and packaged cookies for those who desired them during a few minutes prior to the beginning of the lecture.

The direct cost of the teas was defrayed entirely from a fund collected for that purpose. As stated in the first annual report of the Colloquium Committee: "Each Graduate student was taxed $0.50 and each senior staff member $1.00 at the beginning of each semester." At the end of the first year the tea fund had a balance of $8.85 which as stated in the report, "will be spent on dishes and equipment for next years' Colloquium Tea." The socializations and work sharing in this aspect of the Gucker Years is illustrated by the statement in the report that

"Dishes were washed by two graduate students — who were designated by the Colloquium chairman before each meeting. Twenty six graduate students were so honored this year."

An illustration of the perceived tone of the Chemistry Colloquia in the first years is indicated in the announcement of the occasion when Schmidt made his first presentation as a new member of the faculty. The IDS on 13 November 1947 announced that he would speak on "A Liquid Ammonia Calorimeter and Some Heats of Reactions in Anhydrous Liquid Ammonia." It stated further that "Tea will be served before the meeting in Room 201....".

BEGINNING OF THE SOUTHERN INDIANA SECTION OF THE AMERICAN CHEMICAL SOCIETY

A record of the first discussions "on the possibility of forming a new ACS section in Bloomington" was included in the minutes of the meeting of the chemistry faculty on 5 November 1947. Some consideration had been given to such action by various faculty members and
others for several years. At this meeting Campagne "presented information mainly gathered by Mr. (Walter) McCarthy, a graduate student." This led to the appointment of a committee of Campagne, Beaumont, and W. McCarthy, "to study details necessary to initiating a chapter (sic) here."

At a faculty meeting three months later Campagne reported that the Indiana Section of the ACS (Indianapolis) had given permission for the Bloomington area to separate and form a new section, but it would object if the designation should be Indiana University Section. Campagne also "reported that 54 signatures (25 were needed) are now available on the petition for the formation of a local ACS section." In May Campagne brought the faculty up to date. This included a report that the Midwest Cooperating Sections of the ACS would meet later in the month in Cincinnati "to arrange for speakers for the various cooperating sections for next fall." The faculty authorized one or more members of the Campagne committee to attend and act for the department in moving forward. Also it approved adoption of the name "Southern Indiana Section" for the developing organization. Plans were made to hold an organizational meeting soon so that the section could begin to operate later in 1948.

The organizational meeting was held in the Chemistry Auditorium on 1 October 1948. It was announced in the IDS ten days earlier and other means were employed to call it to the attention of members of the ACS in this region (Brown, Greene, Lawrence, Martin, Monroe, Orange, and Owen counties). Campagne became the first chairman. The other initial officers were Irwin Gunsalus, Vice Chairman; Avis Rector, Secretary; and Schmidt, Treasurer.

Because a councilor was needed to represent the section at the national ACS meetings, the chemistry faculty in July had designated Merritt to serve as acting councilor. At the organizational meeting Gucker was made councilor. He served in this role until 1954 and as alternate councilor during 1954-1957.

The inaugural meeting was on 20 October in the Chemistry Auditorium. Linus Pauling, then president-elect of the ACS, was the speaker and indeed the guest of honor. A dinner in his honor was given in the Memorial Union Building. Representatives from the Purdue, Indianapolis, and Terre Haute ACS sections attended.

The evening was festive and stimulating to the large audience at the lecture. Pauling spoke on "Valence and the Structure of Metals." Because he and Gucker had been friends since the two were fellow National Research Council Postdoctoral workers at the California Institute of Technology in 1925-27, it was natural that Gucker should introduce the inaugural speaker. Felix Haurowitz was in the audience, having joined the departmental faculty only four months earlier. He and Pauling had exchanged friendly but conflicting views for several years on the nature
and production of antibodies. Some of the views were divergent but finally they were resolved in accordance with Haurowitz's interpretations. However, all along the two great scientists admired each other. It added to the importance of the occasion for these two dissimilar giants in science to share in the beginning of this ACS section.

An amusing but unexpected feature of Pauling's lecture was his ebullient reaction when an electric pointer he was using ceased to operate midway in the presentation. The projection screen in the auditorium was high above the floor and a good pointer was needed in presenting some features on the slides. Undaunted by the failure of the pointer, Pauling pleasantly disdained the offer of a long wooden pointer. He quickly leaped to the top of the long lecture table behind which he had been speaking. From that commanding position he could with his hand effectively point to the slides. Moreover, he had an extraordinary view of the audience, a situation he found satisfying. Strangely this was not his first adversity in the use of slides. As reported in C&EN (22 December 1986, p. 44), in 1931 Pauling was giving an address at the national meeting of the ACS in Buffalo, New York. This was in connection with the presentation to him of the ACS Award in pure chemistry. The projector broke down. As reported, this had "provided an unexpected opportunity for him to display his thorough knowledge of his subject" because he could speak brilliantly without reliance on slides.

The dramatic performance from the top of the lecture table probably stimulated greater interest in the second lecture which followed the next day. This lecture was concerned with protein structure and concepts of antibody formation. At that lecture Pauling and Haurowitz had a constructive and pleasant interchange of information and interpretation of the findings in their laboratories, thus enriching this bonus from the first meeting of the new local section.

The membership of the section was primarily faculty and graduate students in the Department of Chemistry, with some members in related areas in the university, and a few others in this part of Southern Indiana.

The First Three Years:

The establishment of the Southern Indiana Section with headquarters at IU enhanced the prestige of the department. With rare exceptions for many years all the officers were members of the IU faculty. During the first approximately two decades the meetings were held monthly and the speakers were prominent chemists or other scientists. For several years in large part they were selected and scheduled in cooperation with representatives of several other regional local ACS sections. Thus the speakers toured the sections as scheduled and the costs were shared by all who participated. The participation of this department
complemented the chemical colloquium program for visiting speakers. Generally the lectures were at 8 PM in the Chemistry Auditorium. These were preceded by dinners for the speaker in one of the private dining rooms, usually Room E, of the Memorial Union Building. Occasionally a speaker would remain on campus long enough the next day to address a chemistry class or meet with a research group.

Some of the earlier speakers and their topics were the following:

- P. H. Groggins, of the U.S. Bureau of Agriculture and Industrial Chemistry, on “Recent Progress in Organic Synthesis.” 5 November 1948
- M. L. Wolfrom of Ohio State University on “The Chemistry of Streptomycin.” 3 December 1948
- L. F. Audrieth of the University of Illinois on nitrogen chemistry. 7 January 1949
- A. H. Emery, executive secretary of the ACS, on the educational, publishing, and other operational roles of the ACS. 10 February 1949
- B. H. Storch, chief of the research and development branch of the Office of Synthetic Liquid Fuels in the US Bureau of Mines, on “Synthetic Liquid Fuels.” For almost two decades Storch’s focus has been on the wide-scale production of liquid fuels from coal. 4 March 1949
- L. S. Fosdick, head of the Department of Chemistry in the School of Dentistry at Northwestern University, on “Chemical Aspects of Dental Decay.” Attention was directed to Fosdick's studies on factors involving the rate of acid formation and its neutralization in the mouth. 7 April 1949
- J. C. Winters, of the Rohm and Haas Chemical Co. on “Recent Ion Exchange Developments.” The company's early work on synthetic ion exchange resins markedly advanced analytical chemistry and industrial applications. 3 November 1949
- H. H. Willard, Professor of Chemistry at the University of Michigan, on “Separation by Precipitation.” As announced by the IDS, “A part of Dr. Willard’s talk will deal with pointing out the importance of analytical chemistry in everyday life.” 9 December 1949
- V. K. LaMer, Professor of Chemistry at Columbia University, on “Kinetics of Colloidal Growth.” During War II he directed research concerning gas masks, screening smokes, insecticides, aerosols, and colloidal optics. January 1950
- J. P. Greenstein, chief biochemist of the National Cancer Institute, on “Enzymatic Resolution of Racemic Amino Acids.” 10 February 1950
- G. W. Beadle, Chairman of the Division of Biology at California Institute of Technology, on “Chemical Genetics.” Reflecting the undeveloped knowledge of the subject in 1950, the IDS stated that he gave “an explanation of the patterns from which proteins are copied
during the development and functioning of living systems." 3 October 1950

L. F. Fieser, Professor of Chemistry at Harvard University, on "Oxidation of Cholesterols; Question of an Endogenous Carcinogen." The research and certain concepts presented have long since ceased to excite interest, but totally different concepts, based on equally inconclusive evidence, dominates the thinking of large segments of the population. 7 November 1950

F. D. Rossini, head of the Department of Chemistry at the Carnegie Institute of Technology, on "Excursion in Chemical Thermodynamics." His honors included the Hillebrand Award for his research and leadership on the thermochemistry of hydrocarbons. 6 February 1951

W. A. Noyes, President of the American Chemical Society in 1947 and Professor of Chemistry at the University of Rochester, on "Organic Photochemistry." 8 May 1951

During the first several years the leadership in the section involved chemists and others in the university with interests in chemistry. A preponderance were faculty members. After about two decades this gradually changed to chemistry graduate students who were members of the American Chemical Society. The number of speakers per year diminished and the section seemed to have little impact on chemistry or issues of concern to chemists.

**SPACE NEEDS AND ADJUSTMENTS**

The surge toward more effective teaching, research, and interactions outside the university gave urgency to the provision of greater amounts of appropriate space. The Chemistry Committee on Space gave much attention to the problem and it was frequently discussed in faculty meetings. Of course both the committee and other members of the faculty were guided by certain assumptions. As stated in the committee's report of May 1949 (Billman, Merritt, Seidel, Day),

"Indiana University will be the leader in basic chemical research in the State if the present chemistry faculty works industriously toward that goal."

It also concluded that:

"Large-scale group research projects will be universally accepted as necessary for effective progress in the increase of basic knowledge. This will require large areas of space for such units."
The final conclusion of this 1949 report was that an addition to the Chemistry Building was needed as soon as it could be provided and it should approximately double the amount of space for chemistry.

The Space Committee in 1950 (Haurowitz, Johnson, Peake, Seidel, and Campagne) extended the study and recommendations. It was well documented that every instructional, service, and research function of the department needed to be expanded and remodeled. This was the first carefully prepared report to conclude unequivocally that a large addition was necessary and that all of the new components should be on the south side.

The 1951 annual report of the committee (Johnson, Merritt, Peake, Seidel, Haurowitz) continued to stress the urgency of gaining much more space. It concluded that

“If this addition of a new annex is not possible at present, a temporary improvement could be achieved by taking over the laboratories of bacteriology (in Kirkwood) or of the genetics group (Sonneborn et al. in west end of 3rd floor Chemistry), when these move into the Life Science Building (soon to be constructed).”

Further discussing and planning led Frank T. Gucker to inform Dean Briscoe in December 1950 that the department desired to be assigned all the space then occupied by the Department of Bacteriology on the top floor of Kirkwood Hall when it moved to the planned life sciences building (Jordan Hall). Within a few months plans were announced for the large new building which was to accommodate bacteriology and other biological sciences. Bacteriology was able to move into the new building in 1955. Quickly thereafter the vacated space was slightly remodeled and within months it was occupied by the analytical chemistry division of the department.

During the extended decade of preoccupation with space needs modest alterations were made in many parts of the Chemistry Building, but no significant amounts of new space were obtained in the Gucker years except the small radiochemical building which was built in 1950 and the underground storage vault for flammable supplies completed in 1949.

**SAFETY DEVELOPMENTS**

During these years laboratory safety was imaginatively promoted. Enrollments were increasing, new space was not available, and safety was paramount. The principal emphasis and guidance was from the safety committee in which the major leadership came from Peake and Rohrer, Seidel contributed significantly as the expeditor of action. Some of the
student organizations were active, especially Alpha Chi Sigma. The more notable actions were focused on the provision of special storage facilities for flammable solvents and improved safety in handling these and other hazardous supplies; erection of a separate facility for the use of radioactive materials and the systematic monitoring of such uses; and the development and use of motion pictures on laboratory safety.

**Storage Vault for Flammables**

After several years of discussion and inquiry on the storage and handling of flammable and other hazardous chemicals the department and university administration unequivocally decided that an underground storage vault immediately outside the Chemistry Building would be the safest and most feasible facility. It was noted that several universities including Illinois, Michigan, Purdue, and Northwestern had such storage vaults.

One of the earlier responsibilities of Seidel in the department was to monitor planning, construction, and use of the vault. In reporting on his progress to Gucker while the latter was on vacation in August 1948, Seidel wrote that chemistry planning had been completed and the plans had been delivered to the office of the university’s architect, E. P. Bardwell. Construction occurred in the spring of 1949. The 19 April issue of the IDS featured a detailed description of the storage vault.

The all-concrete facility was a 20' by 35' room in which even the ceiling was two feet underground. It was immediately west of the Chemistry Auditorium. Steel doors connected it through an anteroom with the main chemistry storesroom which was immediately below the auditorium. An elevator connected the anteroom to a loading area above the vault. A one-rail track, from one end of the vault to the other, and a hoist facilitated the handling of heavy containers. Exhaust fans, humidity control, wiring to ground static electric charges, and an automatic carbon dioxide fire extinguishing system contributed to the safety of the new arrangement.

The facility was used regularly until construction was started in 1961 for the Chemistry Addition. Thereafter, until the Addition of the 1980’s was completed, the bulk quantities of flammable chemicals were stored in facilities away from the Chemistry Building. Although no significant mishaps occurred during more than a decade that the facility was used, new concepts of safety, and means for its implementation, strongly argued for the abandonment of underground storage, especially near student-occupied buildings. The change was not contested.

*Safety Movie:* In the late 1940s a rapidly developing and cooperative relationship between the Department of Chemistry and the Audio-Visual Center of the university included the filming of a motion picture
on "Safety in the Chemistry Laboratory." A significant step in this direction was discussed in a chemistry faculty meeting on 18 November 1948. During the next year the film was produced and released.

On 7 January the IDS featured an article on it by Clair Metcalf. She quoted Eugene Seidel as stating:

“This timely and much-needed educational film goes beyond the mere enumeration of safety rules. Much of the film’s value lies in its attitude-building and fact-giving aspects. They are interwoven throughout the film in a continuous pattern.”

The film was accompanied by a student’s manual, “Laboratory Safety,” made available by the Fisher Scientific Company. It contained a check list for the self-testing of safety procedures in the laboratory. Although both the film and the manual were of general interest, they were primarily for introducing safe chemical laboratory practices to high school and college students taking general chemistry. Rohrer and Peake were the educational authors. The leasing and sales of the film, and other distribution matters were handled by the Audio-Visual Center.

Another safety film “Plan to Live” was promoted by the Center after Gucker in a faculty meeting on 4 January 1952 asked whether another movie on safety might be produced “which could equal the success of the safety movie.” The quickly produced second film was shown to the chemistry faculty for the first time in March 1952! Gucker was so favorably impressed that he suggested a showing of it at the planned luncheon for the Association of Indiana University Chemists (AIUC) at the forthcoming ACS national meeting in Buffalo. Other safety actions occurred which attracted the attention of both students and alumni.

Smoking: The widespread recognition of tobacco smoking as a very significant health issue did not occur until sometime following the Gucker years as chairman. However it was long regarded as a fire hazard and unpleasant for many. For Gucker personally it was especially unpleasant, particularly because he was allergic to tobacco smoke. Regulations existed against smoking in the laboratories and library and there were varying degrees of discouragement of smoking. Notably soon after Shriner became chairman in 1941 he led the effort to maintain total prohibition of smoking throughout the Chemistry Library. This had an element of irony because he was an inveterate cigar smoker. He firmly adhered to the rules, which did not apply to smoking in faculty offices or the office of the chairman.

Naturally the restrictions applied to all areas in which flammable chemicals might exist. In general the stockroom personnel and others
adhered to the prohibition. An exception was called to the attention of the faculty in 1951. The minutes of a faculty meeting on 27 June recorded:

"Peake complained of smoking in the stockrooms by stockroom helpers. The matter was referred to Seidel, and the faculty was urged to set an example and to enforce rules in this regard."

It so happens that this was the last chemistry meeting over which Gucker presided as chairman. But in the following years as dean of the College of Arts and Sciences he remained a strict enforcer of no-smoking regulations, which never became diminished in subsequent decades. Eventually smoking inside any chemistry facility became strictly prohibited.

Radiochemical Laboratory: Soon after the end of World War II several members of the faculty became strongly interested in the use of radioactive isotopes in various areas of research. These included Haurowitz, Merritt, and Day. Also the importance of providing regular instruction was recognized. The first course in radiochemistry, C407, was adopted by the chemistry faculty in July 1950. The prerequisites were two semesters of physical chemistry. There were to be two lectures and one 4-hour laboratory period per week. Merritt was the first teacher. Because instruction began before the planned radiochemistry building became available special safety precautions were exercised.

Throughout the development of work involving significant amounts of radioactivity safety was emphasized. This was from personal considerations as well as the necessity to conform to governmental regulations.

Safety considerations and the increasing shortage of space required prompt action to obtain new and specialized space. Preparation was made to apply to the newly created Atomic Energy Commission (by Congressional action in 1946) for substantial support needed for the construction and equipping of an appropriate separate facility. In February 1949 Seidel reported at a chemistry faculty meeting that an application for support would be prepared soon and suggestions should be given to Merritt. Ten months later Gucker informed the faculty of a favorable letter from the AEC. Before the end of 1950 support had been provided and site preparation for the construction had been started.

As reported in the IDS in January 1951, it was "the beginning of I.U.'s atomic research laboratory which will be completed in the Spring."

The informative article, characteristic of the IDS in those years, further stated:

"The building, which will be made from concrete block, will provide facilities for carrying on atomic research under a grant from the Atomic Energy Commission. In addition, seniors and graduate stu-
dents in chemistry will be instructed in techniques in the use of radioactive material."

Several followup articles appeared in the IDS that year. On 5 December it reported that the building had been completed, and it was being used. Two weeks later another fact-filled article appeared.

The 75 x 36 ft. one-story concrete block building was located a few feet south of the Southeast wing of the 1931 Chemistry Building. The laboratory areas in the facility were succinctly described in the 1951-52 annual report of the Space Committee as follows:

```
Room   1 Counting lab
       2 Counting lab
       3 Class and computing room (3-4 desks)
       4 Office (3-4 office spaces)
       5 Laboratory
       6 Laboratory
       7 Hot lab
       8 Animal room
```

A small amount of space was utilized for toilets, wash rooms, and storage. The report, prepared by Merritt, referred to the facility as the "isotopes laboratory." Before the building was completed the Atomic Energy Commission had furnished $24,500 for the program. The total cost of the building and equipment was estimated to be about $39,500.

The modest funding for the building and the research and teaching it supported were extensively reported by the IDS. Everything pertaining to radioactivity in the laboratory was newsworthy. As the IDS reported to the public in May 1951, even before the building was quite completed, the department had two contracts with the Atomic Energy Commission:

"One contract provides funds for research in 'The Stability of Chelate Compounds,' radiochemical equipment, and for giving instruction to advanced students studying radioactive materials and techniques."

The other contract

"provides funds for biochemical research in 'Mechanisms of the Combination of Antigen with Anti-Bodies.' Dr. Felix Haurowitz, professor of chemistry, is directing this work."

The article stated that

"Dr. Lynne L. Merritt, associate professor of chemistry will direct the research in chelate compounds."
Three months later the IDS reported that the Atomic Energy Commission had extended its support for the radiochemical work through a grant of $9,600 for another year.

By November 1951 the new building was ready for use. In a long especially imaginative report by the IDS the wonderment on campus regarding the future was fanned to newer levels. It was based on the assumption, as stated, that

"Some time during our life times, we will be driving atomic powered automobiles, living in atomic heated houses, and traveling around the country in atomic powered planes, trains, and buses."

The writer proclaimed that

"Part of the credit for that future age of miracles will be due to the research carried out in the simple little structure in the shadow of the chemistry building on the I.U. campus."

One month later another long signed article in the IDS headlined that

"This building, one of the most modern of its type, will give I.U. scientists much needed space and improved equipment with which to continue peacetime study in atomic energy."

One year later the newly created Committee on Radiochemical Building made its first annual report. The report, by committee chairman Merritt, asserted that "Space is now a critical matter in the radiochemical building." Because there were so few women using the building "The women's toilet was converted to one for the men and the men's toilet is being converted to a small laboratory." The women affected had to use a women's toilet on the ground floor of the adjacent chemistry building or slyly use the one facility in the radiochemistry building.

The 1964 Chemistry Addition provided facilities for radiochemical work. Thus the special need for the 1951 building greatly diminished. This little structure was demolished and removed in 1986 to make room for the 1988 Chemistry Addition.

Hydrogenation Laboratory: During the years that Gucker was the chairman a few organic chemistry faculty members had frequent needs for hydrogenation facilities. Safety considerations in 1950 led the Safety Committee to designate three faculty members (Billman, Campagne, and Johnson) to be responsible for the location and operation of the first hydrogenation laboratory. The first location, approved by the faculty (30 May 1951), was in room 217A, a small space located near the
northeast corner of the Chemistry Building. Two months later an extensive discussion occurred in a faculty meeting (25 July 1951). The first action was overturned, largely for safety considerations. A large majority finally voted almost unanimously for a change to room 416 which was on the top floor and relatively isolated from other workers. This became the laboratory for the function and it was so used for several years.

GLASS BLOWING, MACHINE SHOP, AND MICROANALYTICAL SERVICE

The development of glass blowing and machine shop services were notable in the Gucker years as chairman, but progress was made in a few other areas requiring skilled technical personnel. This included the establishment of a dependable microanalytical service.

Glass Blowing: The record concerning glass blowing stands out and its signal importance in the department’s growth during this period aroused widespread appreciation. During the late 1940s and early 1950s the Shop Committee exercised leadership and this was supported throughout the department. Remarkably the initial development of skill and understanding of scientific glass blowing occurred without the benefit of professional tutelage; it arose in one man, Earl Sexton. But this was stimulated by some faculty members, students, and storeroom personnel around him even though they had very limited capability in glass blowing. There were increasing needs for glass blowing in this department and elsewhere. The combination of Sexton’s innate capability and the needs for different kinds of on-site glass fabrication led Sexton to rise from obscurity to the status of a professional and productive glass blower. Remarkably, during these early years he was without contact with any professional in this craft.

Sexton’s first connections with the university was at the age of 27 when he was employed in the IU Department of Physiology as a helper in the teaching laboratory and storeroom of that department. A medical student assistant, George Mellanger, and two faculty members, Dr. Paul Harmon and Dr. Paul Nichol, showed him how to make small glass cannulae needed in instructional work with animals. The stimulation from this small experience led him to attempt work on other glass fabrication needs in the laboratory. This occurred during the early part of World War II.

After serving in the U.S. Merchant Marines during the rest of the war staff employment became available to Sexton in the Department of Chemistry. Shriner’s term as chairman was ending through his resignation. Sexton’s service began 1 July 1946 and it was to continue to 1980 when he retired.

During the uneventfully short but near-hiatus in departmental leadership Day served in an interim role as substitute chairman for two
months, then Mathers served as Acting Chairman during the 1946-47 academic year. Again during the summer of 1947 Day served as interim chairman until the newly appointed Gucker could begin his chairmanship in September. Thus Sexton had the distinction of serving under the leadership of three different persons during his first 15 months in the department.

In addition, Sexton was the third in a succession of two other chemistry laboratory attendants who also devoted some time to a modest level of glass blowing: Robert Harding (1937-43) and Harold Roberts (1941-46).

In 1950 the classification was changed from Laboratory Attendant to Glass Blower. At first, with the enormous increase in chemistry enrollments, much of Sexton's time was needed for teaching laboratory service, but from the beginning he had responsibility for a limited amount of glass blowing. During Sexton's first two years in chemistry this service continued to be performed in a small area, perhaps 6' x 8' of the laboratory service room 212A that served the general chemistry teaching laboratories from 1931 to 1972.

Before the end of the 1948-49 year a room (118) connected with the main storesroom was set aside for a glass blowing facility. For a few years before that time the space had been used for small experimental animals needed in Day's nutritional biochemistry research. By 26 May 1949 the Glass Shop Committee (Seidel and Peake, chr.) stated in its annual report that "The (glass) shop is now complete, and Mr. Sexton is in the process of moving into the shop for permanent location ..." It recommended "putting Mr. Sexton on glass work alone." A little later that year Gucker made specific reference to the developments in his annual report to the ACS Committee on Professional Training. In part he stated that the room had been

"equipped with a glass-blowing bench, storage racks for glass tubing, a glass cutting saw, and a large annealing oven."

In the Shop Committee's annual report for 1949-50 it was stated that a glass blowing lathe was included in the budget for 1950-51. This was along with planning to procure a gas compressor, drill press, and lapping wheel.

Soon after Sexton began his work in R118 the needs for glass blowing mounted up in the department and in laboratories elsewhere on campus. By 1959 the needs had become so pressing that help was procured. Donald Fowler, a recent high school graduate with deep interest in glass blowing was employed. Soon, under Sexton's tutelage, he developed proficiency and became notably dependable. Thus the two craftsmen working as a team gave the department and university unusual
strength in glass blowing. This became so important that the 1962 brochure on *Chemistry at Indiana University* featured

> “Mr. Sexton constructing a high capacity mercury diffusion pump used in the study of decomposition pressures of metal oxides at very high temperature.”

By 1962 the glass shop in room 118 had become entirely too small. A quonset hut between the radiochemistry building and the East side of the Chemistry Auditorium became the next location of this facility. After two years the glass shop was again moved to a more favorable location (A500) in the 1964 Addition to the Chemistry Building. At this time the work had become so heavy that a third worker was needed. It was apparent to Sexton that a new worker in the chemistry stockroom, Thomas Lawhead, was promising. Lawhead was hired in 1964. He learned rapidly and soon became highly productive, thus further establishing Sexton as an astute and capable judge of talent as well as a productive teacher and craftsman himself. After ten years Lawhead accepted a promising industrial position as head of the glass fabrication shop. Lawhead’s replacement was Michael Swafford who remained until 1980 when he left the department owing to the marked reduction that occurred in the need for professional glass blowing.

Providing for superior glass fabrication services and facilities were indeed implemented by Gucker during the early years of its development.

**Machine shop:** During approximately the first two years that the Gucker research group was in the department it was the primary user of the machine shop’s resources. Soon other faculty and their students became more dependent on that resource. Thus an additional machinist became necessary. This was reflected in the department’s Shop Committee’s annual report given at the faculty meeting on 26 May 1949. The committee concluded that the shop was ably handled by Jack Baird who had been in charge almost two years. Reference was made to the employment of Maurice Williams late in 1948 as assistant machinist. This worker, like Baird, was to remain until his retirement in 1976. Baird retired in 1969.

Gradually there was enhancement of equipment resources in the shops. The annual Shop Committee’s report in 1949 stated that a Cincinnati Milling Machine had been installed “to supplement the other equipment” much of which had been procured from the U.S. government virtually without cost as surplus from World War II.

In different issues of the department’s “Manual of Information for Prospective Students of Chemistry” major reference was made to resources such as the machine shop and glass blowing shop. The first
edition, which appeared in May 1949, included an impressive picture of Baird at a large lathe. The story stated in part:

"Two machinists are employed full-time in the shop. One part of the shop is set aside for the use of graduate students and other advanced workers in the Department, thus providing an opportunity to learn some of the principles of shop work. The student shop is supervised by the chief machinist."

The equipment status of the machine shop in satisfying the increasing needs of the department remained basically unchanged for about ten years until the construction of the 1964 Addition provided well designed and adequate space in new quarters. The work load required the addition of two additional machinists, William Caldwell in 1955 and Charles Sater in 1957. The latter left in 1959 and the former in 1968. There were occasionally some degree of tension between some of the faculty members and one or more machinists because it was believed by some that the quality of machining did not achieve the standards that had been set. However, by the time it was possible to have substantially superior equipment and arrangements in the new 1964 addition harmony prevailed and quality productivity increased.

The justifiable pride that prevailed after the move to the new facility is reflected in the description given in the brochure Chemistry published by the department in 1968. A realistic picture of the spacious and well equipped shop was accompanied by the inscription:

"A well-equipped machine shop, staffed by six machinists, is located in the basement of the new wing. Original, unique, or commercially unavailable apparatus that is so commonly required by present-day research is fabricated in this area. Apparatus design, a wood shop and a welding facility are some of the services provided. An electrical apparatus and vacuum pump repair facility is also handled by this group."

In addition, the brochure made reference to the Student Shop stating: "An area containing hand tools as well as precision machines and tools is provided for those researchers who wish to build some of their own apparatus."

The remarkable development in the facilities and personnel for glass blowing, design and fabrication of laboratory apparatus in the machine shops, and other service facilities reflects well the emergence of the department beginning with Shriner in 1941 and strongly moved toward fruition by Gucker at the time of his appointment in 1947. The development continued long past Gucker's four years as chairman and
throughout his 14 years as dean of the College of Arts and Sciences (1951-65).

The following persons, with titles and years of service, were primarily connected with the machine shop from the beginning of staffing in 1947 to 1990:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Years</th>
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<tr>
<td>Allgood, Delbert</td>
<td>Res. Machinist</td>
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<td>Baird, John (Jack)</td>
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<td>Bastin, Kenneth</td>
<td>Res. Machinist</td>
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<td>Brown, Howard</td>
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<td>Caldwell, William</td>
<td>Machinist</td>
<td>1955-68</td>
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<td>Deckard, Cleophas</td>
<td>Instrument maker</td>
<td>1968-71</td>
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<td>Dorsett, John</td>
<td>Supr. Mechanical</td>
<td>1963-</td>
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<td>Fleener, Gary</td>
<td>Res. Machinist</td>
<td>1985-</td>
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<td>Lysher, John</td>
<td>Lab. Machinist</td>
<td>1969-70</td>
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<td>Martin, Richard</td>
<td>Machinist</td>
<td>1966-72; 1977-</td>
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<td>Miller, John William</td>
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<td>Packman, Drew</td>
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<td>Sater, Charles</td>
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<td>Williams, Maurice</td>
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</tbody>
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Several workers in the machine shop were unusually competent, loyal, and responsible. Perhaps the most commendable of all was John Dorsett.

**Microanalytical Services:** The traditional development of synthetic and natural product organic chemistry required readily available and dependable microanalytical services to provide elementary analyses of new and unidentified organic compounds. The alternative was to send such compounds to a commercial laboratory providing such service. The cost per analysis was relatively reasonable but delays in receiving analytical reports were, among other factors, reasons for having full local control.

The problems of dealing with relatively untrained student part-time assistants to perform microanalysis, and the uncertainties regarding the analytical data, impelled the adoption of a different alternative. This followed extensive attention to the problem by the Microanalytical Committee for 1949-50 (Klemm, Fischer, and Nebergall) which had been appointed by Gucker. The committee for 1948-49 (Klemm, Merritt, Kaslow) had also struggled to meet the need.

Finally at a faculty meeting on 25 July 1951 Day reported that he had requested authorization for the appointment of a full time micro-
analyst. This had been approved by the new Dean Gucker subject to its endorsement by Dean Briscoe, which was granted. Fortunately Joanna M. Dickey, AM’33, had good qualifications and she was interested in returning to Bloomington from her industrial employment in Pennsylvania. She accepted effective that year and her service as microanalyst and in other analytical responsibilities was gladly continued by the department until 1969. Then her personal responsibilities to her family changed, she had happily married, and with her husband she moved away.

**MANAGEMENT OF SUPPLIES, EQUIPMENT, AND STOCKROOMS**

The increasing amount, quality, and diversity of supplies and equipment needs in teaching and research following World War II required greater systemization of the procedures for procuring, storing, and handling of nearly everything. The major determinants were the changing number and needs of the faculty and students as well as the rapid developments in instrumentation and myriad laboratory procedures. Change was inherent in the progress of chemistry. For example the development of borosilicate glass, widely described under the trade name “Pyrex,” was a significant aspect of the changes in chemistry. The first use of Pyrex glass in this department was in 1917-18, as reported by W. H. Bell who received his AM degree in 1918. Pyrex beakers were purchased for use in his research under the direction of Mathers.

A significant action in adjusting to change was on 17 March 1948 when a chemistry faculty meeting was held to discuss and answer questions regarding purchasing procedures and policies with members of the university’s Purchasing Department. Members of that department in attendance were C. J. Black, R. A. Hearn, M. C. Rogers, R. M. Priest, and M. E. Witmer. At that time several of the faculty members had been in the department less than two years. Clarification of procedures and policies occurred and unity of purpose was well advanced.

Another important area for continuing improvements was in the modernization of the physical arrangements and systemization of procedures in the chemistry storerooms. A beginning in this direction was the designation of a faculty Committee on Stockroom Cataloging in October 1949. The committee (Johnson and Klemm) conferred with the limited stockroom personnel and together some advantageous procedures were introduced.

A new focus on this problem was started at a faculty meeting on 13 January 1950. Following considerable discussion Seidel was designated to accelerate and coordinate action. Many changes occurred during this period which included the restructuring of the inventory system, revised procedures in receiving and stocking shipments of chemicals and
apparatus, replacement and redesigning of shelving, and marked changes in the shelving facilities and staffing of the subsidiary storerooms serving different laboratories throughout the Chemistry Building.

Some illumination of the status of the storerooms and their operation at that time is reflected in a portion of Chairman Gucker's 1950-51 budget request of 14 March 1950 to J. W. Ashton, Dean of the College of Arts and Sciences. He wrote in part:

"We actually need also an increase of $500 in the hourly assistants budget in order to improve the storeroom service, which I could not fit in the limited budget. Now that subsidiary storerooms have been set up on the different floors and proper storage shelves have been arranged there, we wish to keep these open throughout the day..."

Marked improvements did occur, but gradually the feeling arose in some of the faculty members that they should have access to the main stockroom and glass blowing shop at all hours. Finally at a faculty meeting on 19 October 1951 Schmidt moved and it was seconded by Rohrer that:

"Those faculty members who wish it should be issued a key to the stock room and glass blowing shop. All who enter the stock room and glass blowing shop out of hours shall sign and date a record book available for this purpose, besides filling out the usual withdrawal slips for anything removed."

This action had been anticipated. Therefore the Storekeeper, Glen Hepley, and Assistant to the Chairman, Seidel, had been invited to attend. All present participated in the animated discussion. Hepley and Seidel expressed doubts as to their ability to keep a satisfactory inventory under the proposed system. Other arguments for and against were presented, but the motion carried. All the faculty were present except Gucker and Peake. To effect some degree of protection it was moved by Johnson and seconded by Merritt that:

"It is strictly prohibited for faculty members to permit graduate students to enter the main stock room or glass blowing shop outside regular hours."

This vote was carried unanimously.

Most of the faculty members at that time were accustomed to working in their laboratories at almost all hours of the day and night, and occasionally they did find that access to the main stock room would be convenient if not essential to achieve their purposes. However, as anticipated by some of the faculty, as well as Hepley and Seidel, the new
freedom was accompanied by some degrees of carelessness. Finally a consensus was reached that free access should be restricted — even to faculty — and it was discontinued.

During every passing year increasing teaching and research requirements had impact on the stores services and others and new services were started. After approximately twenty years (in 1972) the demands and complexity of needs had resulted in the initiation of a computerized system and the sweeping substitution of a Chemistry Scientific Stores for the traditional processes, thus making the Stores operate on a self-contained revolving fund basis. In effect a large proportion of the needs were satisfied through an open stores system instead of relying on storeroom attendants to search for and assemble supplies requested by each qualified student, assistant, or faculty member.

Although inaccessibility to the store room during “closed hours” was a little troublesome to faculty and students during the Gucker years, a variety of significant problems quickly accompanied the beginning of the open stores system in 1969. This was made clear in a three page memorandum (14 October 1970) to all chemistry personnel by the then Director of Laboratories, W. E. Streib, and the head of the store room operation, Sylvester Brown. The memorandum asserted that there were “some very serious breakdowns mostly due to abuse of the system by our users.” The abuses that were emphasized included: opening cartons and moving items from their location, failure to use requisition forms and complete them accurately, failure to complete a check out at the service window and leaving without being checked out at the service window by an attendant, and “pilfering.”

In spite of these problems, which were eventually corrected, the innovative but cautious contributions to management and the attitudes engendered during the Gucker years remained influential a long time. The overall actions and perseverance to keep the stores and laboratory servicing operations adequate and in tune with the changing needs constitute a major contribution in the development of the department.

CHEMISTRY LIBRARY

During the Shriner years in the department continuing emphasis was placed on the strengthening of the chemistry library and this was continued during the Gucker years. The quality and quantity of the books and serials were important for teaching and research. Each year there were significant increments in the holdings. There were certain advantages in having the bacteriology library in the chemistry library except that space limitations caused considerable crowding. The crowding was to continue to 1955 when the bacteriology holdings were transferred to the library in the newly-finished Jordan Hall.
A major strength was the Chemistry Librarian, C. H. Kretzschmar. Following his transfer to the library of the School of Medicine at Indianapolis in 1950 he was soon succeeded by another extraordinarily effective librarian, Albrecht Kronenberger.

The discomfort in using the library during summer months was partially alleviated by the installation of window air conditioning in 1949. However it was not really comfortable until the entire Chemistry Building was air conditioned several years later.

In Gucker's annual report to the Committee on Professional Training of the American Chemical Society, which followed his first year as chairman, he emphasized that fans had been installed "to increase the comfort during the summer months." Also, he stated that fluorescent lights had been installed in the reading rooms and adequate stack lights had been put in place. He concluded that "This has given us excellent library facilities."

The report of the Chemistry Library Committee for 1950-51, which followed Gucker's third year as chairman, showed that 739 new books and bound periodicals had been added. To aid in accommodating to the extremely crowded condition it was suggested that some of the infrequently used journals "will need to be stored in the room presently used as Mr. Kretzschmar's office."

In spite of crowding the chemistry library had excellent management and it was widely appreciated and extensively used throughout the years.

RESEARCH FELLOWSHIPS, GRANTS, AND CONTRACTS

Prior to the 1940s virtually the only direct funding for graduate research was through modest industrial grants administered by specified faculty members in support of research of particular interest to the donors. In large part such grants were used to provide stipends for the graduate students assigned to the supported research. In general such fellowships were preferred over teaching assistantships because the fellows' research became the basis of their graduate degrees.

The funding of research programs during World War II by governmental agencies and some research foundations quickly exceeded those from industries. Such postwar funding became dominant concurrently with Gucker's years as chairman of the department.

The following illustrative listing of the fellowships and research assistantships provided through governmental, industrial, and foundation sources in the early Gucker years is taken from the first (1949) bulletin on Chemistry at Indiana University:

"(1) the unrestricted DuPont Fellowship paying $1,200 a year or $1,800 to a married person; (2) a fellowship of the National Insti-"
tutes of Health paying a salary of $1,200 a year or more, depending upon the qualifications and number of dependents of the holder; (3) the Corn Industries Research Foundation Fellowship paying $1,200 for ten months’ work in the field of starch and sugar biochemistry; (4) the Limestone Institute Fellowship paying $1,200 a year for research devoted to some problem having to do with limestone; (5) the Sterling-Winthrop Research Institute Fellowship of $1,100 per year for research in the field of thiophene chemistry; (6) the Nutrition Foundation Fellowship of $1,000 for ten months for the study of the biochemistry of vitamin A; (7) the Ohio Oil Company Fellowship of $1,000 for ten months for research in the field of organic sulfur compounds; (8) three research assistantships at $1,350 per year for research in the field of aerosols under a contract with the U.S. Army; (9) three research assistantships at $1,350 per year for research in thermochemistry and thermodynamic properties of solutions, under a contract with the Office of Naval Research; (10) a postdoctoral fellowship of the Carnegie Institution of Washington for studies of heat capacities of salt solutions up to the critical temperature; (11) a research associateship in aerosols under a contract with the U.S. Army; and (12) a research associateship in thermo-chemistry of solutions, under contract with the Office of Naval Research.”

The total amount of such research grants, contracts and fellowships in 1949-50 was $78,440.

Five members of the faculty (Campagne, Day, Haurowitz, Gucker, and Peake) were each directors of one or more of the funds with the largest amount, $31,752, designated for Gucker. Soon a much larger proportion of the faculty became directors of such sponsored funding and the number and size of the grants and contracts increased enormously. This is illustrated by the following summary in the 1988 IU bulletin on The Graduate Program in Chemistry (P. 10):

“During the first semester of the 1987-88 academic year, 33 students held fellowships, another 73 students were appointed as teaching assistants, and 97 held appointments as research assistants. The stipends are more than sufficient to meet the basic graduate student living costs.....”

Whereas in 1949 the DuPont Company was practically the only company that regularly awarded financial support, by 1988 such contributors included DuPont as well as The Dow Chemical Co., Eli Lilly & Co., Procter & Gamble, Lubrizol, Sterling-Winthrop, General Electric, and others.

The mounting concern in the department about the awarding of special recognition for superior teaching by graduate assistants began to
be resolved in a faculty meeting on 7 April 1949 when it was agreed to establish two teaching fellowships. A description specified that "the project is in the nature of a teacher training program for university and college teachers." This was implemented in 1949 and continued several years. The awardees, all with proven ability as laboratory assistants, received higher stipends and their primary duties were in the conductance of recitation sections in general chemistry courses.

Information regarding fellowships and the selection of awardees was regularly published in the IDS. For example, in the IDS of 6 January 1949 the DuPont fellowship grant for 1949-50 was announced in four paragraphs. By this time IU had become one of 47 universities to share in the program. With the selection of Robert Patrick by the faculty for the 1949-50 award the practice was started of paying the recipient's fees (tuition) from the portion allotted to the department.

**Chairman Gucker's Research Program at I.U.**

Frank Gucker's impressive contributions in chemical research began at Harvard in the early 1920s under the guidance of this country's first recipient of a Nobel Award in Chemistry, Theodore W. Richards, who received the recognition in 1914. In 1925 Gucker's first scientific paper was published with Richards in the JACS. It concerned a differential method for the exact determination of specific heats of aqueous solutions. His fourth publication, on heats of dilution, followed four years later and the coauthor was again Richards. Such research was continued for brief periods first at Cal Tech and then in the Ammonia Division of the DuPont Co. After joining the chemistry faculty at Northwestern in 1929 he continued his research on the accurate determination of heat capacities, heats of dilution, sound velocities, and densities of solutions. Between 1925 and 1942 he and his students published over thirty papers in this systematic, long-range study of thermodynamic properties of solutions.

The intensity, thoroughness, and objectives of this program are well reflected in Gucker's comprehensive research proposal to the National Science Foundation in 1966. This application was to extend his support in this area from 1967 through 1972. He wrote in part:

"A satisfactory understanding of the nature of solutions of electrolytes would provide a quantitative picture of their behavior over the whole range of concentration and temperature which is available to experimental study. The limiting values of the thermodynamic properties of these solutions which can be measured directly at low concentration, such as the apparent molar heat capacity, volume, and compressibility, would be explained in terms of ion-solute interaction, while the change of all of these properties with concentration would be explained chiefly on the basis of inter-ionic
attraction and possibly such properties as hydration which may change with concentration.”

The dependence of such research on Gucker’s wise and skillful direction and on exceptionally skillful laboratory scientists and technical workers is shown in virtually every publication from his group. In particular it is illustrated in his report, with associates Chernick and Roy-Chowdhury, which was given before the National Academy of Sciences in November 1959. This was published in the Proceedings of the Academy in January 1966. A characteristic of the papers reporting such elegant research was the inclusion of acknowledgements of indebtedness to technical workers. In this paper the recognitions included

“Mr. Maurice Williams for construction of most of the mechanical apparatus ..., to Mr. George Siddons and Mr. Gerald Stout for the electrical equipment ....”

In connection with other research activity he took pains to acknowledge the technical contributions of Jack Baird as a skillful machinist and Earl Sexton for superior glass blowing.

With the beginning of World War II he and others at Northwestern joined in conducting basic research leading to the improvement of gas masks. The focus was on aerosols, but there was continuing interest in the nature of solutions. From approximately 1942 until his death in 1973 he and numerous graduate students and postdoctoral workers published more than 35 papers and major reports on their high precision work and skillfully designed equipment which established new dimensions in conquering aerosol problems. The basic research in its applications did indeed lead to improvements of gas masks. The first approximately five years were at Northwestern and all the rest was accomplished at IU.

In appraising the research in 1973 one of the students in the program, Robert L. Rowell, wrote of Gucker:

“He was never satisfied with measurements of even small numbers of aerosols but wanted to get at the single particles themselves. This led him to develop a counter for single particles and to improve the sensitivity of the penetrometer to the point that it could even measure the light scattered by the air molecules in the sensing zone.”

The productivity in thermochemistry and precise calorimetry continued during all the years of his advancements in light scattering measurements, calculations, and applications in controlling noxic gases, smogs, and air pollution. During these nearly five decades some of his students at IU included C. T. O’Konski, A. H. Peterson, R. M. Haag,
Throughout the more than four decades of sponsored research at Northwestern University and Indiana University the principal Gucker research grants and contracts were from various governmental agencies including the U.S. Office of Scientific Research and Development; U.S. Atomic Energy Commission; Division of Air Pollution, Bureau of State Services, U.S. Public Health Service; Geophysics Research Division of the Air Force Cambridge Research Center; Air Pollution Control Office of the Environmental Protection Agency; National Institutes of Health; National Science Foundation; Department of the Army; and Department of the Navy.

By 1950 the Gucker research activities and those of several other faculty members had brought the annual level of research grants and fellowships in the department to more than $100,000. Throughout the rest of his life Gucker remained active in research and during these final decades the support level remained among the highest in the department. When he reached the age for administrative retirement in 1965, he retired with high honor from the deanship of the College of Arts and Sciences. He utilized all the released time for additional attention to his research and service in teaching chemistry until 1970 when he became Professor Emeritus of Chemistry. Even at this age he devoted as much time as possible to research although failing health competed for his time and attention.

OTHER FACULTY RESEARCH DURING THE GUCKER CHAIRMANSHIP AND ANNUAL LISTING OF SCIENTIFIC PUBLICATIONS

The continuing diversity and depth of research in this period led to substantial increases in the number and diversity of research publications. This initiated the annual issuance of a listing of Scientific Publications of the Department of Chemistry and the sequential numbering of the publications. The series started with articles and books by faculty members that appeared on or after 1 July 1950. The first listing published covered a two-year period; thereafter each listing was for one year.

It was determined that through June 1950 492 scientific publications had been made by members of the department since the first publication which was by van Nüys in 1881 (on water analysis). The numbering of new publications began in 1950. The first seven and their publication numbers in the first listing were the following:


In addition to the research areas indicated in these seven publications, others and titles of representative articles or books included:

**J.H. Billman**
- The formation of solid derivatives of aldehydes
- Synthesis of dissecondary amines

**R. B. Fischer**
- The use of benzidine dihydrochloride for sulfate determinations
- Precipitation of barium sulfate: Investigation by electron microscopy

**F. H. Haurowitz**
- Hemoglobin, anhydrohemoglobin and oxyhemoglobin
- Persistence of C¹⁴-anthranil-azoovalbumin in injected rabbits
- The fate in rabbits of intravenously injected I¹³¹-ovalbumin
- Linkage of cystine in proteins

**L. H. Klemm**
- Kinetics of catalytic hydrogenation of naphthyl-1-cyclopentenes and naphthyl-1-cyclohexenes
- Reactions of arylsulfonates

**J. S. Peake**
- The alkylation and alkoxylation of silane

**F. C. Schmidt**
- Heats of solution and reaction in liquid ammonia
R. L. Shriner
Preparation and properties of substituted 2,3-diphenylbenzopyrylium perchlorates
[Research with R. R. Otter completed before 1946]

H. C. Thacher, Jr.
The theory of the dielectric constant

The listing for this two year period included 57 articles, two books, and one motion picture (on chemical laboratory safety). All chemistry faculty members published at least one article; and one (Haurowitz) published thirteen articles and one book. The coauthors included 45 graduate students. The most common journal used for publications was the Journal of the American Chemical Society in which fifteen articles appeared and eleven different members of the faculty were authors (Campagne, Day, Haurowitz, Kaslow, Klemm, Merritt, Nebergall, Peake, Rohrer, Schmidt, and Shriner).

For the following single year of 1952-53 the proportion of faculty involved in the publication of research was even higher. Again, more papers were published in the Journal of the American Chemical Society (11) than in any other periodical. Also, Haurowitz was the most prolific publisher of research (7 papers) and his work appeared in six different journals and books. Two of the three newcomers to the faculty since 1950 (W. J. Moore and V. J. Shiner, Jr.) published one article each.

By 1960-61 the number of departmental publications had doubled and the diversity of publication outlets had greatly increased both in subject areas and prestige. Correspondingly the changes from 1940-41 to 1950-51 had been equally dramatic in diversity and amount of publication output.

In spite of Gucker's heavy responsibilities as Dean of the College of Arts and Sciences from 1951 until his administrative retirement in 1965, and his death in 1973, his research and publication activity never ceased. During the period of 26 years in the university he published an average of well over one article per year and in the last five years of his life he was perhaps more creative and productive than in any comparable time period in all the half century of his academic years.

The faculty as a whole was determined and resourceful during the Gucker chairmanship. Haurowitz in his years of achievement and maturity held a well deserved reputation in Europe and America and indeed wherever basic biochemistry and immunochemistry were appreciated. Merritt had started well, especially as a highly regarded student and young colleague of H. H. Willard at the University of Michigan. At Indiana he moved forward soundly but imaginatively in developing a strong program in instrumental methods of analysis both in teaching and research. Campagne had come to the department with training and enthusiasm in organic sulfur chemistry and he made strong beginnings in medicinal chemistry that were to be productive throughout his pro-
fessional life. Day, in combination with Nebergall and Day's very able and indefatigable student, J. C. Muhler, formed a team which developed "an effective decay-preventive dentifrice" that revolutionized oral hygiene, advanced the understanding of fluoridation and health, and greatly reduced the incidence of dental caries.

**The Gucker Years as Reflected in 1950 by the IDS**

During the Gucker years as chairman the activities of the department were reported rather well by the *Indiana Daily Student*. The following brief items reflect some of the events that appeared during 1950:

On 6 January V. K. LaMer, a noted chemist at Columbia University addressed a meeting of the new Southern Indiana Section of the American Chemical Society in the Chemistry Auditorium. He was the guest of honor at a dinner given by the section in the Union Building before the meeting.

The March meeting of the section was addressed by Jesse P. Greenstein, chief biochemist of the National Cancer Institute. As stated in part in the IDS report, "With the aid of a slide projector, Dr. Greenstein explained the intricate methods of extraction" of protein from hog kidneys.

In the same month it was announced that J. A. Leighty of Eli Lilly & Co. visited the department "to become better acquainted with the faculty and with graduate students so that ideas of mutual interest could be exchanged."

Early in March it was reported that Gucker was "host last Saturday to Dr. E. D. Raines, chairman of the Department of Chemistry at Kentucky State College for Negroes in Frankfort, Ky." Raines received his PhD degree from IU in 1938.

In the same month, as reported, Day and Haurowitz were planning to attend the annual meeting of the Federation of American Societies for Experimental Biology in April at Atlantic City. On the return trip Day was to stop in Cincinnati briefly to attend a planning meeting of representatives of the Midwest Cooperating Sections of the ACS to plan section programs for the following year. Also, in March Merritt and Rohrer attended one of three divisional meetings of the ACS in 1950. This one was in Houston.

The many conferences and other meetings attended by Gucker included a symposium in April at the Army Chemical Center in Edgewood, MD. In May the IDS covered at some length the lecture given by Haurowitz to members of the premedical honorary society, Alpha Epsilon Delta. The title was "A Comparison of Medical Studies in Europe and the United States."

The end of the 1949-50 academic year marked the retirement of Mathers from the university in his 69th year. He had been connected
with the faculty of the department 47 years. The reported interview included the statement that “I plan to keep in touch in university activities as much as possible.” That plan was implemented for 23 years, until he died in 1973.

The reported chemistry interviews that year included an extended coverage in October of a device patented by J. H. Billman in collaboration with E. D. Seeber of the Department of French and Italian. Called an Organic Chemistry Wheel, the device was developed to aid students in studying organic chemistry. In essence it was two cardboard revolving wheels attached together. The IDS explained that,

“Revealed on one side, through openings in the revolving disk are standard methods (reaction equations) for the preparation of the common types of organic compounds. On the reverse side, a corresponding wheel shows the properties of these compounds.”

The devices were sold in a large number of institutions in this country and Canada. When properly manipulated the student could review “a total of nearly 400 essential basic reactions encountered in the average organic chemistry course.”

The developing interest of the department, especially Merritt, on X-ray applications in chemistry, led to a seminar on this subject on 17 November 1950. The distinguished speaker, G. L. Clark, had been head of the analytical division in chemistry at the University of Illinois 22 years. This, like many seminars in that period, was well covered by the IDS.

A final coverage of chemistry in 1950 by the IDS was a signed article by Dick Madden who had interviewed Campaigne, and L. S. McClung who was then chairman of the Department of Bacteriology. The subject was antibiotics, which was then new. Penicillin, chloromycetin, aureomycin, and terramycin were already known. The review focused on the “wonder drugs, now in use on the Korean battlefront.”

**Professional Involvement of Faculty in the State, Nation, and World**

The “professional visibility” of the department and university was obviously enhanced when F. Haurowitz joined the faculty within the first year of Gucker’s chairmanship. Perhaps the most notable contribution in his first year was the publication of a new edition of his esteemed *Fortschritte der Biochemie* which reviewed progress from 1938 to 1947. He began this service to biochemistry in 1924. This fourth edition, which was intended to be his last, appeared in English in 1950. However the indefatigable scientist had second thoughts and he produced still another
survey "the fifth in a series of reports on the progress in biochemistry since 1914." In the expression of his reason for attempting this Herculean task he wrote in the preface:

"The answer is that one of the reasons for writing this book is the author's desire to keep abreast of the state of Biochemistry."

It was entitled Progress in Biochemistry since 1949 and it appeared in 1959. This was the last of a published comprehensive survey of biochemistry by one person! Among the other distinguished early contributions of Haurowitz in the department was the publication of his book in 1950: The Chemistry and Function of Proteins. A second edition was published in 1963.

At least two other distinctive faculty members besides Haurowitz and Gucker gained some prominence in the Gucker years of 1947-51. They were Merritt and Campaigne. Merritt notably gained enhanced stature in connection with his sabbatical leave at CalTech in 1949-50. Campaigne's rising stature also had some connection with his sabbatical leave soon after at UCLA. Both men came back imbued with new and constructive ideas for implementation in their research and each had favorably impressed remarkably capable and productive chemists. Merritt followed up some of his experiences in California with the vigorous and ingenious development of X-ray and computer resources for the determination of the crystal structure of molecules. Campaigne's emerging successes in organic sulfur chemistry, and especially his achievements in the synthesis of a compound promoted as Thenfadil, led him on to recognitions and a prolific career in medicinal chemistry.

Nearly all the other chemistry faculty were self-starters and active in moving ahead professionally both in teaching and research. They also attended professional meetings, published papers, and several were invited to give lectures before other groups. In the Gucker years, and for at least a decade thereafter, as well as decades before, the Indiana Daily Student was a fairly revealing window on academic matters in the university. The following illustrative and selected news items regarding chemistry appeared in the IDS during 1951, Gucker's last year as chairman:

In March Merritt spoke on "Structure Determination by X-Ray Diffraction" before the Wabash Section (Terre Haute) of the American Chemical Society. Three weeks later the IDS reported that Merritt gave a paper on gallium chloride by himself and Oscar Menis (PhD'51) at the spring ACS meeting in Boston.

In March Haurowitz attended a conference of about twenty specialists in immunochemistry. This was at Columbia University and it was to "consider ways to stimulate research in immunochemical research."
Following this he visited by invitation the Office of Naval Research in Washington.

Early in April the IDS published an interview with him by one of its reporters. This followed a lecture given by Haurowitz at a local section meeting of the ACS in Minnesota. The interview brought out the essence of his widely accepted views regarding antigen-antibody relationships in immunological processes. For example, as reported, in part, quoting Haurowitz

"The bulk of the antigen is found in the mitochondria, and remain there for many weeks while antibodies are formed. Since the mitochondria are considered as self-duplicating units, endowed with the ability to form proteins, our observation suggests that the antibody disturbs the normal synthesis of proteins so that the slightly modified proteins are formed. They differ from the normal proteins formed in these cells by the fact that they combine specifically with the antigen."

Three weeks following this interview the IDS gave information on the department's participation in the annual meeting of the Federation of American Societies for Experimental Biology in Cleveland. Haurowitz and his student C. Crampton (PhD'51) reported on "Intracellular Distribution of Radiodinated Antigens." Day and C. Becker (PhD'51) gave a paper on "Utilization of Glucosone and the Biosynthesis of Glucosamine in the Rat."

Late in April the IDS reported that Fischer and Kaslow attended a planning meeting of the Midwestern Cooperating Sections of the ACS in Cincinnati. Fischer was made secretary-elect. The Cooperating Sections included parts of Missouri, Illinois, Kentucky, Ohio, and Indiana. Three weeks later the IDS stated that Fischer had spoken by invitation to chemists at the University of Illinois on "Microwave Spectroscopy in Analytical Chemistry."

Late in May the IDS announced that Day had been appointed to a four year term as associate editor of the Journal of Nutrition, the official publication of the American Institute of Nutrition. Six days later it stated that Haurowitz would speak on European and American medical schools to premedical students on campus. Several weeks later it reported that Haurowitz was scheduled to speak at the Brookhaven National Laboratory on some of his research, particularly on "Functions of the Nucleus in Protein Synthesis."

In addition to frequent reporting on the research and the involvement of chemistry faculty in professional meetings it kept the readers informed on other matters, especially in promotions in rank, special assignments, etc. In June 1951 it announced that Schmidt and eight other
faculty members in other departments had been promoted to full professor.

Also, the IDS always reported events in the Indiana Academy of Science that were of local interest. In November 1951 it stated that Gucker, even though now Dean of the College of Arts and Sciences, and five other members of the chemistry faculty were participating in the Academy's fall meeting at Butler University. In a symposium on the chemistry curriculum Gucker spoke on physical chemistry courses and Campagne discussed the one semester organic chemistry course for non-science majors. Faculty members reporting on their research were: Kaslow, Rohrer, Klemm, and Billman.

These selected news items in the IDS represent fairly the impressions given to its readers on the professional activities of the chemistry faculty.

CHEMISTRY ALUMNI LINKAGES

A hallmark of the Gucker years in chemistry was the consistent and creative attention to the continuation of mutually rewarding relationships with students and others following their years of effective work on campus and in the department. Two of several notable aspects of the relationships were (1) the establishment of an organization of alumni and others identified with the department, the Association of Indiana University Chemists, and (2) the preparation and periodic distribution of newsletters.

Soon after Gucker’s chairmanship began he encouraged the chemistry faculty to think about the formation of an association of chemistry alumni and other chemists with ties to the department. He described as a model the one he knew best, the Association of Harvard University Chemists. For years chemistry faculty members had maintained friendly but unorganized relations with the alumni and others. The Gucker idea took hold quickly. Through prompt faculty encouragement Gucker appointed an organizing committee composed of Mathers, Billman, and Peake, with the latter serving as chairman.

The first action was the mailing of a letter to all the chemistry alumni for whom addresses were available in the department’s incomplete alumni files. It announced that an organizational dinner would be held at the April 1948 meeting of the ACS in Chicago. At this meeting the committee was requested to serve longer and to draft a constitution. The general plans concerning an association of chemistry alumni was announced in the IDS on 20 April 1948. At that time it was believed that 1200 graduates in chemistry were eligible for membership. On 29 April the IDS reported that “Graduates and faculty members of the Department of Chemistry met last week in Chicago to form the Association of I.U. Chemists.”
A brief newsletter (the second) was then prepared and mailed in August 1948. It included the names of alumni whose addresses were unknown.

Some responses were received but the attempt to hold an alumni meeting at the September 1948 ACS meeting in St. Louis was a failure. Only three persons were present, but the committee and the department persisted. Postal cards were mailed early in 1949. The response was gratifying and this encouraged everybody.

A third letter, of five pages, was mailed in August 1949. This, like the two earlier communications, was drafted by Peake and prepared for mailing in the departmental office. It contained news items regarding 38 alumni. The first item reported the selection of J. C. Warner, PhD'23, to serve as President of the Carnegie Institute of Technology. He was inaugurated 28 October 1950. In the news of the department ten faculty members (Briscoe, Brown, Campaigne, Day, Gucker, Haurowitz, Mathers, May, Merritt, and Schmidt) were mentioned. Staff members in the news were Baird, Sexton, Williams, and Eckels (who had retired). This letter constitutes the first substantial newsletter. Copies of this letter and all subsequent news letters have been preserved, and a bound collection is kept in the chemistry archives.

It is of special interest that the typing, duplicating, and other secretarial work in the preparation for mailing of the newsletters was the general responsibility of Elizabeth Greene. This continued to be one of her responsibilities through all subsequent issues at least until 1990.

The fall 1949 meeting of the emerging AIUC was a luncheon in connection with the ACS meeting in Atlantic City. More than fifty alumni and faculty members attended. This was briefly reported in the IDS. Then at a regular chemistry faculty meeting on 17 February 1950 a constitution for the AIUC was adopted. It declared that

"The objectives of the Association shall be to serve its membership as a medium for the gathering and dissemination of information of interest to the members and to sponsor meetings of the alumni of the Department of Chemistry."

Provision was made for the annual designation of a president and a secretary-treasurer, but with the stipulation that the chairman of the department would act for the AIUC in the degree that it might be necessary.

Meredith Sparks was the first president, serving in 1950-51. The successive presidents, each serving one year until the end of 1974 were: Frank Dolian, W. T. Rinehart, Nolan Sommer, A. M. Borders, W. M. LeSuer, D. J. Cook, R. M. Lingle, L. I. Gilbertson, Herschel Grose, W. P.

By the end of 1974 it had been decided by the department that it was more efficient to forego the periodic selection of presidents, secretary-treasurers, and advisory groups. The total responsibility of maintaining the newsletters, alumni gatherings at ACS national meetings, and other organized relationships was accepted by the office of the departmental chairman. Also, the development of a program for special contributions to the department - the Friends of Chemistry - added to the feeling that less structure was needed in the maintenance of strong bonds with the alumni. However the department relied on H. Day and E. Greene to coordinate and support an exchange of information between the alumni and the department. This substantial change included the annual departmental designation of a committee to produce and publish a comprehensive newsletter. The Gucker idea for an Association, initiated in 1948, bore much fruit. It soon became firmly established in principle and it properly adapted to changing needs. Thus it is a fixed tribute to the chairman of 1947-51.

MEMORIALS TO F. T. GUCKER

Soon after the death of Dr. Gucker in 1973 the Department of Chemistry took steps to establish an annual lectureship in physical chemistry to commemorate his memory. R. L. Rowell and C. T. O’Konski, former graduate students in his group, and Day were designated by E. H. Cordes, then chairman of the department, to constitute the fund raising committee. Many contributions were received from chemistry alumni and numerous other friends in the university and elsewhere; thus making it possible to provide an endowment fund that is expected to sustain the memorial in perpetuity. The first five lecturers, beginning in 1974, were: Max F. Perutz, John T. Edsall, Stuart A. Rice, John C. Polanyi, and John A. Pople.

The second memorial came in 1983 when an impressive building in the Herman T. Briscoe Residence Center was fittingly named the Frank T. Gucker Hall. His portrait, which was painted at the time of his retirement, now hangs in this Hall.
References

The department's Archives/Alumni office was the primary source of recorded information. The specific sources included minutes of chemistry faculty meetings, reports of chemistry committees, correspondence files, and reports to ACS offices and various granting agencies. In addition, extensive reviewing of back issues of the Indiana Daily Student yielded much useful information which was compiled and is now on file in the Archives/Alumni Office. Besides these sources the University Archives continued to be a source of information. The author's personal files and his late wife's diaries provided many specific facts. An especially perceptive and illuminating record is the 59 page account by Professor Emeritus Campaigne completed in 1983 and filed in the Chemistry Archives. It is entitled:

I Remember Him: A Biography of Frank Thomson Gucker, Jr. April 8, 1900 - March 6, 1973

The contribution by Campaigne lists all the publications by Gucker and all theses completed under his supervision.
Chapter IX

The Day Years as Chairman: 1951-62

At a chemistry faculty meeting on 9 May 1951 Chairman Gucker quietly announced that he had accepted the deanship of the College of Arts and Sciences effective in July. However he would continue his research program and devote most of his afternoon time to work in the department. The impending change was met with surprise but a feeling of satisfaction that this colleague of only four years would remain active in the department. The departmental program was moving along well but serious attention had to be devoted to the selection of a new chairman.

On 27 June, at the final faculty meeting under his chairmanship, Gucker announced that Day would serve as acting chairman during the long interval anticipated for the selection of an “outside” chemist of high reputation to serve the department. The concluding action of the meeting was a vote of appreciation to the newly designated dean.

At this time the faculty consisted of: Billman, Campagne, Day, Fischer, Gucker, Haurowitz, Johnson, Kaslow, Klemm, May, Merritt, Nebergall, Peake, Rohrer, Schaap, Schmidt, Seifert, and Thacher.

Over one-half of the faculty and nearly all the nonacademic staff had been appointed during the Gucker chairmanship. Many new appointments and other changes were to be made in the following decade since the momentum and forces for growth and development had been strongly established in the past decade.

The search for a new chairman gave serious consideration to a number of prospective appointees. Over the next few months these were discussed by the faculty and individuals reported their preferences to Dean Gucker. Finally, notwithstanding the original intention, an agreement on Day for the chairmanship was reached by all concerned. Approval by the Board of Trustees was announced in the IDS on 8 July 1952. Five years later the appointment was renewed for another five year term.

The 1950s were essentially a continuation of the policies of the Gucker years as chairman. This included frequent and meaningful faculty meetings, meaningful committee action in decision making, and cooperation in moving toward goals. It was characterized by strong faculty appointments, marked increases in funding, increasing national recognition, and the planning and construction of the large 1960s addition. The purpose of this chapter is to present some of the events and actions which indeed affected the department but without providing a comprehensive coverage of everything. In so doing many of the persons involved are identified so that credits are established in perpetuity.

DIAMOND JUBILEE OF THE ACS

The beginning of the 1950s decade coincided with the year-long observance of the American Chemical Society's Diamond Jubilee. This gave unusual opportunity for interaction with chemists and chemical thought on a national scale. The culmination of this mammoth event was at the fall meeting of the ACS in New York on 3-7 September 1951. The highest all-time registration totaled 13,466. A feature was the issuance of a commemorative ACS three-cent U.S. stamp.

On campus the Jubilee observance included a “Chemical Magic” show by F. C. Schmidt on the Bloomington television station on 19 September. Two days later, under the sponsorship of the Southern Indiana Section of the ACS, an expanded observance was held in the University Auditorium. Dean Briscoe spoke on the significance of the Jubilee. This was followed by a “Chemical Magic” show performed by chemistry faculty members Rohrer and Schmidt. The IDS reported that it “highly delighted the small crowd of students and townspeople there.” Through these events and the general publicity about chemistry the movement into the 1950s was accelerated.
The department had special reason to observe the 75th anniversary of the ACS. This was because it became so recognized in the university about the same time (1874) the ACS was founded in 1876.

The Faculty

The solid core of a good department is the faculty. As in the past decade the current faculty, chairmen, and deans were constantly on the alert to improve the effectiveness of all the faculty and to search for the best possible additions. During the period of 1951 to 1962 fifteen new regular faculty were recruited and appointed. The first two, in the first year, were W. J. Moore and V. J. Shiner; the last three, in the last year, were E. H. Cordes, L. K. Montgomery, and D. G. Peters. Moore was selected while Gucker was chairman but his appointment did not begin until 1952. A brief accounting of the appointment of all the new faculty in this decade is important.

Shortly before Gucker’s transfer to the deanship of the College of Arts and Sciences he had been in communication with W. J. Moore of Catholic University. This was followed up by Day’s participation. On 27 July Moore visited the department and lectured on some of his work. Soon thereafter he agreed to join the faculty as professor effective in the fall of 1952. His credentials in physical chemistry were higher than those of any appointee at any time except Gucker. He had published significant work in solid state chemistry and he had a rigorous and well respected textbook in physical chemistry.

V. J. Shiner had completed his doctoral degree at Cornell in 1950, and he had been a Fulbright fellow in physical organic chemistry at University College in London one year. He came to the department’s attention in early 1952. A visit to the department and a lecture on his work were stimulating. Eight days later after the faculty and Day had considered his record an instructorship was offered and accepted.

Soon thereafter the resignations of L. H. Klemm and Dana Johnson were received and accepted. Klemm joined the faculty at the University of Oregon and Johnson went to Kansas State College.

It was clear that a special need existed for strength in natural products chemistry. Marvin Carmack, then at the University of Pennsylvania, became the choice after he presented a lecture on his work in November 1952. Soon he accepted an appointment as professor effective in 1953-54.

Thus the annual report to the ACS Committee on Professional Training in October 1953 listed the following faculty and their academic ranks:

Professors: Campagne, Carmack, Day, Gucker, Haurowitz, May, Merritt, Moore, Schmidt
Associate Professors: Billman, Fischer, Kaslow, Peake, Seifert
Assistant Professors: Nebergall, Rohrer, Schaap, Thacher
Instructor: Shiner.

The actively retired faculty were Brown and Mathers.
Clearly there was need for further strengthening in other areas, especially in analytical chemistry and biological chemistry.

E. J. Bair at the University of Washington had been publishing promising work on molecular spectroscopy. He visited the campus in April 1954 and was appointed effective in 1954-55, adding strength particularly to experimental physical chemistry and analytical chemistry. The next year notable strength was added in theoretical chemistry through the appointment of Harrison Shull then on the faculty at Iowa State University. In the same year Henry Mahler came from the Enzyme Institute at the University of Wisconsin. Each contributed to the growing reputation of the department. Truly a turning point in the breadth and quality of the faculty began in the fall of 1954-55.

The appointment of Shull turned out to mark an exodus of faculty from Iowa State University to chemistry at IU. The first to follow Shull was R. Schaeffer in inorganic chemistry who came in 1958 and in the same year R. A. Bonham finished his graduate work at Iowa State and joined the physical chemistry group. Not much later J. A. Thoma and then E. Wenkert transferred from Iowa State to the faculty here. This naturally raised questions, on both campuses and elsewhere in chemistry. Was it all gain for IU and loss for Iowa State? Was it merely coincidental? In each individual case the transfers were to the advantage of IU. All were especially productive in research and each person established a good record in teaching. But within a little more than two decades all had gone on to other institutions except Bonham who became a stable and productive specialist with his group here in his Electron Impact Spectroscopic Laboratory. After a few years Wenkert transferred to the Rice Institute and Schaeffer became Dean of the College at the University of Wyoming. After serving in various administrative roles at IU Shull transferred elsewhere and finally became the President of the University of Colorado. Thoma transferred to the University of Arkansas.

In the meantime, in 1958-59, W. L. Meyer came directly from his graduate work at the University of Michigan and began an active program in organic chemistry. Later he also transferred to the University of Arkansas.

The last three faculty appointments in the Day years were in 1961-62. Each came soon after finishing his doctoral work; Cordes in biochemistry at Brandeis University, Montgomery in organic chemistry at California Institute of Technology, and one year of postdoctoral work at Harvard, and Peters in analytical chemistry at Harvard University.
Cordes rose rapidly in esteem and productivity both in teaching and research and he served as chairman during 1972-78. Finally the frustrations of administrative responsibilities here and opportunities in industrial chemistry induced him to resign and accept an executive position with the Merck, Sharp and Dohme Company. After several years of concentration in teaching service Montgomery became greatly enthused by his successes in superconductivity research and in the 1980s he became a significant contributor in that exciting development. Peters contributed broadly in student advising, classroom teaching, and direction of both graduate and undergraduate research. With the transfer of Wenkert to Rice University in 1974, the Herman T. Briscoe Professorship he held was transferred to Peters, who has retained the title with distinction since that time.

**FACULTY ENHANCEMENT**

Each positive development in the department contributed to general morale and productivity. One instance that added to the good feeling was the creation of a new summer younger faculty research fellowship program by the DuPont Company. This occurred effective in summer 1953 with V. J. Shiner the recipient. The award was a contribution of $1500 to the department. From this the young faculty member received one-fifth of the base salary for two months. Any amount remaining was made available for research supplies and/or a stipend for a graduate student working with the faculty member. The program was regarded as an award to the department for encouraging young faculty members.

Another enhancement was announced at a faculty meeting on 26 February 1954. This was a plan by the DuPont Company to invite a number of younger faculty members from different institutions for complimentary inspection trips to their research and manufacturing facilities. This would provide opportunity to broaden acquaintanceship and perspective. Departmental chairmen were invited to nominate representatives. W. B. Schaap was designated for the visitation. Of course he accepted.

Within a few years these faculty members and others were recipients of other more auspicious awards. For example in 1960-61 Schaap was the recipient of a NSF faculty fellowship for research at the University of California (Berkeley). In the same year a still younger colleague, Bonham, was the recipient of a research fellowship at the U.S. Naval Research Laboratory. During the second semester of 1959-60 Moore was on leave from the department as Visiting Professor at Harvard. His replacement here was J. J. Lander of the Bell Telephone Laboratories.

In 1956 Merritt became the first member of the chemistry faculty to receive a Guggenheim Fellowship. It enabled him to spend a full year
on sabbatical leave at the California Institute of Technology. This enriching action began a pattern that finally included the following subsequent Guggenheims to chemistry faculty members:

R. A. Bonham 1964 D. A. McQuarrie 1975
R. Schaeffer 1965 V. Viola 1980
E. Wenkert 1965 G. Ewing 1983
C. S. Parmenter 1971 J. M. Hayes 1987

For the first time in the history of the department a noted chemist, F. G. Arndt, served as a visiting professor during the second semester of 1953-54. In addition to his regular lectures and the direction of some research in the department he had continuous interactions with the faculty. This was an enriching experience for many.

The annual reports of the department to the Committee on Professional Training of the American Chemical Society reflect the faculty development of the period. For example in the 1954 report, which summarized statistics and events for 1953-54, the following was included regarding the faculty:

"The regular faculty of 19 persons participates as follows regarding certain functions of special interest. They published approximately 60 scientific papers, books, and book reviews; made approximately 45 trips away from Bloomington and Indianapolis to attend scientific meetings; gave approximately 25 scientific lectures by invitation away from Bloomington and Indianapolis; held 12 offices in off campus scientific societies; were consultants to 10 different industries and governmental agencies; and 7 served as referees or associate editors for major journals and research contracts and grant divisions of governmental agencies."

In connection with faculty development the Secretary of the Committee on Professional Training wrote to the chairman in 1955 stating:

"The Committee has asked me to congratulate you on the very material improvement which has occurred during the past few years with respect to your staff. You have made a number of promising additions and we know that you will continue to exercise the greatest care in the selection of future staff members..."

Two years later, in October 1956, the annual report to the Committee on Professional Training referred to equally salutary activities and accomplishments. One was to the effect that the total grants from outside agencies exceeded $250,000. This was the largest amount ever received
by the department in one year. In 1958-59 those sources yielded $420,500 for research. When Gucker became the chairman in 1947 the total grants for that year were approximately $90,000. This was much higher than in any previous year. Thus in a little more than a decade this marked advance in 1947 was almost quadrupled. The growth and enhancement continued for a long time.

CONFERENCES

A special source of far ranging stimulation came from the major conferences and related meetings. In particular these were: 1951 Conference on Organic Sulfur Chemistry, 1953 Structural Aspects of Coordination Compounds, 1954 Medicinal Chemistry program of the ACS, 1958 Conference on Hyperconjugation, and 1961 National Organic Symposium of the ACS.

(a) Conference on Organic Sulfur Chemistry: The conference was initiated more than two years in advance. At a chemistry faculty meeting in April 1949 Campaigne suggested that a major conference was needed on organic sulfur compounds. The idea quickly gained support. Planning was started by the Summer Symposium Committee headed by Schmidt. In December that year a separate committee, chaired by Campaigne was designated for the conference. This became the first conference of substance ever held by the department.

Five of the speakers for the sulfur conference were from other countries: Heinrich Hauptmann of Brazil, H. J. Bacher of Holland, Fritz Arndt of Turkey, F. G. Mann of England, and Claude Fromageot of France. Other speakers included: Marvin Carmack, Hans Heymann, F. G. Bordwell, E. Emmet Reid, Norman Kharasch, John C. Sheehan, Francis Binkley, and C. J. Cavallite. Approximately 150 persons attended of whom 72 were from out of state.

In the final report on the conference the local committee (Day, Haurowitz, Schmidt, Campaigne) wrote concerning the meeting rooms: “The choice of the A, B, C, D rooms in the Union Building was particularly fortunate in view of the fact that they are air conditioned.” A memorable contrast in temperature, and thus in comfort, was felt by all at the featured dinner, which was held at the non-air conditioned Bloomington Country Club. It was a sweltering evening. In spite of the esteem felt for the venerated Professor Reid, the speaker of the evening, all were uncomfortably hot. The committee in its report noted that the buffet dinner was “superb.” The cost per person was $4.00

Twenty-four companies were invited to participate and twenty-one responded to the opportunity to provide financial support. This aid plus a modest income from the sale of dinner tickets “came to $4,614.05.” The total costs were $3,550.35. The unobligated balance was held by
ORGANIC SULFUR CONFERENCE, 1951
Back Row: John Sheehan, E. Emmett Reid, C. Fromageot, Fred Bordwell; Middle Row: F. G. Mann, H. J. Backer, Fritz Arndt, Chet Cavalito; Front Row: Norman Kharasch, Han Heymann, F. Binkley, M. Carmack, Heinrich Hauptmann
the Indiana University Foundation for use by the department in sponsoring other chemistry conferences. Many members of the chemistry faculty and non-academic staff helped much in making the conference so successful, but the major credit is attributable to Campagne.

The committee's final report was presented at a faculty meeting on 4 January 1952 and it was heartily approved. At this time Day announced the appointment of a committee (Campagne, Nebergall, Merritt as Chairman) to begin the planning for the next conference.

(b) Conference on Coordination Compounds: At a faculty meeting in May 1952 the Merritt Chemistry Symposium Committee recommended a conference in summer 1953 on structural aspects of coordination compounds. Merritt had recently been enthused by the prospects of X-ray crystallography in the determination of structure while he was on leave at the California Institute of Technology. Others here were also personally interested. Merritt's proposal was promptly adopted.

Soon there was active planning for the event. The principal workers were Merritt and Schaap. Everything developed smoothly in the selection of speakers and topics and the enlistment of adequate financial sponsorships. The conference was held on campus 18-21 August 1953. Approximately 175 chemists from many universities and industrial companies attended. Although many from other laboratories were stimulated by the event it is probable that by far the greatest benefactors were the students and faculty of the department. The emerging developments in computer science and technology made the timing of the conference ideal. Active research in structure determinations began to flourish here. The Molecular Structure Center of the department was energized.

(c) 1954 Medicinal Chemistry Meeting of the ACS: A proposal to host this annual event of the ACS was presented to the faculty in October 1952 by Campagne, Kaslow and Rohrer. Campagne was designated to direct the effort. This was with full local support. The major event attracted several hundred chemists to the campus. Several internationally known speakers, including R. B. Woodward, were highlights of the meeting. The plenary sessions were held in the university auditorium.

(d) Conference on Hyperconjugation: At a faculty meeting on 1 May 1957 Shiner proposed a conference on the highly specialized subject Hyperconjugation. Like the conference proposals he had previously made this was firmly supported by the department. Some assistance was given by the Indiana University Foundation. Campagne and Shiner became the conference cochairmen, with the former functioning mostly as "business agent" and the latter in charge of the scientific program.

The conference was held on 2-4 June 1958 with 16 scheduled major presentations. In addition several important investigations and views were presented extemporaneously by some participants during discussion sessions. The total registration was 117, including 61 participants from
23 states other than Indiana. Financial support was provided by the NSF and six industrial companies. The conference papers were published by Tetrahedron in 1959. The major outside contributors included R. T. Arnold, E. Berliner, P. B. D. de la Mare, M. J. S. Dewar, W. M. Lauer, E. S. Lewis, R. S. Mulliken, C. C. Price, W. M. Schubert, A. and S. Winstein.

(c) National Organic Chemistry Symposium: In 1958 the department was informed that its invitation to host the 17th National Organic Chemistry Symposium had been accepted. Active local planning was started in 1959 with Shiner and Campagne cochairing the General Committee. Because the meeting was so large the Conference Bureau handled a large proportion of the logistics such as registration, housing, and collection of fees. Approximately 1000 registered and attended the various sessions at the University Auditorium. The symposium was held 25-29 June 1961 under the sponsorship of the Division of Organic Chemistry, Indiana University, and the Southern Indiana Section of the ACS.

The Local Arrangements Committee made special plans for entertainment. These included a reception on the lawn of the President’s House by then President Wells, an exhibit of chemical books at the Lilly Library, and an organ recital in the University Auditorium by Oswald Ragatz.

**Undergraduate Development**

Characteristic of the department from its beginning, all the faculty taught undergraduates and interacted with significant numbers of students virtually all the time. Although there was much reliance on graduate students in the teaching program, especially in laboratory instruction, all courses at Bloomington were taught by regular faculty members or occasionally by visiting faculty members. The faculty cared about all the undergraduates. In this section most of the attention is limited to those actions and events that illustrate change.

For example during 1951-52 the Chemistry Curriculum Committee, chaired by Merritt, devoted much attention to the B.S. degree in chemistry. At the time 48 hours in chemistry were required. This high amount discouraged the acquirement of sufficient breadth in other sciences if not in non-scientific areas. The committee pointed out that it diminished the opportunity for academically very strong students to gain enough breadth to qualify for election to Phi Beta Kappa. The requirement was reduced to 45 hours. Also, the recommendation was adopted to include 5 hours in biological science.

In the same time period an elective seminar for undergraduates was introduced. A particular objective was to stimulate a greater degree of interaction between advanced undergraduates and faculty.
In 1956-57 for the first time superior students in general chemistry were placed in a special section. The identification of such students was partially accomplished through special examinations. Various other actions were begun or accelerated about that time to identify and stimulate such students until they graduated.

Every year the appropriate committees gave attention to the undergraduate courses and sought for ways to effect improvements. A comprehensive revision of the A.B. and B.S. programs was completed and accepted by the chemistry faculty and College of Arts and Sciences in 1960-61. It was inaugurated in 1961-62. This included substantial changes in analytical chemistry and in physical chemistry. A more rigorous undergraduate course in inorganic chemistry was started.

In 1961-62 the developing program was extended by the creation of a special section of organic chemistry (C341). In that first year all the students in general chemistry section for superior students and all who made A grades in the regular sections were permitted to begin the organic chemistry special section without any other chemistry. The high grades they earned suggested that the change was warranted. In the following year the special sections program was expanded to include such groups in C342 and C361. Students who had completed several special sections thus became ready to take more advanced courses and/or research.

All of this required much individualized advising of the growing number of regular students as well as superior students and those who had scholastic problems. Thus coordination and leadership in advising were important. This led to the gradual establishment of an office for undergraduate advising and record keeping in the mid 1950s. This significant role was filled by Shiner until he became the departmental chairman in 1962. At that time Day became the advisor.

The various curricular and other changes on behalf of the students led the department in 1959-60 to begin a comprehensive chemistry honors program. It was applicable to all qualified students. Already several departments in the College of Arts and Sciences had adopted programs. For some time Seifert was the Chemistry Honors Advisor. By 1963-64 the bulletin of the College listed 21 departments that had started programs leading to degrees "with Honors." Details concerning the requirements for admission and curriculum changed some from time to time, but the emphasis remained on the stimulation of students and on "Honors Research" within departmental research groups. The Chemistry Honors Advisor had much responsibility in advising and coordinating each enrollee in all phases of the program.

INDIVIDUAL RECOGNITIONS: THE CHEMISTRY HONORS BANQUET

The Chemistry Honors Banquet developed through the conviction that outstanding achievement in chemistry or any academic discipline should be recognized as fully as accomplishment in any athletic activity
or other worthy pursuits. The first department-wide recognition was in 1954. At a faculty meeting on 7 May the chairman announced that at a seminar two weeks later a chemistry handbook would be presented by Schmidt to the top freshman chemistry student, and one award each would be given by Rohrer to the two highest rated seniors.

A stimulus toward special recognitions was in 1952 at a meeting of the chemistry faculty. Warm interest was expressed in the currently announced program of the Chicago Chapter of the American Institute of Chemists in inviting departments of chemistry to nominate their top students for recognition. The Institute sought recommendations. In March William E. Hatton was chosen by the faculty. Later that year the Institute’s certification was presented to Hatton. The Institute continued this recognition of top seniors for several years and the department participated every year.

In 1953 RCA, which then had a major manufacturing plant in Bloomington, initiated a $800 scholarship to be awarded to an undergraduate in the physical sciences. This first award was to A. M. Bornstein, a junior chemistry major who in 1954 was selected for the American Institute of Chemists’ Award. During this decade and subsequently various awards were initiated. The needed action was a coordination of recognitions.

As stated in the chairman’s annual chemistry report for 1957 the department gave a dinner in May that year in the Memorial Union. The honored guests were four outstanding general chemistry students and three notable seniors. Each was given a modest award. Faculty and other students were present. It was a pleasant and relaxing social occasion which was surely appreciated by all present. There has been such an occasion every year since and all have been in the Union Building. Of course a marked difference from those in the earlier years has been the number of the awardees, the nature of the awards, and the number of persons present. The banquet pre-eminently recognizes excellence and that attracts attention.

A feature of the banquets was a prominent scientist or other celebrity who gave a brief address. At the second banquet, in 1958, the featured speaker was Nobel laureate Vincent duVigneaud of Cornell University. This time graduate students were also recognized. Eighteen undergraduates and graduate students were honored. For 1958-59, on 23 May, the event was held in the then new Frangipani room. Professor Hickinbottom of Queen Mary College, London, addressed the group. Another distinction was the use of a cream and crimson program cover. The cover was used with high consistency throughout thirty years or more.

At the fourth banquet, in May 1960, the address was on “The Rewards of Scholarship” by Professor John C. Bailar. Faculty members
who participated were: Bair, Campagne, Day, Gucker, Kaslow, Schaap, Schaeffer, Schmidt, and Shull. Among the students honored were: J. C. Huffman, T. Marquis, R. Ake, R. Baker, J. Gill, R. Chernin, L. Dorman, R. Rowell, R. Christoffersen, E. Davidson, R. Ensman, and J. Wolfe.

In 1961 the guest speaker was T. Carney, vice president and director of research at the Eli Lilly Company. In 1962 it was Dean of the Faculties R. L. Collins, and in 1963 Vice President and Dean for Undergraduate Development Samuel Braden was the speaker.

A pleasing feature of the dinners and preceding receptions has been the presence of so many parents and close friends of the awardees as well as several deans, faculty members and their spouses. In particular, for the guests an additional feature was musical entertainment during the first decade. The total attendance first exceeded 100 in 1962 and it was first over 200 in 1967. Generally the number is about 175 per year.

The idea of holding such recognitions has spread to at least one other university. A letter in 1987 from S. Schneller, PhD'68, then chairman of the Department of Chemistry at the University of South Florida, reported that they had introduced the program in toto.

DEVELOPMENTS IN THE GRADUATE PROGRAM

By the 1950s developments in chemistry had changed the perception of needs and means for strengthening graduate work. The research projects of several faculty members were attracting more significant grant support and, among other developments, the new National Science Foundation was just becoming established. The faculty continued its critical attention to factors that could be further improved in the graduate program such as more productive research, improved stipends and fellowships, more effective recruitment, curriculum, stimulating and productive experiences for the students throughout their years in the department, and the establishment of a separate office for the chemistry graduate program. Two areas of special note were improvements in the system of examinations and the introduction of research as quickly as possible.

Examinations: A system of cumulative examinations slowly grew from the frustrations that seemed to be inherent in the program of comprehensive examinations initiated in 1950-51. This program specified that the examinations were to be administered two times per year and each student was to be examined "At the first opportunity after completing 24 hours of graduate study...." The program became disappointing for students and faculty.

After much consideration by the faculty in April and May 1957 basic changes were initiated which seemed to be promising and in conformity with the requirements of the Graduate School. This was to be the substitution of a program of separate cumulative examinations in
each of the five fields emphasized in the department. The program was based in part on the recent experience and thinking of chemistry colleagues in a few other universities. Campaigne was the strongest proponent here and he was quickly joined by other chemistry faculty members. The details of the first version were described in an attachment (Section D) of the minutes of the faculty meeting on 1 May 1957. Thirty days later another meeting resulted in further refinements of the "cume" program. The new program was initiated on Saturday 21 September 1957.

On 17 October the COGTAS Committee (Committee on Graduate Testing and Standards) headed by Campaigne reported at the faculty meeting. Twenty-four students began the examination, each writing in the field of his/her choice. Six discontinued it, which was allowable, and did not turn in their work. Three passed and 15 failed the examination. In the second examination, one month later, 29 participated with 10 passing and 19 failing.

The program at that time required passing grades in five cumulative examinations within a prescribed period of time. It encouraged students to take the examinations regularly, beginning in the first year. Nine examinations were given per year.

In July 1958, the faculty reviewed the new system and found it so satisfactory that it was recommended for total replacement of the preliminary examinations system. After six months it requested the Graduate School to require the completion of such cumulative examinations and completion of the two foreign language requirements for admission to candidacy for a PhD degree.

After two years of experience, in May 1959, the committee reported to the faculty that "it is an excellent system," but a few minor modifications were recommended and adopted without dissent. In line with the continuing movement for chemistry students to take both minors in chemistry, such candidates were required to complete seven cumulative examinations out of the fourteen offered in two years, with a minimum of four in the major field. However in October that year Day advised against presenting this to the Graduate School at that time since "the Graduate Faculty Council had approved the cume system with some misgivings." This advice was accepted. Later the system gained unquestioned support.

A related development was in the institution of placement examinations both in organic and physical chemistry for entering graduate students. This was adopted by the faculty on 28 February 1958 and it continued for a few years before it was abandoned as unnecessary. The purpose was to aid in advising and in placing students at the appropriate academic level. Based on their performance some were advised to take one or more advanced undergraduate courses. Some of the examinations were prepared in the department and others were Graduate Level Place-
ment Examinations obtained through the Examination Committee of the ACS Division of Chemical Education.

Chemistry Graduate Office: A related consequence of these changes was the development of systematic and more extensive record keeping concerning graduate students and the examinations. Thus at a faculty meeting on 12 June 1957, Campagne emphasized the need for a designated and full time secretary responsible to the chairman of COGTAS. This person should also aid much in keeping in contact with the graduate students regarding examinations and other matters. He emphasized that the need would be accentuated with the beginning of this new system. Implementation of the proposal was the starting point in the establishment of a Chemistry Graduate Office. Campagne became the first graduate advisor. His management and standards were so effective they gave the office an excellent start.

Introductory Graduate Research: Through the attention to curriculum, selection, advising, and testing of graduate students, especially in 1956-57, a promising new program of introductory graduate research was begun. Its designation as C500 became a kind of common denominator for the beginning graduate students. Through it each individual had a new focus on work in chemistry. Each became affiliated with a particular faculty member early in the first year and under guidance accepted a research problem that had promise of providing stimulating development in an area that could be continued beyond one year or, if advisable, it could be terminated with a definitive report or write-up. Thus if for good reason it was advisable for a student and faculty member to continue the research relationship subsequent work would be under the course title for the field of the professor. If a change in the research relationship seemed advisable the change to a different professor would be readily facilitated after the C500 work had been concluded with a written report.

Shiner was the faculty member designated to organize and monitor the program in the beginning, in 1957-58. The course began with a few lectures by Shiner on the central role of research in graduate training. This was with close reference to the textbook by E. Bright Wilson on "Introduction to Research." Before the end of the first semester the students sought out two or more faculty members under whose direction they were interested in working. Mutually satisfactory arrangements for work with one were arranged. Thus all of the second semester was available for the introductory research and the final preparation of a well written report. The expected grade for the first semester was Inc. After the end of the second semester the incomplete was changed to the appropriate final grade and a grade was registered for the second semester. Throughout both semesters Shiner, as director of the program, provided the necessary integration for both the students and the faculty.
Evaluations of the program were frequent. On 25 May 1959 at a faculty meeting Campagne's suggestion was adopted that students with deficiencies, especially in the intended major, should defer work in C500 until the deficiencies had been corrected. Further study of C500 was assigned to the Curriculum Committee for 1959-60. Even throughout the 1980s the program continued to be an important feature of beginning graduate work.

**STIPENDS AND FELLOWSHIPS**

Until 1958-59 stipends for chemistry graduate students were generally lower than at other Big Ten universities and there was unevenness between different kinds of support. In January 1958 the stipends for teaching assistantships were $1725 per ten months. Until then there were occasional differences between the rates for assistantships and fellowships and between teaching and research assistantships. Generally the research assistants and fellowship holders had been in the department longer. At a meeting on 28 February 1958 the faculty voted unanimously to maintain the same rates for teaching and research assistantships. Then nine months later Day announced that the department had been authorized to offer $2000 per academic year for graduate teaching assistantships effective in 1960-61. This achievement promised to make us quite competitive in this respect with the other Big Ten schools.

In addition to the satisfaction from progress in stipend rates, the faculty members were encouraged by the report in December 1959 that the number of inquiries from prospective graduate students was 59, which was twice as high at this time as one year before.

**Fellowships:** During the first few years following World War II, two particularly significant unrestricted graduate fellowships were provided by the Dow Chemical Company and the DuPont Company. Before the end of the 1950s fellowships provided by other companies included: Lubrizol, Eastman Kodak, Monsanto, and Hercules Powder. In a memo to the faculty, on 28 March 1960 Day reported that the assurances of fellowship grants in 1960-61 during the prior three months included the following:

<table>
<thead>
<tr>
<th>Fellowship</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dow Chemical</td>
<td>$2500</td>
</tr>
<tr>
<td>Eastman</td>
<td>3000 (plus)</td>
</tr>
<tr>
<td>DuPont</td>
<td>5000</td>
</tr>
<tr>
<td>DuPont</td>
<td>1200 (to supplement a regular teaching stipend)</td>
</tr>
<tr>
<td>Hercules Powder</td>
<td>4000</td>
</tr>
<tr>
<td>Lubrizol Foundation</td>
<td>3000</td>
</tr>
</tbody>
</table>

Naturally the availability of such support raised morale and stim-
ulated all faculty and graduate students. And it impressed prospective students.

In general the more accomplished students academically and in service as teaching assistants were prime candidates for fellowships. Some of the recipients included the following:

<table>
<thead>
<tr>
<th>Year</th>
<th>Fellowship</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952-53</td>
<td>Dow fellowship</td>
<td>Richard Neithammer</td>
</tr>
<tr>
<td></td>
<td>DuPont fellowship</td>
<td>Harold K. White</td>
</tr>
<tr>
<td>1953-54</td>
<td>DuPont fellowship</td>
<td>Jack Young</td>
</tr>
<tr>
<td></td>
<td>DuPont teaching fellowship</td>
<td>Paul Dorain</td>
</tr>
<tr>
<td>1954-55</td>
<td>DuPont fellowship</td>
<td>Paul Graham</td>
</tr>
<tr>
<td>1957-58</td>
<td>DuPont fellowship</td>
<td>William Paudler</td>
</tr>
<tr>
<td></td>
<td>Eastman Kodak</td>
<td>Robert Conley</td>
</tr>
<tr>
<td></td>
<td>Lubrizol</td>
<td>Glenn Berchtold</td>
</tr>
<tr>
<td>1958-59</td>
<td>DuPont fellowship</td>
<td>Robert Chernin</td>
</tr>
<tr>
<td></td>
<td>Monsanto</td>
<td>Darrell Ebbing</td>
</tr>
<tr>
<td></td>
<td>Dow</td>
<td>Brown Murr</td>
</tr>
<tr>
<td>1959-60</td>
<td>DuPont teaching associate</td>
<td>John McDowell</td>
</tr>
<tr>
<td></td>
<td>Monsanto</td>
<td>Robert Chernin</td>
</tr>
<tr>
<td></td>
<td>Lubrizol</td>
<td>William Kreighbaum</td>
</tr>
<tr>
<td></td>
<td>Dow</td>
<td>Linneaus Dorman</td>
</tr>
<tr>
<td>1960-61</td>
<td>DuPont teaching associate</td>
<td>Benjamin Edwards</td>
</tr>
<tr>
<td></td>
<td>Dow</td>
<td>Joseph Wilson</td>
</tr>
<tr>
<td></td>
<td>Monsanto</td>
<td>Peter McKinney</td>
</tr>
<tr>
<td></td>
<td>Lubrizol</td>
<td>James Wolfe</td>
</tr>
<tr>
<td></td>
<td>Eastman Kodak</td>
<td>Louis Ross</td>
</tr>
<tr>
<td></td>
<td>Hercules Powder</td>
<td>James L. Copeland</td>
</tr>
</tbody>
</table>

The proportion of black students awarded fellowships was painfully low, but the number of applications for admission were equally low. However some financial aid was almost always provided. One of the notable black students was Paul Graham who came here from Antioch College early in the 1950s. His academic performance was exemplary. Apparently he was the first black graduate student to be given a teaching assistantship, an appointment that both he and the students appreciated. Illustrative of the free interaction between black and white chemistry students in that period are Paul Graham and James A. Sluss, PhD’62. These two students, one black and the other white, shared the same small research laboratory and seemed to get along fine. Sluss was from Alabama.
and his background was typically southern for that period. Unfortunately Graham decided voluntarily to give up his work here and left without a degree.

**M. A. Degree for Teachers (MAT)**

The immediate post World War II period was characterized by various concerns regarding the need for well educated and dedicated teachers in the public schools, especially in high schools. There was a yearning for greater levels of subject matter content in the graduate courses for teachers, especially at the master's level. Shortly after World War II the Graduate School established the Master of Arts for Teachers (MAT) program. The purpose was to include more course work in the subject matter of the areas to be taught than was included in the customary master's programs in the School of Education, yet permitting students enough time to fulfill the certification requirements for high school teaching. Also, an object was to give greater emphasis to the particular content needed in teaching subjects well at the high school level. As stated in a 1958-59 report by the Chemistry Committee on the MAT program, it

"is less stringent in advanced subject matter, thesis and/or language requirements than are the regular professional master's programs in the departments of the Graduate School."

The chemistry MAT program was first mentioned in the 1954 brochure on chemistry. Each subsequent issue made reference to it until the 1976 issue. From this time on the program seemingly had become so unimportant to the department that no reference to it was made. As described in 1968 the program was

"to give broad training in the various areas of chemistry to teachers or prospective teachers of secondary school science."

It specified that

"Research may be included in this program but it is not required."

To be eligible for the program it was necessary to have a minimum of 18 hours of college chemistry credit. It was also necessary to take

"courses in several fields of chemistry including at least one semester in physical chemistry and one in history of chemistry."
It was emphasized that all the necessary courses could be obtained through work in the summer sessions.

As reported by the committee on this program in 1958-59 (Nebergall and Fischer) during the first approximately ten years only 23 students were enrolled. Eight completed and received the MAT degree. Eight were continuing in it. Seven had dropped out for various reasons. It was obvious that the needs and expectations were not being accomplished.

In a 1958-59 analysis by the committee it was pointed out the main problems seemed to be a lack of all the needed courses, difficult scheduling problems, and the practical necessity of completing all the work during summer sessions. By that time the significance of the successful Sputnik launching in October 1957 had permeated the country and changes were occurring, especially through federal government intervention. This was recognized in the 1958-59 report by the committee:

"It should be noted that, for better or for worse, the NSF programs of summer and academic year institutes are draining many high school teachers away from the existing programs such as ours."

Soon the department began to gain institute support.

Within a short time after starting the MAT program in chemistry it became obvious that an attractive program of subsidization was necessary. An application to the newly developing National Science Foundation was successful. It became operational in summer 1956. The stipend for each participant was $200 plus an allotment of $50 for each dependent. This plus the support for operating expenses made the program attractive to promising enrollees in the MAT program as well as others qualified for additional college work in teaching. The purpose, as stated in the application was:

(1) To review and discuss the impact of recent research developments on the teaching of chemistry. (2) To conduct discussions on new methods of teaching chemistry in the fundamental chemistry courses and the method of educating the general public in matters relating to chemistry."

This first institute was directed by R. B. Fischer and the co-director was D. J. Cook. The administrative committee consisted of Day, Fischer, Nebergall, Shiner, Schmidt of the Chemistry Department and P. Peak of the IU School of Education and Cook of DePauw University. The institute stimulated the MAT program as well as teaching in general. Thus a new era in teaching college and high school teachers was launched and the graduate program recognized the need to help train and stimulate teachers of science in high schools.
NSF Institute for Teachers: The institute programs lasted in different forms considerably more than a decade. A summary report of the “Summer Institute for College Teachers of Chemistry” in 1959 by the director William H. Nebergall clearly portrays all the significant features. It illustrates the objectives, quality, and value of this remarkable post-Sputnik activity.

As headlined in the report the objectives were:

“To provide experienced teachers of college chemistry: (1) with new subject matter for their courses through surveys of important recent developments..., (2) an opportunity to discuss current problems and to exchange ideas ..., (3) an opportunity to work in a research laboratory..., and (4) an opportunity to learn to use some of the modern research instruments and to become acquainted with the principles upon which their operation is based.”

In this 1959 program there were 59 teacher participants of which 53 were recipients of stipends from the grant provided by the National Science Foundation. They came from nearly as many different institutions in this country. They were selected from 158 persons who applied. Eighty were offered stipends and 29 rejected offers. In addition to the regular participants various other strongly interested persons took part in one or more phases of the institute. Virtually all the participants lived in two halls of residence and they had most of their meals together, and several local faculty members frequently dined with them. Moreover the visiting weekly lecturers lived with the participants.

The visiting lecturers included a number of distinguished scientists noted for excellence in teaching. These included J. C. Bailar of the University of Illinois, W. R. Kirner of the NSF, F. D. Martin of Purdue University, H. H. Sisler of the University of Florida, Henry Eyring of the University of Utah, C. A. VanderWerf of the University of Kansas, Harvey Diehl of Iowa State University, and others including faculty at IU. Such lecturers received honoraria of $400 plus allowance for travel expenses and there were no charges for board and room for the week that each was a guest of the institute.

Besides the lectures there were various other educational activities which included participation by some in the regular course on instrumental methods of analysis. A few also had individual research projects under the direction of local faculty members. There were two field trips, some social occasions, and a banquet.

A major inducement in the attraction of participants was the stipends. Through the NSF grant there were fifty stipends in 1959, and about the same number for the other institutes held at IU. Each stipend was $300 for the four-week period, plus an allotment of $60 per de-
dependent, up to a maximum of four. Moreover it was necessary for the dependents to be in residence with the participants. In addition, a travel allowance at the rate of four cents per mile was provided. The maximum could not exceed $80. The room and board costs did not exceed more than approximately $100 per person.

Such institutes here, and at other favored institutions, were a boon to teachers and the schools they served. It is unfortunate that their stimulating effects could not be continued longer.

**TECHNICAL FACILITIES AND SERVICES**

Technical facilities and services developed through qualified personnel were clearly essential for the training of students and concentration on productive research. The pivotal action began in the World War II years through the necessarily frugal efforts of R. L. Shriner in the provision of rudimentary machine shop facilities, glass blowing, and microanalytical services. The beginning of special concerns and actions in these areas have been depicted in earlier chapters. In general the stimulation and monitoring of action was the special responsibility of some faculty and/or faculty-student committees. The presentation herewith focuses on only a small proportion but it is illustrative of the development.

The continuing development and expansion of facilities and services resulted in a plethora of memoranda and other documents which in turn called for a compilation of information to help all concerned keep informed. Finally in September 1959 all the "mimeographed information items and regulations" were assembled together in the first manual of this nature. This extensive aid to the department consisted of three parts: (a) General Information and Regulations, (b) Undergraduate work, and (c) Graduate work. It reflected a concise picture of the department at that time.

The manual included the following:
1. Directory of Chemistry (faculty, staff, graduate, postdoctoral, undergraduates)
2. Department of Chemistry Committees (made available separately)
3. Scientific Contributions from the Department (made available separately)
4. Library
5. Chemistry offices and secretarial services
6. Keys, property, and general security
7. Safety
8. Storerooms, supplies, and equipment
9. Machine shop
10. Glassblowing shop
11. Microanalytical laboratory
12. Radiochemistry laboratory
13. Hydrogenation laboratory
14. Spectrophotometer laboratory
15. Duplicating services
16. Cash purchases
17. Travel (procedures re authorizations, offices, etc.)
18. Employment: placement of graduating students and alumni; part time within department
19. Services provided by other divisions of the university
20. Housing
21. Association of Indiana University Chemists

Further illustration of the resources and their uses, the section on Infrared and Ultraviolet Light Spectral Service informs the readers that spectra of samples could be obtained on a service basis:

“The spectra will be recorded by the graduate assistant in charge of the spectrometer laboratory to the specifications requested by the person submitting the sample, with limitations described below.”

The limitations were explicit and reasonable.

This laboratory on spectral services represented a marked advance over facilities and state of the art within the decade of the 1950s. A considerable degree of credit for its development is owed to Dana W. Mayo, a graduate student from 1953 to 1957 who pioneered in the use of the instruments at that time.

It is notable that in the 1959 manual cataloguing technical facilities and services no reference is made to mass spectrometry, molecular structure facilities, computer service, electronic instrument service, and some other facilities that became prominent a decade or two later. Also, throughout the 1950s further developments occurred in the facilities and services for more traditional glass blowing, metal working, and other technical adjuncts to teaching and research.

The spread of interest in the adoption of new instrumentation as it became available is reflected in the substantial changes in the Facilities and Services part of the revision which appeared in September 1962. During a span of three years various specific additions and changes had been made but the transcendental difference is the inclusion of a section on “Magnetic Resonance Laboratories” in the 1962 issue.

**Nuclear Magnetic Spectroscopy:** In the mid 1950s NMR spectroscopy quickly started a revolution in both organic chemistry (See review re J. D. Roberts and Priestley Medal, C&EN 26 May 1986, p. 27) and inorganic chemistry. During this time R. Schaeffer joined the faculty here. He quickly moved toward this powerful tool and he was joined by several
other newer chemistry faculty members, particularly W. L. Meyer. Through concerted effort funding for the new tool became possible. As stated in the chairman’s annual report to the university near the end of 1959-60,

“The acquirement of a nuclear magnetic resonance apparatus has greatly strengthened the programs of at least one fourth of the chemistry faculty.”

The department was extraordinarily fortunate to have a career naval man in the undergraduate program, Arthur O. Clouse, who had returned to complete a degree in Education. This was with the intention of spending the rest of his professional life teaching high school chemistry and/or physics. In the navy he had acquired some experience in electronics. Learning about the departmental interest in NMR he offered to work about twenty hours per week with Schaeffer and other faculty members as a technician. Starting in February 1962 the rate was $2.25 an hour. The problem was to properly regulate the NMR apparatus and make it yield meaningful information on the compounds of primary interest. The part time technician and full time student earned a pittance and the team of spectroscopists, working on a shoestring, began to produce meaningful information.

In his 1961-62 annual report to the ACS Committee for Professional Training the new departmental chairman V. J. Shiner, on 21 November, reported that equipment received during the year included “an NMR instrument.” NMR spectroscopy had been established in the department.

After his graduation with a BS degree in education in June 1962 Clouse was given full time responsibility for

“operation, development, and design of Nuclear Magnetic Resonance systems and other types of spectrometers.”

His progress was so widely appreciated that in September 1970, under R. Schaeffer as department chairman, he was officially declared responsible

“for all electronic services in the nuclear magnetic resonance, computer, mass spectrometry, x-ray diffraction and instrumentation service areas.”

In these major areas he worked closely with students and faculty from practically every area of chemistry. This involved close collaboration in the planning and operation of various projects. In effect he became
central to the research efforts of various groups. This led to the publication of research with different groups. Such pivotal responsibility was recognized in 1972 by elevating Clouse to associate professor of chemistry with tenure. No other person in this department has ever attained the distinction of a professorial rank with only a baccalaureate degree. It was fully merited.

The associate professor remained responsible and productive in his role until his retirement in 1980 with the title Associate Professor Emeritus of Chemistry. At a retirement reception by the department he was presented a digital multi-meter and probe and an engraved plaque:

“In appreciation of 18 years of dedicated service to the Department of Chemistry, Indiana University.”

In addition to the full time service of 18 years his early association with the NMR program as a part-time student for two years was equally unique; it helped get the program started well. Thus more than any other person the greatest credit for NMR developments here is owed to Art Clouse.

**Mass Spectrometry**: Mass spectrometry was introduced in the department in the early 1950s by W. J. Moore as a necessarily low cost isotope ratio mass spectrometer. It had limited mass range and there were various operational difficulties. The need for versatility and reliability in such instrumentation remained unfulfilled until funding for developments occurred in the mid 1960s. Soon thereafter mass spectrometry became a major feature in the armamentarium of the department.

**THE CHEMISTRY LIBRARY**

Since the time that T. Wylie looked after the university’s meager collection of books, before the move to the present campus, chemistry has maintained a central interest in the library. Indeed Wylie was in effect the university librarian. But always there have been felt needs for improvements, both in the chemistry library as well as in the total library resources and their management. During the 1950s the pattern of continuous maintenance of good standards of acquisition of books and journals was adhered to. Much attention was given to planning for library needs in connection with the anticipated addition to the building which culminated in 1964.

The average annual expenditure for books during 1949-54 was $2300. This rose to $2900 in 1955-56 and to $3200 in 1956-57. These increases were necessitated by mounting costs but they were large enough to increase the total purchases. Along with this was a need to procure systematically historical books. This opportunity was enhanced by the
availability of a special university library fund for the procurement of historical materials. In 1953 the chemistry faculty asked the chairman to request the participation of chemistry in the use of such funds. This was granted.

As reported in the minutes of the faculty meeting of 3 June 1957 a serious and long-standing problem existed in the long delays that frequently occurred in the cataloging of new acquisitions before the books could be made available on the book shelves. The cataloging had to be done by the chemistry librarian and his time was very limited. Finally a reasonable resolution of the problem was effected.

A major concern arose in 1959 (Chemistry faculty meeting 23 October) regarding the charge to a campus committee appointed by President Wells on the advisability of the development of a central science library for the Bloomington campus. Both the chemistry faculty and C. Waddington, the chemistry librarian, participated in the searching discussions of the committee. Carmack served on the committee. The general view was that if such a library should be created it would be located in the area between Myers Hall and the Chemistry Building. A high degree of skepticism on the merits of the idea prevailed in chemistry. Finally the reasons against the change decisively outweighed reasons for it and the idea was abandoned.

A general feeling of high responsibility for the chemistry library prevailed amongst the students and faculty until the late 1960s. Through a policy of issuing keys to faculty and graduate students such users of the library had regular access to the resources at all hours. Although there were no librarians or assistants on duty except during regular hours loss of books and journals was remarkably low and high standards were maintained. However with general changes in attitudes toward responsible conduct in public places it finally became necessary to withdraw all keys to faculty and students. The library had become large and somewhat impersonal, but it still remained a high symbol of the earnest individual with a deep interest in chemistry.

**INFORMATIONAL PUBLICATIONS**

The first definitive departmental publication including comprehensive specific information for prospective students and others was a 36-page brochure in 1949. The cover page provided an attractive picture of the 1931 building and the back cover pictures the familiar first laboratory completed in 1840. This illuminating “Manual of Information for Prospective Students of Chemistry” was widely distributed and it was followed in 1954 by a second bulletin of equal attractiveness and size. The front cover pictured one of the graduate students, Dana Mayo, PhD’57,
and the back cover pictured the speakers at the Conference on Coordination Compounds held in the department in 1953.

The first few publications in the series were applicable to all persons interested in some aspects of the department. By 1974 some special brochures were offered; in that year it was a more detailed presentation entitled “Undergraduate Program in Chemistry.” In 1979 the focus was directed more toward “Chemistry: The Graduate Program at Indiana University.” That has continued to this time.

These contributions greatly extended and illuminated the succinct information covered in the other university catalogs such as those of the College of Arts and Sciences and the Graduate School.

THE AIUC NEWSLETTER

The nurturing care of John S. Peake in spearheading the preparation and distribution of regular, informative newsletters to all the known alumni and close friends of the Department of Chemistry was a stimulating influence in the continuous development of strong bonds within the Association of Indiana University Chemists. The newsletter was from the start the mainstay of the association and it remains so even to the present time (1990). However as conceived by Gucker when he became chairman of the department in 1947 it was presumed that the organization would rely considerably on social hours, breakfasts, etc. at semiannual meetings of the ACS as a means of bringing alumni and others together. Both functions have served well over the years but the substantial organizational structure envisioned was finally abandoned about 1975. Since that time the necessary management has depended entirely on the chairman’s office and committees so appointed in the department. The informality of this procedure and the high responsibility of managers of the newsletter have served very well.

When there were officers these were selected annually at the fall meeting of the association in connection with the AIUC social gatherings at the ACS meeting. A strict formality was the designation of an alumnus for president and a local faculty member for secretary-treasurer, with the latter being responsible in a liaison capacity between the department and the alumni.

In 1957 the production of the newsletters was assigned to a new staff member, Joanne Dickey, AM’33. She had returned to the department to serve first as microanalyst, and then as spectroscopist. At first looking after the newsletter was only a small part-time job for a few persons, but in recent decades several faculty and staff members have participated and some have devoted much time to the enterprise.

In 1968, Elizabeth Greene accepted the responsibility for getting news assembled and for a short time being the managing editor. She has
had varying degrees of responsibility for it nearly all the time from the beginning until the present time.

During the first two decades the financing of the operations was dependent on small contributions made by alumni, but eventually the costs were defrayed by subsidies from anonymous contributions, the Alumni Association, and the Friends of Chemistry account. The latter was established as a general resource in the 1970s for departmental enrichment needs through individual contributions.

The officers of AIUC and their terms of office during the first two decades were as follows:


By far the most extensive information of the AIUC and the department, is recorded in the periodic AIUC Newsletters. The general format was the succinct reporting of news items in two major categories: news of individual alumni and news pertaining to the department. For most of the first two decades — until the Friends of Chemistry program began to raise money — virtually every issue of the newsletter gave suggestions for the remittance of something to help defray the costs of postage, supplies, etc.

A constitution for the AIUC was proposed in an early issue of the newsletter. This was formally adopted in 1966. It gave the ultimate power to the departmental chairman. Each year a mailing was sent to all the members which included a slate of one candidate per office with a blank space for each in which an alternate candidate could be presented. It is not known that any alternates were ever proposed. Each mailing also requested news items for subsequent use in the newsletter; and reminders were included that contributions to defray costs were always welcome. The secretary-treasurer was always responsible for this mailing as well as the newsletter.

Collected issues of the newsletters became invaluable sources of accurate and timely records of significant events in the progress of the department and alumni. Of course the Chemistry Archives and Alumni Office has a collection of virtually all the newsletters.
ANNUAL REGISTER OF THE SCIENTIFIC PUBLICATIONS

During the period of the 1950s and later decades virtually all the faculty engaged in productive research as well as in teaching. Starting in 1952 an annual register of all the scientific publications from the department was begun with 1950 the beginning year. It was determined that prior to 1950, 492 publications had met this criterion and the first was in 1881. That first publication was by T. C. Van Nüys and it included rather extensive chemical analysis and some microscopic studies of water in Indiana. Most of the publications were in the latter half of that 69 years. The listing gave the full authorship and title as well as reference. Copies of the register were made available to all inquirers and they were mailed to prospective graduate students and other interested persons.

A concise listing of some of the topics and the number of publications included in the 1952-53 register reflects the research activity at that time:

Billman (3) Aromatic esters of malonic acid; 4-nitrophthalimides
Brown (retired) (1) Catalytic activity of reduced nickel molybdate
Campagne (8) Synthesis of 2,5-diaryliothiophenes; 3-substituted thiophenes; dimethylformamide, as a formylation agent
Day (5) Lycopene and utilization of carotene and vitamin A; stannous fluoride and dental caries
Fischer (3) Audiofrequency conductometer; chemical precipitation processes
Gucker (2) Compressibility of solutions; fundamental constants for physical chemistry
Haurowitz (7) Mechanisms of the immunological response; theories of antibody formation
Kaslow (3) Quinolinemethanols; bromination of phenylquinolines
Klemm (2) Reactions with cyclopentene
Merritt (2) Crystal structure of dimethylglyoxime; x-ray structure determinations
Moore (1) Flow of oxide layer during oxidation of copper
Nebergall (2) Preparations of stannous fluoride and dental caries
Rohrer (2) Catalytic activity of reduced vanadates
Peake (1) Ternary liquid systems involving phase equilibria
Schmidt (1) A diagnostic test in simple mathematics
Shiner (1) Solvolysis rates of some deuterated tertiary amyl chlorides
Thacher (1) Dielectric properties of dispersed liquids

In the last of the Day years as chairman, 1961-62, the scope of the scientific publications listing was naturally larger and the topics were appreciably different, but the high level of faculty participation continued, as indicated in the following:
Bair (2) High-resolution kinetic spectroscopy; (book) Introduction to Chemical Instrumentation

Billman (1) 8-Sulfonamidoquinolines as a new class of organic reagents

Bonham (4) Structure of 1,2,5-thiadiazole; corrections of electron diffraction data for failure of the Born approximations; some asymptotic formulas for the Legendre functions

Campagne (8) A novel disulfide ring closure; nuclear magnetic spectra (of some compounds); decarboxamidation; absorption spectra of some unsymmetrical disulfides; (books) Elementary Organic Chemistry; Chapters in two other books

Fischer (2) Precipitation reactions from homogeneous solution; instrumentation in the undergraduate chemistry curriculum

Haurowitz (10) Use of radioisotopes in immunological research; recovery of injected antigens from rat spleens; chapters in two books

Mahler (10) Studies on the mechanism of enzyme-catalyzed oxidation reduction reactions; replication of T₂ bacteriophage; helix-coil transition in deuterated deoxyribonucleic acids

Meyer (2) On the stereochemistry of conjugate addition

Moore, W. J. (4) Thermodynamics of the formation and migration of defects in cuprous oxide; diffusion of oxygen in single crystals of nickel oxide

Nebergall (2) Reactions of various tin (II) compounds with calcium hydroxyapatite; the silicon-phenyl asymmetric stretching vibration

Schaap (2) Electrochemistry in anhydrous ethylenediamine; a polarographic study of mixed-ligand complex formation

Schaeffer (3) Studies of boron-nitrogen compounds; interconversion of boranes. IV

Schmidt (1) Electrochemistry in anhydrous ethylenediamine

Seifert (1) Electronic commutator method for determining E° of formation of fused halides

Shiner (5) Isotope effects in deuterium oxide solution; pyridine catalyzed hydrolysis of carboxylic anhydrides; exchange reaction catalyzed by liver dehydrogenase

Shull (5) The concept of partial ionic character; the chemical bond in molecular quantum mechanics

Thoma (1) Evaluation and correlation of partial parameters involved in paper chromatography

Wenkert (4) Synthesis of olivacine; isolation and structure of perakine

Publication of the annual register was discontinued in the late 1980s.
ROLE OF DEPARTMENT IN FLUORIDATION OF DENTIFRICES AND WATER

Over several decades in this century the Department of Chemistry through many individuals has contributed much to the advancement of chemical knowledge and its applications. The annual register of scientific publications is only one of several measures of the scope, nature, and significance of the contributions. Among diverse illustrations that could be selected specific attention should be focused on the fluoridation of dentifrices and water, primarily because it has widespread public appeal, and it has affected the dental health status of millions of people.

Fluorine and many of its compounds have been important to this department since 1918 when F. C. Mathers spent the latter part of World War I in the U.S. Chemical Warfare Service. In attempts to produce compounds of fluorine and carbon electrochemically he fortuitously isolated the element fluorine. Several patents involving the process were issued to Mathers between 1919 and 1924. For decades he continued to make use of fluorides in his electrochemical work but generally he regarded the isolation of fluorine his most important accomplishment.

Research in the department concerning fluoride and dental health issues related to the responsibility of teaching biological chemistry to the first year dental students and Day's close connection with that program. In 1944 the dental students were as usual given opportunity to conduct special laboratory projects toward the end of the semester. A few students, including J. C. Muhler, elected to try out a newly published method for the determination of fluoride in bone and teeth. At that time fluoride had been recognized as a probable preventive factor in controlling dental caries. As expected, the laboratory work and this hypothesis stimulated Muhler's interest and that of the class.

After Muhler's transfer to the Indianapolis campus, with the rest of the class for the remainder of the four year program, his focus on fluoride and dental health continued. Concurrently in another institution it became known that isolated dental enamel treated with an excess of fluoride in vitro becomes less soluble in acid such as was presumed to cause dental caries. Muhler decided to compare different fluorides as respects their effectiveness in protecting enamel from acid. Several fluoride compounds, including stannous fluoride, were obtained from the stock that Mathers had accumulated. He soon found that stannous fluoride was unique in that it was more protective than others. This became the beginning of a program to investigate the effectiveness of stannous fluoride and other fluorides in protecting against dental caries.

After Muhler received his dental degree in 1948 he became one of Day's full time graduate students in the department. At this time extensive experiments were started to compare the protective effect of different
fluorides on the occurrence of dental caries in young rats on a dental
caries-inducing diet. In less than a year the research had yielded strong
evidence that stannous fluoride is much more protective than sodium
fluoride and other fluorides that were tested. A preliminary report by
Day and Muhler was made early in 1949.

The need for more sound chemical study was clear. Muhler and
Day had begun to think that the protective effect would occur in humans
and that the benefits could be readily and safely achieved through the
fluoridation of dentifrices with stannous fluoride. Day encouraged his
new faculty colleague W. H. Nebergall to join in the research and be
particularly responsible for the chemical aspects of the problem. Neber-
gall's role, like that of Muhler's, quickly became indispensable.

The research of the group took on several aspects: (a) Is fluoride
an essential nutrient? (b) Why is stannous fluoride superior to other tested
fluorides in preventing dental caries? (c) How can stannous fluoride and
related compounds be efficaciously used in dentifrices to promote better
dental health? and (d) what guidelines should be followed in developing
any patents that may seem to be feasible and appropriate? These and
diverse related issues occupied much of the time of Day, Muhler, and
Nebergall. Soon they concerned several students, some other faculty
members, and several administrators in the university and the I.U. Foun-
dation.

Because fluoride is ubiquitous in all foods and drinking water as
well as in all tissues of the body, especially teeth and bone, it was im-
portant to determine whether the body could develop and survive without
some fluoride. If it should be found to be essential, research on the
essentiality might advance understanding of its role in protecting against
dental caries.

To investigate the question required the restriction of young ani-
mals (rats) to an environment virtually free from fluoride and with re-
striction to a diet equally free from fluoride but adequate otherwise in
meeting all the needs for growth and normal functioning. This became
a large part of Muhler's dissertation research problem. Much work con-
cerning fluorides and dental caries was pursued in addition. He seemed
to have unlimited stamina and unbounded interest in pursuing these
problems.

The prolonged investigations were conducted under meticulously
well controlled conditions in which all the animals were maintained under
identical circumstances but the controls, caged separately, were given a
small amount of sodium fluoride in the drinking water. Under the con-
ditions employed both the fluoride-deficient and the fluoride-supple-
mented rats thrived equally well. Growth, reproduction, appearance, and
behavior appeared to be the same. Both groups experienced no more
than traces of dental caries. This was not surprising because the basal
diet contained no sugar and it was free from particulate matter that could become occluded in the chewing surfaces of the teeth. In an article by Maurer and Day (J. Nutr., 63, 561, 1957) reporting some of the research a qualified conclusion was drawn that the health value of fluoride under practical living conditions is apparently confined to the promotion of resistance to dental caries.

This aroused the blatant clamor of some of the major antifluoridation groups in this country who promptly rallied around misinterpretations of the report. Quoting out of context they attempted to make it appear that the work had shown fluoride to be unimportant in maintaining good dental health. This rabid form of opposition to the public fluoridation of water supplies was also joined by some other opponents of fluoridation who regardless of protective action on dental caries were concerned primarily on the principle of individual rights. They emphasized the importance of choice in the matter of additives to the public water supply. Thus Day was naturally drawn into public discussions and decision making in public water fluoridation.

A particular example of public responsibility by a scientist is in Day's involvement concerning the fluoridation of the Bloomington, Indiana water supply. This arose in the 1960s several years after the first clinical testing of dentifrices with added fluoride had been started (June 1952) in the Bloomington public schools. The Day, Muhler, Nebergall group was centrally involved in the research. Children in different test groups were supplied different kinds of test dentifrices, some containing added fluoride and some without. By that time evidence favoring the fluoridation of water supplies had made fluoridation a reasonable choice. But such action in Bloomington at that time would have introduced a new variable thus complicating the interpretation of the clinical work on experimental dentifrices. Therefore Day requested the city to defer the beginning of water fluoridation until the clinical tests had progressed further. On hind sight this was clearly the right decision, thus permitting the clinical trial data to be interpreted unequivocally.

Planning for the first studies involving the use of stannous fluoride for human beings began in 1950. These were in cooperation with the Division of Dental Health of the State, but this included the full and ready consent of the local school officials and university administration. During spring 1951 approximately 1200 children in the Bloomington public schools were used in the first study in which a solution of stannous fluoride was applied topically to one group, sodium fluoride to a second group, and only water to a third. Of course this was preceded by experiments with hundreds of rats given stannous fluoride at different levels and a search of the literature concerning the tolerance of various animal species and humans to different kinds of tin compounds. Based on all of
this the Day group was confident that the amounts of stannous fluoride intended to be used could be employed with utmost safety.

After one year it was clear that children treated with stannous fluoride had experienced far greater protection (83.1 percent) than those with sodium fluoride (23.6 percent). This stimulated all concerned to move ahead.

The major funding and substantial technical assistance was provided by the Procter and Gamble Company, thus expanding and strengthening the now more diversified research team. This was begun in 1950 with the understanding that the Indiana group would provide progress reports while the research findings were being advanced toward publication. At P&G the principal coworkers were Verling M. Votaw and Arthur W. Radike, both loyal IU chemistry alumni. This relationship continued for many years.

In August 1950 Day stated in a letter to Votaw

"We have spent considerable time in discussing various aspects of the fluoride-dental caries problem with several different persons. As a result we are all agreed upon a program of research ...."

The letter was accompanied by a research grant proposal. One part was the investigation of the preparation and structure of tin fluoride and a study of the effect of such compounds on the composition and structure of dental enamel. The other part was a continuation of the study of the caries preventive effect of different fluorides and other substances. The proposal was agreeable to the company.

The development of this type of research and its close industrial connections was looked upon with misgivings by a few members of the chemistry faculty, but it received and continued to hold the confidence of the university administrators. For example, concerning the first research agreement with P&G, Dean Briscoe wrote to Day

"There is no reason why we cannot or should not accept the Procter and Gamble research grant. It is an excellent proposition."

Time and events proved the wisdom of Briscoe’s opinion.

By the end of 1950 Muhler, Nebergall, and Day recognized that the research could lead to major applications in dental caries prevention. Also it was believed that some of the findings might become patentable and that greater public benefit probably would occur through the patent route than without it. Moreover, through the assignment of any financially successful patents to the Indiana University Foundation the university would indeed be strengthened. They decided they were on the
threshold of important developments and mutual understanding should be reached involving themselves, the foundation, and P&G.

Accordingly in March 1951 Day discussed the team’s views with the then Executive Director of the Foundation, H. S. Wilcox. The next day this was followed with a long typewritten background statement prepared personally by Day. Finally, through amicable discussions and unfolding developments, on 22 April 1952 Muhler, Nebergall, and Day entered into formal agreement with the Foundation

"to conduct research investigations concerning the action of stannous fluoride on teeth and the effect of stannous fluoride on dental caries for the Foundation with funds supplied the Foundation by Procter and Gamble Company pursuant to a Research Agreement between the Foundation and P&G."

This agreement assigned to the Foundation

"All discoveries, improvements, or inventions conceived as a result of or pertaining to their respective work on the research investigations supported by P&G and in and to any and all patents and patent applications relating thereto."

These early agreements provided invaluable assurances which were mutually beneficial.

The expectations and understanding in the earlier period of formal agreements are reflected in the following paragraph Day wrote in a letter to Votaw in April 1951:

"I believe that stannous fluoride, prepared according to Nebergall’s method, will prove to have outstanding effectiveness in dental caries prevention if it can be properly incorporated in a pleasing dentifrice. I believe such products will ultimately dominate the dentifrice field. Also, I believe that there can be scarcely any justification in allowing fluoride to be placed in proprietary mouth washes if it can be successfully used in dentifrices. Obviously there will have to be sharp limits on the number of cosmetic, drug, and food products to which fluorine in any form can be added."

As anticipated, the big challenge was the satisfactory incorporation of the fluoride compound in a pleasing dentifrice. Based on the general division of responsibilities between Day, Muhler, and Nebergall this crucial and specific part fell to the latter and his laboratory workers.

Again Mathers’ shadow seemed to be forever present in this development. Nebergall had attended a lecture by Mathers about the time he started the effort to make stannous fluoride compatible with the nec-
necessary abrasive. In the lecture Mathers stated that in the calcination of limestone — for quite different purposes — in general such solid substances become less reactive when heated. A follow up on this comment proved to be very significant.

The heartening breakthrough was in the finding by the Nebergall group that a controlled heating process makes the conventional dicalcium phosphates compatible with stannous fluoride. Also, as soon shown by scientists in the P&G laboratories, no substantial change occurred in the desired abrasive characteristics of the phosphates. The heat treatment resulted essentially in the formation of calcium pyrophosphate.

The Indiana group soon began to utilize the resources of the P&G Patent Department for advice on the preparation and filing of patent applications on the production of fluoride-compatible abrasives for dentifrices and on a few other discoveries that had been made. In this Nebergall was the principal worker on the university team. The major patent was issued to Nebergall in 1959. In accordance with the agreement of the team with the IU Foundation in 1952 this patent and others resulting from the work were assigned to the Foundation.

The extensive animal testing finally included an equally thorough program to inform elements of the public that would be vital for further successful clinical testing. These included meetings with the local dental society and public school officials. The topical application program started earlier had been very helpful in gaining understanding and cooperation.

As Day pointed out in the A&S The Review (Summer 1975, p. 13),

“This first clinical study of a dentifrice containing stannous fluoride proved to be a landmark in preventive dentistry.”

After the first six months children who had used the toothpaste containing the fluoride had 53 percent reduction in new decayed, missing or filled teeth as compared to comparable control children. The first definitive publication of such studies appeared in the Journal of Dental Research in October 1954. The continuing positive results from a continuation of the study was published in the Journal of the American Dental Association in February 1955. Over the next several years other studies by the Indiana University — P&G group confirmed and expanded these findings. Besides, they were confirmed by various other research groups. Throughout the extensive and diverse clinical testing programs Muhler was indispensable.

The problem of gaining the authorization of the Food and Drug Administration for public use of the new dentifrice was handled by the sponsoring company but the Indiana group gave testimony and advice
when that was appropriate. In January 1955 P&G filed application for authorization to market the new product CREST. This was soon granted.

Of course the advertising and marketing of CREST was totally the responsibility of P&G. The first advertising for the product appeared in March 1956. It is notable that at that time much advertising of dentifrices was exaggerated and misleading. A difference emphasized in the CREST promotions was the strong basis in sound laboratory and clinical research on which all claims were based. By 1965 even a major competitor of P&G stated in its national advertising that “Stannous fluoride has been researched more thoroughly than any other anti-cavity ingredient.”

A signal development recognizing the quality of the research, testing, and promotion of dentifrice fluoridation came in 1960 through the actions of the prestigious Council on Dental Therapeutics of the American Dental Association. The Council reported,

> “After careful consideration of the results of clinical studies conducted on CREST toothpaste, manufactured by the Procter and Gamble Company, the Council on Dental Therapeutics has recognized the usefulness of the dentifrice as a caries preventive agent.”

This pronouncement electrified interest in CREST with nearly overnight stimulation in usage, which effect continued for decades. Even the market value of P&G stock experienced the greatest upswing in the history of the company.

The 1950s and early 1960s were the peak years of the team effort in the advancement of fluoridized dentifrices. As Day wrote in the Meadowood Messenger (January 1987, pp. 1-2) concerning some of the events,

> “The most rewarding facts are that the standards of dentifrice research have been raised and for more than 25 years benefits to oral health have been accruing to millions of people in many parts of the world.”

The royalty income from the patents benefited the university substantially and in different ways. The agreement between Day, Muhler, Nebergall and the IU Foundation was reached before any royalty income had been earned and it preceded the adoption of firm guidelines on patent policies between the foundation and potential inventions throughout the university. It was agreed that the foundation would receive fifty percent of the P&G royalties, with Muhler and Nebergall each receiving twenty percent and Day receiving ten percent. This was primarily Day’s proposal. He gave general direction to the research and administered general arrangements in virtually everything, but the other two men contributed more and they should receive more.
Because Day was chairman of the department throughout the most active years of the research and he had other responsibilities, he made arrangements at the beginning of royalty payments for his royalty income to be kept in a special account by the Foundation. It was firmly agreed that all the income and its earnings would be used only for special enrichment purposes within the Department of Chemistry. During the most active period of the income, from 1958 to 1976, expenditures for such enrichment amounted to $146,174. These ranged widely including: scholarships, recruitment of graduate students, colloquia, undergraduate research participation programs, moving expenses for new faculty, Brazilian project, Honors Banquet, lectureships, Briscoe Professorship, printing costs for special brochures, etc. The yield from the invested income continues to provide support for needs that cannot readily be met from general funds or restricted funds. Many beneficial projects have been made possible through the existence of this resource. It should be noted that a variety of ridiculous myths arose and circulated concerning many aspects of the development. Even bizarre stories circulated that attributed the funding of Ballantine Hall to income created through CREST.

The prolonged and passionate opposition to fluoridation of public water supplies by some groups engaged Day’s attention throughout all the years after his association with Muhler started in 1945. Such action of a minority was essentially misguided and fanned by unscientific premises. Under such circumstances Day in good conscience had to respond. A particular focus occurred during the eight years he served as a member of the Common Council of the City of Bloomington, from 1964 through 1971. To a considerable degree the city government and the university community had begun to trust Day’s judgment on fluoridation.

Fluoridation of the Bloomington water supply was delayed initially to avoid a brief period of interference with the clinical testing of trial dentifrices, but simultaneously the city government was in a major program of expansion and improvement in the total water system. Fluoridation could logically be deferred until it was possible to make it a part of the new water processing program.

However the ultimate decision for fluoridation had to occur with the understanding and full concurrence of the public. This required time and informed participation of the public as well as its representatives in the city government. After the decision to fluoridate the water had been reached Day wrote by invitation an article on “Community Decision-Making Concerning Water Fluoridation” (Exper. Med. and Surgery 25, 139, 1967). As pointed out in the article, one of the important elements in providing useful information was the action of a local newspaper to publish in some detail facts and arguments in favor of fluoridation along with reasons held by the opponents for withholding fluoridation.
The newspaper coverage of the issue occurred shortly before the city took official action which was to lead to fluoridation. Three successive issues of the Sunday publication carried the extensive articles; Day authored the pro articles and a reporter on the newspaper staff wrote the opposition articles. Finally both of the local newspapers editorialized in strong favor of fluoridation. In spite of vigorous opposition by a few local antifluoridationists the Common Council voted unanimously in favor of fluoridation and the mayor eagerly approved the measure.

Concurrent with completion of a new water system drawing from nearby Lake Monroe the water for this multicounty area has been fluoridated continuously. Throughout the decades of the 1950s and 1960s the Department of Chemistry made breakthroughs in the fluoridation of dentifrices and it exerted significant influence in other applications of fluoridation to public dental health.

One lasting recognition of the breakthroughs in fluoridation and in the basic chemistry of fluorine is embodied in the stone carvings of chemical element symbols that grace the exterior of the entire chemistry building. Near the main entrance of the 1988 Addition the many shields on which symbols have been engraved include one representing the early discoveries by F. C. Mathers on the isolation of fluorine. The carving in this shield is $\text{F}_2$. Adjacent to it is a carving for $\text{SnF}_2$. Of course the latter memorializes the developments concerning the successful fluoridation of dentifrices by Muhler, Nebergall, and Day.

**Lecture Demonstration Explosion**

The fourth annual High School Night program started out with pleasant anticipation in the Chemistry Auditorium on the evening of 24 April 1957. Approximately 225 students, teachers, and parents were the guests of the Southern Indiana Section of the ACS and the Department of Chemistry. The previous three programs had been exciting and rewarding, but this was to be horror-filled.

As advertised in advance, the meeting was to be a part of an effort to acquaint more students in the Bloomington area "with the large variety of vocational and professional opportunities in chemistry and related sciences." The planned program was to include "some of the more spectacular lecture demonstration experiments", a glass blowing demonstration, a short motion picture, and guided tours of several of the research and teaching laboratories of the department.

Tragically an often repeated lecture demonstration here and elsewhere went awry and five persons were injured so seriously that they required hospitalization and at least ten others were harmed.

In concluding the spectacular demonstrations the operators, as they had safely done on previous occasions, burned powdered aluminum in
liquid oxygen. This was done in accordance with directions that had been published in the *Journal of Chemical Education* sixteen years before (J. Chem. Ed., 8, 1027, 1931). It had also been described elsewhere. At this unfortunate time instead of creating only a sensational flash of white light there was also a detonation. This disintegrated the iron hemispherical dish containing sand in which the powdered aluminum and liquid oxygen reacted. Particles of the disintegrated dish and a shower of sand were hurled into the audience.

One student lost an eye, another suffered a crushed arm and lacerations on both arms, two other students and a teacher received fairly severe cuts which required plastic surgery. Several persons received facial abrasions from the propelled sand. Two windows in the auditorium were broken and the soapstone top of the demonstration table was fractured. It was sadly memorable.

Every person concerned reacted compassionately and helpfully, both at the scene and at all times afterwards. Day reported the accident immediately to the Executive Director of the ACS, Alden Emery. Others in the university took appropriate and sensitive action. The news of the accident was published in *Chem. & Eng. News* on 17 June (p. 90) 1957.

One follow-up action was the establishment of a team to study and report on the probable technical causes of the accident and to make recommendations. The team was composed of Calvin Austin of the nearby US Naval Ammunition Depot, C. S. Rohrer, and R. L. Seifert of the chemistry faculty. An early report was made to the department in August 1957 and a final report was published in the *Journal of Chemical Education* (36, 54-57, 1959). It was decisively concluded that “The aluminum-liquid oxygen mixture must be considered a high explosive.”

This sobering experience resulted in comprehensive reviewing of all laboratory and classroom exercises of importance in safety in chemistry here and presumably in many other institutions. Every aspect of laboratory work and lecture demonstrations here was carefully reevaluated. Any feature that seemed at all hazardous was modified to assure greater safety or it was discarded. Everybody became impressively safety conscious.

Without unnecessary delays all significantly injured persons were compensated appropriately and in good faith by the insurance carrier. This occurred to the satisfaction of everyone.

The public reaction and especially that of persons injured as well as their families was in all cases understanding and without acrimony. Day, acting for the department, made personal contacts with all directly affected persons and their families. Individual letters of regret and information about the explosion were sent to the principal or other person in charge of each school represented in the audience. The entire experience
reflected well on the good faith of all other persons and organizations involved.

PLANNING FOR THE 1964 ADDITION

The large 1964 Addition came about through a period of approximately two decades of increasing recognition that much more space was of the essence for chemistry to serve its functions well in the university. As World War II approached the end in 1944 Shriner and those around him devoted much time and effort to planning. The recommendation was modest but earnest; the request was for 400,000 cu. ft. of new space to be added to the south side of the 1931 building. In the efforts continued by Gucker and his colleagues the burgeoning growth in numbers of students, further advances and concepts in chemistry heightened the pressure for more space. A well documented report to the university in May 1949 presented the well established arguments. These were augmented by a further and convincing assumption:

"Large-scale group research projects will be universally accepted as necessary for effective progress in the increase in basic knowledge. This will require large areas of space for such units."

The consistent efforts of the department for a major space addition seemed to remain virtually unrewarded for approximately one decade. The only relief was the reassignment of some space on the upper floors of Kirkwood Hall, the basement area of Wylie Hall, and the west end of the third floor area that was occupied by the new Department of Bacteriology from 1940 to 1955.

But certain signs of relief began to appear in 1953. In a memorandum on 1 July that year Day encouraged Kaslow and his Chemistry Space Committee (Kaslow, Merritt, Moore, Rohrer) to keep working and to maintain close contact with E. P. Bardwell, the university architect. Primarily this was to determine the most desirable location for an addition to the chemistry building. He stated that

"during the past week I have talked with Dean Briscoe and he speaks encouragingly regarding the prospects for a new chemistry wing."

In 1953 the department was thinking in terms of 84,000 sq. ft. as a minimum goal for expansion.

One of the slightly heartening steps was in January 1954 at a meeting of the Chemistry Space Committee with the Associate Dean of the Faculties R. L. Collins and Architect Bardwell. The dean expressed the opinion that the department's needs as presented were persuasive,
and we would have a reasonable chance of obtaining an addition about half the size needed by 1960. He believed the planning should provide for an extension of the addition at a later time.

During the following several months there was much study and discussion within the committee and faculty and with Donald Jones representing the Administrative Studies Office. In July 1954 Day wrote to President Wells requesting the construction of a "large wing to be attached to the Chemistry Building." Several cogent supporting reasons were given. In addition it was pointed out that Purdue was at that time completing an addition to their building. Following that completion it was pointed out that seven of the Big Ten schools would have more adequate chemistry buildings than at this university.

Concurrently with the action for an addition the department was engaged in a cooperative role with certain other departments for the establishment of a molecular biology center. The university’s application for partial federal funding was not submitted until 1957. Finally it was turned down in 1959.

Concerned that the continuing effort to receive a major federal grant in support of the desired molecular biology center might be a deterrent to high administrative action toward a chemistry addition, in April 1958, Day wrote again to J. A. Franklin. He stated that

"we will be doing a great disservice to a great number of students if the planning for chemistry is relinquished in favor of molecular biology."

He concluded with the declaration that

"I intend to take any steps that may be necessary to obtain new and more effective leadership in this Department if a determined effort is not made to gain an appropriation for chemistry during the next session of the legislature."

Copies were sent to Deans Gucker, Cleland, Briscoe, and Ashton. Nine days later (9 May 1958) Franklin responded. He stated that the letter had been presented to the Administrative Committee and it

"is interested in improving these facilities and does expect to include this project in its legislative request for the coming session."

He added that the General Assembly would be hard pressed "to meet all the needs presented to it." Also, he acknowledged that if the application .... for a molecular biology center should be granted it could impair the efforts to get adequate funding for a chemistry addition.
In May 1958 the chemistry faculty approved the general plans of the Chemistry Space Committee for an addition to the Chemistry Building and remodeling of the present building for undergraduate instruction. It was understood that the General Assembly in the forthcoming session might not appropriate the needed funds. During the next several months the departmental planning, with the involvement of Don Jones, included visits to several industrial laboratories and consultation with several academic chemists who had been much involved in the chemistry building programs on their campuses. The consultants included M. G. Mellon of Purdue and G. Ross Robertson of UCLA. Their reports were made in June 1959.

During 1958-59 a few chemistry faculty members expressed doubts about certain planned features of the addition, in particular they were skeptical about the plan to have a wide block-type structure compactly attached to the south side of the west section of the present building. A prominent feature was to be many windowless laboratories backed to a common utility core. One member strongly opposed the plan. Thus for several months the space committee gave more attention to these features as well as others.

Dr. Mellon surveyed many aspects of the general planning with reference to his long experience as chemistry faculty coordinator in planning at Purdue. He endorsed the space committee's general plans, including the utility corridor and windowless central core laboratories, but he firmly advised care in planning the air conditioning. He strongly urged the engagement of an engineering firm with proven experience in designing air conditioning for chemistry buildings.

Dr. Robertson, after visiting IU, consulted six persons in California who he recognized as authorities. He advised the space committee to proceed with the plans and stated that he was supported by his "real authorities that your Indiana proposal in general principle is thoroughly sound."

In reporting again to the chemistry faculty in July 1959, the space committee stated:

"The design of the proposed Chemistry Addition is dictated by
(a) limitations of space and area placed on us by the university and its supervising architects
(b) the need to leave some space for future expansion
(c) the desire to achieve the most efficient use of the space that can be provided with the money available"

The report in its entirety was approved by the faculty. After the application for partial federal funding of the proposed molecular biology center had been turned down in 1959, Day discussed
the effect on planning for the chemistry addition with Dean Collins. (Owing to the retirement of Dean Briscoe the year before Collins had become full Dean of the Faculties.) Day, in December 1959, proposed the following:

1. Include in the addition the needs of the department which it has been expected the molecular biology center would provide.
2. Apply to the United States Public Health Service for a grant to provide a portion of the construction costs which can be realistically defined as required and intended for health research.
3. Make plans to provide the funds that may be necessary to match any funding by the Public Health Service.
4. Prepare to meet the entire needs for an expanded Chemistry Addition even if support should not be obtained from the outside agencies.

By this time the university had tentatively allotted $2,200,000 for the chemistry addition. In his prompt response Dean Collins wrote as follows:

“In very broad terms the Administrative Committee discussed today matters touching the Chemistry Addition, as outlined in your memorandum to me of December 10, 1959.

“We are all agreed that we want to go as far as we possibly can in meeting the legitimate needs for Chemistry expansion and indeed we would like to see much of the molecular biology proposal preserved. At the least, this means that we should go ahead with the USPHS proposal for support on the health related aspects of research in Chemistry.

“As to how much we can push up the $2,200,000 that had been tentatively allotted for the Chemistry Addition, all that can be said at this time is that the increase will have to bear some relation to the success we have in our NSF applications for equipment and the USPHS application for the physical facility.

“I believe that it is essential that we have a meeting on this matter as soon as possible after the holidays. At the meeting we should have present, I think, Mr. Randall, and Mr. Clark, yourself and key faculty in Chemistry, Dean Gucker, and myself. Also, as supporting evidence, we should have the opinions of the biology group as to how additional expansion in Chemistry will be helpful in their growth — in lieu of the molecular biology installation that we had hoped for.”

Early in January 1960 the discussion suggested by Collins was held. Shortly thereafter the Chemistry Space Committee with Bardwell re-
ported to the chemistry faculty. A number of decisions were made at that level including the following:

1. The addition will be primarily devoted to research.
2. It will be attached to the present building on the southwest side.
3. It will feature a central utility core.
4. Owing to the particular design of the addition and because it is to be used primarily for research it will be air conditioned. [In 1960 there was still doubt that a building should be air conditioned unless there were special need for this "luxury."]
5. The addition will include up to three extra bays, in addition to the nine already provided in the plans, if the total cost does not exceed $3,000,000.
6. If the support to be requested from the USPHS should not be granted substantially in the amount specified and it should not be obtainable from other sources the extra bays will be deleted to the extent necessary "since further delay in procuring the needed facility must not occur."
7. Much of the research space in the present chemistry building is to be gradually converted to undergraduate instructional space.

At that time the estimated space, costs, and funding sources were the following:

Total allowance for program (site preparation, architects fees, contingencies, construction and fixed equipment): $3,000,000.

Deduction for proportion that is not research (5% of total) 150,000.

Total allowance for portion of program that is research $2,850,000.

Net gain in gross research (Total gross additional space minus current gross research space to be converted to other uses) 81,983. sq. ft.

Percentage of total new space that is net gain for research 76.

Allowance for Addition that provides net gain in gross research (2,850,000 x 76%) $2,166,000.

Percentage of gross gain to be used for health research 50.

Cost of gross gain for health research $1,083,000.

Amount to be requested from USPHS (less any amount that may be provided by NSF for fixed equipment) 541,500.

Total allowance for program to be provided by Indiana University $2,458,500.
Two weeks following the chemistry faculty meeting on 28 January 1960, Collins informed Day that the university had agreed to this plan for the addition at a total cost of approximately $3,000,000 and on the basis that approximately $500,000 would be provided by outside sources such as the USPHS. Also, he asked the department to defer consideration of a chemistry library in these plans.

In transmitting this information to Bardwell, Day wrote that

"Until funds can be found for the erection of a new solvents storage area (to replace the facility to be displaced by the addition) we will use the quonset hut east of the Chemistry Auditorium."

On 25 February 1960 Bardwell submitted a revised estimated project cost as follows:

"The following is a revised estimated project cost based on latest cubage obtained from Daggett, Naegele, and Daggett, Inc., architects, this date:

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<th>Description</th>
<th>Cost</th>
</tr>
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<tbody>
<tr>
<td>a. 1,410,000 cubic feet @1.60</td>
<td>$2,256,000.</td>
</tr>
<tr>
<td>Plus five (5) percent contingencies</td>
<td>112,800.</td>
</tr>
<tr>
<td>b. Excavation below ground and foundations</td>
<td>128,281.</td>
</tr>
<tr>
<td>c. Demolition and erection of solvents storage vault</td>
<td>65,000.</td>
</tr>
<tr>
<td>d. Utilities</td>
<td>40,000.</td>
</tr>
<tr>
<td>e. Site preparation and landscaping</td>
<td>7,000.</td>
</tr>
<tr>
<td>f. Fixed laboratory equipment</td>
<td>324,170.</td>
</tr>
<tr>
<td>g. Fees</td>
<td>175,995.</td>
</tr>
<tr>
<td>h. Site exploration</td>
<td>4,000.</td>
</tr>
<tr>
<td>i. Miscellaneous (Insurance, advertising, building model, etc.)</td>
<td>7,800.</td>
</tr>
<tr>
<td>j. Equipment (housekeeping, Venetian blinds, signs, etc.)</td>
<td>6,500.</td>
</tr>
<tr>
<td>k. Scientific equipment</td>
<td>188,000.</td>
</tr>
<tr>
<td></td>
<td>$3,315,546.</td>
</tr>
</tbody>
</table>

This does not include office furniture, etc. but does include the additional three bays.

The total estimated cost was $3,315,546. As pointed out by D. H. Clark, University Business Manager, the earlier estimate was $2,320,000, without estimates for meeting the solvents storage requirements and the needs for equipment.

In April 1960 Day met with Franklin and some of the other administrative officers. It was decided that the university architects should consider what could be accomplished with $2,900,000 and with
$2,400,000. The former would be the basis for construction if approximately $500,000 should be obtained from the USPHS and/or other outside sources. The latter would have to suffice if such sources did not yield the needed support.

It was concluded that the desired twelve-bay (module) building would be shortened by one to three bays if additional funding could not be obtained. Also, it was apparent that other deletions probably would be necessary. This included the chemistry library which probably would have to be excluded from the addition and provided for later through other funding. This deletion, like various others, caused much discussion and some opposing feelings about what should be done.

The decision on local architectural planning made in April did not cause much action. On 8 July 1960 Day wrote to Clark asking for activation of such planning. The architects had discontinued work on the addition on the basis that they had not been given authorization, and this was not expected before the USPHS had informed the university in writing that a grant would be made.

The needed federal action soon came, in a letter dated 12 July 1960. The commitment was to award $371,633 for the addition. Three days later Clark, over the signature of J. A. Franklin, wrote to President Wells requesting that the trustees authorize "the planning of the Chemistry Building Addition using a nine bay addition."

The letter specified that

"At the present time we have an appropriation of $2,200,000 available from the General Assembly. In addition we have $381,000 available from grants. This will provide the amount of $2,181,947.70 for the building and elevators, $40,000 for outside utilities, $133,716.87 for architectural and engineering fees, $100,000 for built in equipment, $15,000 for site work, $40,000 for removal of the solvent vault and $70,958.43 for contingencies and other expenses for a total project cost of $2,581,632."

Eleven days later, on 26 July 1960, Clark wrote to various persons concerned that the trustees had approved the planning program as requested. Five days later R. W. Casati, acting for Bardwell, informed Daggett, Naegele & Associates, Inc., the project architects, on the amount of funding available for construction and related costs and stated that within a short time a general review meeting would be held. From this point on in the addition project Casati was much involved as a representative of the university architect.

There were of course many problems in accommodating to the dislocations that would be necessitated by joining the addition to a substantial area of the chemistry building, and this was to occur when en-
rollments were increasing and faculty research programs were requiring more space. Also, the construction of the addition would require the demolition of the concrete storage vault for flammable solvents that was under the parking area immediately west of the chemistry auditorium. Kaslow, by this time chairman of the Chemistry Building Committee, had much responsibility in working with various individuals and groups to develop suitable arrangements.

Some of the problems that had to be resolved were presented to Collins by Day in a letter dated 21 September 1960. The letter pointed out that faculty areas most seriously affected by the planned construction program would include those "occupied by Professors Shull, Shiner, and Meyer and their associates." It stated that the main stockroom and the glassblowing shop would be greatly affected. In addition, the letter pointed out that "the enrollment in chemistry courses this semester has set a new record for rapid increases." It stated that

"in general chemistry enrollment is approximately 20 percent higher than last September, and the increase last year was 16 percent higher than the year before."

These problems and others were described, with requests for university administrative action, in a three-page letter by Kaslow to Clark, dated 16 December 1960. The emphasis was on prompt action to provide a new solvent storage facility and ventilation for several areas of the chemistry building in which windows would be removed and/or ventilation would be cut off by the construction process. Many letters and discussions were to follow in the months ahead. They were concerned with many matters including adjustments to temporary loss of space, search for compensating space outside the chemistry building, and initial planning for the remodeling of the chemistry building following the completion of the addition.

The working drawings for the addition were completed by the middle of July 1961. Through the coordinating role of the university architect's office many actions occurred within the next two months. These included an issuance of invitations to bid on 25 July and an opening of bids on 24 August. Letters of bid awards were issued 13 September. Construction work officially started 2 October 1961.

There were three categories of construction and one prime contractor for each. The contractors and the bid prices were:

<table>
<thead>
<tr>
<th>Category</th>
<th>Contractor</th>
<th>Base Bid</th>
<th>Alternates 1-5</th>
<th>Base Bid</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>The Lathrop Company, Toledo, Ohio</td>
<td>$1,229,000</td>
<td>$-55,700</td>
<td>$1,173,300</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Limbach Company, Cincinnati, Ohio</td>
<td>$910,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electrical: Sanborn Electrical Company, Indianapolis, Indiana

Base bid 356,600.
Alternates EW1B and 2-6 35,095.

391,695.

$2,474,995.

These bidders and the terms given above were considered by the Department of Chemistry in consultation with Casati acting for the university architect. The department's approval was given to the university shortly before the bid awards were issued.

When the construction was officially completed 1 May 1964 the building addition, total cost was $3,081,623.

The categories of cost were the following:

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>General construction</td>
<td>1,152,190.97</td>
</tr>
<tr>
<td>Mechanical</td>
<td>860,329.09</td>
</tr>
<tr>
<td>Electrical</td>
<td>385,200.38</td>
</tr>
<tr>
<td>Miscellany</td>
<td></td>
</tr>
<tr>
<td>Outside utilities</td>
<td>30,000.00</td>
</tr>
<tr>
<td>Architects and Engineer</td>
<td>143,188.70</td>
</tr>
<tr>
<td>Equipment (Lab &amp; Office)</td>
<td>410,000.00</td>
</tr>
<tr>
<td>Landscaping</td>
<td>10,000.00</td>
</tr>
<tr>
<td>Builder's risk insurance</td>
<td>6,745.20</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>9,900.97</td>
</tr>
<tr>
<td>Contingencies</td>
<td>85,309.68</td>
</tr>
</tbody>
</table>

Total: 683,902.56

The funding was provided as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>State appropriation</td>
<td>2,210,000.</td>
</tr>
<tr>
<td>National Institutes of Health Agency</td>
<td>371,623.</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>250,000.</td>
</tr>
<tr>
<td>Indiana University Foundation (Research Division)</td>
<td>250,000.</td>
</tr>
<tr>
<td>Total</td>
<td>3,081,623.</td>
</tr>
</tbody>
</table>

Thus 71.7 percent of the funding was furnished by the State of Indiana and 28.3 percent was from federal grants and the Indiana University Foundation. The latter's contribution was in fact from indirect (overhead) costs obtained in administered grants from federal sources.

The supervising architects were Eggers and Higgins, New York; the architectural firm Daggett, Naegele and Associates, Indianapolis; and the engineering firm was Ammerman, Davis and Stout, Indianapolis. The
Sheldon Equipment Company supplied the laboratory furniture and hoods.

The gross area of the Chemistry Addition is 101,440 sq. ft.; the cost per sq. ft. was $30.38. This is in marked contrast with the cost of the chemistry building finished in 1931. The total amount was $504,463, which was $5.67 per sq. ft.

When bids for construction were awarded it was well understood by all concerned that a 12-bay addition was needed to meet current requirements and the anticipated growth and other changes in the decade ahead. Because the funding from state and federal sources simply would not provide for more than a 9-bay addition, the program was altered to permit the building of a second addition similar in conformation whenever funding could be provided. That more than nine bays had been intended is made clear by the omission of limestone facing in constructing the south side of the addition; and by the inclusion of an elevator shaft near this end of the new building. Also, the architectural site plan and sketches prepared by the architects in 1960 showed twelve bays.

Like most projects of this size and complexity, various problems occurred during the construction phase. The most costly in time and materials were two fires at different times accidentally caused by welding operations. In each accident sparks ignited large quantities of building materials temporarily stored in the partially completed addition. The intense heat and smoke did extensive damage. Other delays were caused by the need to remove more rock on the site than had been expected and by excessively cold weather.

The delays in completion of the addition frustrated chemistry faculty members and others responsible for efficient operations in the department. For a long time a substantial portion of the 1931 building was either partially or totally out of use owing to the construction work and there was much pressure to become prepared for increasing enrollments. A memorandum in January 1964 from Chairman Shiner to Dean Gucker in the College of Arts and Sciences records some of the facts and concerns.

The general contractor had set the completion time as February 1963. This date was changed five times during the rest of 1963. Thus Chairman Shiner justifiably wrote

“My main concern is to see that we move out of the old building in time to have it remodeled by September (1964) when we will need the space for freshman enrollments.”

Although occupancy of the addition was begun in Spring 1964, it was not until 1975 that essentially all of the old building had been remodeled, including necessary air conditioning. The principal contractor did not totally discontinue construction work on the addition until April
1964, but as C. E. Kaslow wrote in June 1964, they "are still having to send men here to correct and adjust various mechanical difficulties." By the first of June 29 faculty members and 202 graduate students, post-doctoral workers, staff and others were occupants of the addition.

In the midst of the concerns about getting the "bugs" out of the addition and remodeling of the old building some consideration was given to dedication of the new structure. In Spring 1963 Dean Collins suggested that Chairman Shiner request a dedication date. Shiner wrote to Franklin in June that some consideration was being given to the type of dedication. He expected the department to hold a scientific symposium. Although the department, as usual, had many colloquia and seminars following the completion of the addition, there were no formal dedicatory exercises. Probably the main reason was due to the prevailing feeling that remodeling of the old building was integral to the program of providing adequate resources for instruction and research, and that until this was accomplished there could not be a satisfying dedicatory program.

From the beginning of the designing phases questions were raised concerning air handling, humidity control, laboratory flooding controls, and other aspects of air conditioning and safety to meet modern needs. From the beginning there was concern in particular that the vital needs for humidity control in the operation and maintenance of necessary electronic equipment in the addition would not be satisfied in the program offered by the firm given the contract for air handling, Ammerman, Davis and Stout.

One of the first complaints was registered by W. B. Schaap in August 1964. This was within a few months after his laboratory work had been started in the addition. Schaap wrote

"The very high humidity in the Chemistry Addition is causing serious problems due to rusting and corrosion. Equipment and instruments that we have maintained in good condition for several years have deteriorated markedly since being moved to the Chemistry Addition."

This type of problem was encountered by various workers in the addition. Also there were repeated instances throughout the addition in which moisture in circulating air condensed and accumulated in large pools of water on the floor. Thus complaints were frequent and pointed. In considering corrective steps, in February 1965, H. H. Brooks, Director of the Physical Plant, wrote to the University's Business Manager, Clark, "We are in this unfortunate position because the initial design prepared by AD&S was inadequate for the job." At that time steps were begun to remedy the situation as well as possible, and at considerable expense.
But fully satisfactory corrections were never made, probably owing to inherent problems in design.

**IMPRESSIONS OF DEPARTMENT THROUGH THE IDS**

During all of the 1950s decade and the surrounding time period the university community could keep generally aware of events and activities in the department through the Indiana Daily Student. Such coverage was much more extensive than in more recent decades. Selected excerpts of such news presented chronologically can well summarize much of the events and action, thus conveniently portraying that period in time. This means of surveying the extended decade has been employed in this section. In each year not more than one third to one half of the published news items were selected and the excerpts are all relatively brief.

**1950**

Chairman Gucker “was host last Saturday to Dr. E. D. Raines, chairman of the department of chemistry at Kentucky State College for Negroes in Frankfort, KY.” [Raines, PhD’38, was among the first black chemists to receive a doctorate degree at I.U.] (IDS 8 March 50)

Dr. E. E. Campagne ... who developed a new drug, thenfadil, for the treatment and prevention of colds, recently participated in the dedication of the research laboratories of Sterling-Winthrop Research Institute, ... (IDS 12 June 50)

Dr. Frank Mathers who has been with the I.U. Department of Chemistry for forty-seven years will retire from teaching July 1. (IDS 22 June 50)

Dr. George L. Clark, professor of chemistry at the University of Illinois will speak on ‘X-rays — Fifty Years After’ in Chemistry 203 Friday at 4:30 P.M.” [Soon after this time a program of research was started in the department on X-ray diffraction in the determination of crystal structure.] (IDS 15 Nov. 50)

**1951**

By invitation of the Office of Naval Research F. Haurowitz attended a conference of immunochemists at Columbia University. (IDS 1 Mar. 51)

L. L. Merritt spoke on Structure Determination by X-Ray Diffraction at the monthly meeting of the Wabash Section of the ACS at Terre Haute (IDS 21 Mar. 51)

H. G. Day has been appointed an associate editor of the *Journal of Nutrition*, official publication of the American Institute of Nutrition. (IDS 23 May 51)

F. Haurowitz has accepted an invitation to speak at the Conference on Chemistry and Physiology of the Nucleus at the Brookhaven National Laboratory (IDS 1 Aug. 51)
F. T. Gucker, E. Campagne, C. E. Kaslow, C. S. Rohrer, L. H. Klemm, and J. H. Billman spoke at the annual meeting of the Indiana Academy of Science at Butler University (IDS 1 Nov. 51)

1952

The Dean of the Graduate School, R. Cleland announced the names of the first persons to serve on the recently created Graduate School Council. The nine members included H. Day. (IDS 4 Jan. 52)

Joanna Dickey has accepted the position of microanalyst in the Department of Chemistry. (IDS 9 Jan. 52)

W. B. Schaap will speak at the Intervarsity Christian Fellowship meeting at the Student Building. At the last meeting Neil Elsheimer, PG (Chemistry) was elected president of the fellowship for the coming year (IDS 19 Jan. 52)

C. E. Kaslow has been awarded a research grant by the U.S. Army Office of Ordnance Research. Dr. Chu-Tsins Liu will assist Dr. Kaslow in the research. (IDS 9 Feb. 52)

Alpha Chi Sigma sponsored a lecture by V. M. Votaw on “Selecting a Career in Chemistry.” [Votaw was then a member of the I.U. Alumni Association Council.] (IDS 5 Mar. 52)

R. M. Hedrick (PhD47) “is one of a team of researchers (Monsanto) who perfected a new soil-conditioning material called ‘Krilium,’ a sort of synthetic humus.” (IDS 6 Mar. 52)

Alpha Chi Sigma initiates this year “are James Stewart, James Schooley, and Tom Harders, juniors, and Bob Evans, Herbert Beeders, Don Borders, and Alan Bornstein, all sophomores.” (IDS 9 Apr. 52)

F. T. Gucker was scheduled to lecture at a symposium at the University of Chicago which was sponsored by the Atomic Energy Commission and the Office of Naval Research. (IDS 22 Apr. 52)

N. H. Furman, chairman of the Department of Chemistry at Princeton University, will speak at the May meeting of the Southern Indiana section of the American Chemical Society at 8 p.m. Tuesday in the Chemistry Auditorium.” (IDS 3 May 52)

Frank T. Gucker ... is on a speaking tour in New England under the sponsorship of the American Chemical Society. (IDS 14 May 52)

Frank T. Gucker ... has been named a councilor of the Office of Ordnance Research ... of the Department of the Army. (IDS 14 June 52)

L. L. Merritt ... is attending a meeting of the American Crystallographic Association ... where he was to present a paper on his research. (IDS 20 June 52)

R. B. Fischer and W. B. Schaap were promoted to associate professor and assistant professor respectively. (IDS 10 July 52)

F. Haurowitz “will leave July 15 for Paris, where he will deliver two lectures at the Second International Congress of Biochemistry ...” (IDS 11 July 52)

In the coverage of the Indiana State Fair in 1952 the IDS pointed out an exhibit by the Department of Chemistry: “experiment set up for making glycerine which was discovered in 1852.” This was the centennial of the fair, 1852-1952. (IDS 29 Aug. 52)
In a long and breezy article on the periodic departmental picnic the IDS wrote that the following Saturday would mark “the semi-annual pilgrimage of the Department of Chemistry to Brown County State Park for a day (half day) of eating, baseball, football, and a new game called ‘Lets Talk Politics.’ The experiment is being sponsored by Phi Lambda Upsilon, honorary chemistry fraternity.” (IDS 9 Oct. 52)

Dr. J. C. Warner, ’19, has been appointed by President Truman to a six year term on the general advisory committee to the Atomic Energy Commission. (IDS 30 Oct. 52)

J. H. Hildebrand “will speak ... at a chemistry colloquium Friday in Chemistry 203 at 4 P.M. Tea will be served in Chemistry 201 at 3:30 p.m.” (IDS 20 Nov. 52)

F. T. Gucker “will participate in a round table discussion at a meeting of the Indiana Section of the American Chemical Society.” Other participants were E. L. Haenisch of Wabash College, E. T. McBee of Purdue, and C. C. Price of Notre Dame University. (IDS 5 Dec. 52)

“A Christmas party Saturday at 7:30 p.m. in the Chemistry Building for students in the Department of Chemistry is being sponsored by the faculty and staff of the department.” (IDS 12 Dec. 52)

H. G. Day and F. Haurowitz were scheduled to present papers at a symposium in St. Louis over the Christmas holidays. It was sponsored by the American Association for the Advancement of Science. (IDS 18 Dec. 52)

1953

An extended article reported on the granting of a new type of graduate fellowship by the DuPont Company. The purpose “is to improve the teaching of chemistry to undergraduate students by keeping an experienced postgraduate network within the department.” Other schools in Indiana to receive such grants were Purdue, Notre Dame, DePauw, and Wabash. (IDS 9 Jan. 53)

Andre Guinier of the Sorbonne, in France, was scheduled to speak at the chemistry colloquium. His subject: “Some New X-Ray Techniques.” (IDS 22 Jan. 53)

Wm. Shive was announced to be the speaker at a meeting of the Southern Indiana section of the ACS on the subject “The Biological Significance of Anti-metabolites.” (IDS 11 Feb. 53)

“Seven faculty members of the Department of Chemistry will attend a meeting of the American Chemical Society in Los Angeles Sunday through Thursday.” This was a long article giving various details. (IDS 14 Mar. 53)

A long feature article on the microanalyst and her laboratory was headed, “I.U. Microanalyst Tests Tiny Stuff.” (IDS 10 Apr. 53)

It was reported that Alpha Chi Sigma “will have its annual initiation ceremony Saturday, April 18” and that at the banquet to follow John Kuebler “national secretary of the fraternity will be the principal speaker.” (IDS 17 Apr. 53)

A long article featured A. Kronenberger for his bright career in fencing before coming to I.U. in 1950 as chemistry librarian. He was selected by the I.U.
fencing team as faculty advisor and foil coach. Fencing coach F. Wolff stated "Mr. Kronenberger is a very capable man and will certainly help fencing move up here at I.U." (IDS 29 Apr. 53)

It was reported that the "Chemistry departments of Indiana and Purdue Universities will meet Saturday, May 9 in a chemistry seminar at I.U." This was the first of its kind and it was an all day affair with a luncheon in the Union building, group conferences and a general meeting in the Chemistry building, and a picnic supper at Cascades Park. (IDS 5 May 53)

At the initiation banquet of Sigma Xi three seniors in chemistry (R. H. Mountjoy, J. Schooley, and E. Youngen) were designated to be initiated along with 59 other students. E. Campagne was president. The dinner was to be in Alumni Hall. (IDS 14 May 53)

Fourteen associate professors, including E. Campagne and L. Merritt, were approved for promotion to professor on 1 July. (IDS 20 June 53)

J. Schooley "a basketball letterman for the last three seasons, is recipient of the Gimbel Award." It was pointed out that Schooley's "team spirit and leadership played a big role in Indiana's drive to a national basketball championship." (IDS 25 June 53)

F. Haurowitz planned to attend the Gordon Research Conference on Proteins and from there to go to Montreal to attend the International Physiological Congress. (IDS 4 Aug. 53)

The new faculty appointments announced by H. T. Briscoe, Dean of the Faculties, included Marvin Carmack. (IDS 19 Sept. 53)

Max F. Perutz was scheduled to discuss "X-Ray Studies on Proteins" at the Chemistry Colloquium on Friday. (IDS 29 Sept. 53)

The Indiana Chemical Society and the Southern Indiana section of the ACS held a symposium on "Fostering Interest in Chemistry" in the Chemistry Auditorium. This was followed by a dinner in the Marine Room of the Union Building. H. T. Briscoe spoke at the dinner. (IDS 20 Oct. 53)

"More than thirty-five I.U. Professors and graduate students will travel to Earlham College, Richmond, Thursday to attend and present papers at the 69th annual meeting of the Indiana Academy of Science." (IDS 3 Nov. 53)

John C. Warner, '19, ... has been nominated for the office of president of the American Chemical Society." (IDS 11 Nov. 53) [He was elected.]

Eugene M. Seidel, assistant to the chairman of the Department of Chemistry, has resigned to become a member of the staff of the technical service division of Commercial Solvents Corporation of Terre Haute. (IDS 24 Nov. 53)

W. J. Moore chaired the Christmas party in the Chemistry Auditorium. The entertainment included skits by faculty members and students and the singing of Christmas carols. Approximately 200 attended. (IDS 15 Dec. 53)

1954

R. M. Hedrick was scheduled to lecture on "Decision for Chemistry" under sponsorship by the Student Affiliates of the ACS. In 1952 he was named by the U.S. Junior Chamber of Commerce as one of the 10 outstanding young men in the nation. (IDS 8 Jan. 54)
F. T. Gucker was on leave during the second semester of 1953-54. Among other activities he lectured on his research on aerosols at the University of Nottingham, England. Also, he organized a symposium to be presented at Yale University by the Division of Physical and Inorganic Chemistry of the ACS. He was then chairman-elect of the Division. (IDS 4 Feb. 54)

Dr. F. G. Arndt, chairman of the Department of Chemistry in Istanbul and a visiting professor at I.U. will speak Thursday night at the meeting of Sigma Xi national scientific honor society. (IDS 10 Feb. 54)

Twenty junior and senior chemistry majors toured the Eli Lilly Company biological laboratories in Indianapolis Wednesday. J. S. Peake and W. H. Nebergall accompanied the students. (IDS 16 Feb. 54)

David Hammond, Standiford Cox, and Guenther Lengnick, freshmen, have been named winners of special awards for outstanding work and scholarship in the Department of Chemistry. (IDS 18 Feb. 54)

C. E. May has taught chemistry at I.U. since 1908. He “will retire July 1.” (IDS 23 Mar. 54)

Chemistry students will have a picnic this Saturday at Brown County State Park, sponsored by Phi Lambda Upsilon, national chemistry fraternity. (IDS 13 May 54)

V. J. Shiner was promoted to the rank of assistant professor and C. E. May was retired with the rank of emeritus professor. (IDS 23 June 54)

Dr. Lynne Merritt, Jr., and Dr. Walter J. Moore .... will soon return from Europe where they attended international meetings in France, Holland, and England. (28 July 54)

F. Haurowitz, R. B. Fischer, and V. J. Shiner received invitations to speak at sessions of the Gordon Research Conference. (IDS 3 Aug. 54)

The Association of Indiana University Chemists was announced to be sponsoring a reunion of chemistry alumni on 9 October. The program included honors to emeritus professors Brown, Mathers, and May as well as to retired stockroom keeper F. Eckels. Nolan Sommer was toastmaster at the dinner and W. J. Sparks was the principal speaker. H. T. Briscoe introduced the honored guests. (IDS 8 Oct. 54)

Forty-four I.U. faculty members and graduate students are attending the 70th annual meeting of the Indiana Academy of Science at Purdue University. (IDS 15 Oct. 54)

H. G. Day “will preside at a meeting of the Indiana Chemical Society, of which he is president, at Ball State Teachers College, this afternoon and evening.” (IDS 16 Oct. 54)

Prof. R. P. Bell, of Oxford University, England, spoke Friday in the series of Chemistry Colloquiums. (IDS 30 Oct. 54)

On Saturday Dean Gucker will attend a meeting in Washington, D.C., of the Advisory Selection Committee for Chemistry, to screen applications for Fulbright scholarships in chemistry. (IDS 7 Dec. 54)

J. C. Warner ... has been chosen president-elect of the American Chemical Society. In June I.U. “awarded him an honorary degree of doctor of science. As an undergraduate he won a varsity letter in wrestling....” (IDS 16 Dec. 54)

To promote interest in the teaching of science in high schools, two new fellowships have been made available to I.U. graduate students by E. I. duPont de
Nemours and Company. The recipients must be candidates for the MAT degree and must pledge that they will accept high school teaching positions... (IDS 17 Dec. 54)

1955

Research by M. Carmack and W. R. Breneman on lithospermum ruderale has been supported by a new grant of $26,000 from the Cancer Institute of the U.S. Public Health Service. (IDS 4 Jan. 55)

A renewal grant of $1000 has been made to I.U. by the Standard Oil Foundation, Inc., to assist Indiana high school teachers of chemistry who wish to continue their education in the Department of Chemistry. It will provide five Summer fellowships for candidates for the MAT degree. (IDS 13 Jan. 55)

Twenty-four I.U. chemistry students were guests of the Eli Lilly and Company, in Indianapolis, today for an inspection tour of the firm's research laboratories. The tour was led by V. J. Shiner. (IDS 9 Feb. 55)

F. Haurowitz, M. Carmack, R. Fischer, and V. J. Shiner presented papers at the national meeting of the ACS in Cincinnati. (IDS 2 Apr. 55)

H. G. Day and F. Haurowitz spoke at the annual meeting of the Federation of American Societies for Experimental Biology. (IDS 15 Apr. 55)

L. L. Merritt received a Guggenheim Fellowship "for a study of the crystal structures of chelate complexes." (IDS 16 Apr. 55)

A long article was published on H. T. Briscoe and his role as Vice-President and Dean of the Faculties. This was the second in a series of five on the Vice-Presidents of I.U. There is considerable reference to his roles in the Department of Chemistry. (IDS 24 May 55)

Faculty promotions this year included W. H. Nebergall from Assistant Professor to Associate Professor and E. J. Bair from Instructor to Assistant Professor. (IDS 27 May 55)

George Ham, PhD '44, "has been made director of research for one of the larger manufacturers of fine chemicals, the J. T. Baker Company..." (IDS 11 June 55)

Prof. Marvin Carmack ... will speak Friday at a chemistry seminar of the Standard Oil Company at Whiting." (IDS 23 June 55)

Prof. Felix Haurowitz ... flew Friday from Washington, D.C. to Europe, where he will lecture at several scientific conferences and institutions. (IDS 8 July 55)

Prof. E. E. Campagne ... is giving a series of three lectures in northern Indiana, sponsored by the I.U. chapter of Sigma Xi.... (IDS 13 Oct. 55)

Five chemistry faculty members spoke at the annual meeting of the Indiana Academy of Science at Notre Dame University. They were F. Haurowitz, F. J. Welcher, J. H. Billman, W. B. Schaap, and F. C. Schmidt. (IDS 13 Oct. 55)

H. R. Mahler will speak at two West Coast meetings this month. The meetings were at the Universities of Oregon and Washington. (IDS 19 Oct. 55)

E. Campagne lectured on drug research at I.U. at the Jeffersonville Extension Center. (IDS 29 Oct. 55)
William J. Sparks, '26, has been elected to the 12-man policy committee of the American Chemical Society." (IDS 4 Nov. 55)

Studies reported by J. C. Muhler, H. G. Day, A. W. Radike (Procter and Gamble Company) and W. H. Nebergall in the Journal of the America Dental Association "showed 36 per cent reduction of new cavities for tin fluoride toothpaste, as against only 10 per cent reduction for a paste with sodium fluoride." (IDS 19 Nov. 55)

H. Shull ".... is participating in the invitational International Conference on Quantum Mechanics, at the University of Texas ...." (IDS 7 Dec. 55)

1956

H. R. Mahler, in his first year at I.U. has "a new grant of $26,251 for the year 1956 from the U.S. Public Health Service." (IDS 18 Jan. 56)

W. J. Moore's ionic beams research is "described" for IDS readers. As reported in the article the research is supported by a grant of $9,000 annually from the NSF and "the Army Office of Ordnance Research which has just announced a renewal grant of $7,000." (IDS 9 Feb. 56)

David E. Green spoke on "The Electron Transport System" at a Chemistry Colloquium. (IDS 22 Feb. 56)

"The Dow Chemical Company ... has renewed a $2,500 fellowship for the academic year 1956-57 in the I.U. Department of Chemistry." (IDS 10 Mar. 56)

"The Department of Chemistry has received a grant of $3,000 from the Foundation of the Lubrizol Corporation..." This was a renewal. (IDS 16 Mar. 56)

Prof. L. L. Merritt, Jr. .... is lecturing March 15 to 24 for local sections of the American Chemical Society in eight southeastern cities. (IDS 21 Mar. 56)

Several members of the faculty and graduate students "are giving technical papers at the Spring meeting of the American Chemical Society this week in Dallas, Texas." These included E. Campagne, H. Mahler, W. Schaap and V. J. Shiner. (IDS 12 Apr. 56)

In President Wells announcement of faculty promotions C. E. Kaslow was included for Professor from Associate Professor. (IDS 19 June 56)

"The DuPont teaching associateship goes this year to Glenn Berchtold, P.G., Pekin, Ill. This award is for $2,400 to the recipient, plus $500 for use of the Department of Chemistry." (IDS 19 Sept. 56)

"Professor Harrison Shull ... will give a series of four lectures on the use of the I.U. Research Computing Center machines, beginning today." (IDS 6 Oct. 56)

"Dean Fraser ... and Henry Mahler .... will give a joint lecture at a meeting of the I.U. Chapter Sigma Xi at 8 P.M. Thursday in Medical 101." (IDS 6 Nov. 56)

H. Mahler was reported to be scheduled for two lecture series in November. The first was to be several seminars at the University of Wisconsin and the second was to be one lecture each at Johns Hopkins University, Rutgers University, and the University of Toronto. (IDS 8 Nov. 56)

H. Shull lectured in the Department of Physics at the University of Chicago Tuesday. (IDS 14 Nov. 56)
H. R. Mahler “will be visiting professor of physiological chemistry from February to September at the University of Sao Paulo, Brazil.” (IDS 8 Dec. 56)

1957

L. L. Merritt “...has been invited to a conference at the University of Pittsburgh on Feb. 6 to discuss the use of the I.U. Research Computer Center.” (IDS 2 Feb. 57)

A special article appeared on Prudence Windsor, graduate assistant and a former art student, under the headline “Hoosier Girl Chemist Once Studied Art.” [Tragically within three months this promising student died in an airplane accident.] (IDS 5 Feb. 57)

“Prof. Harrison Shull ... has been appointed to the board of editors of ‘Spectrochimia Acta’ ... for a four year term.” (IDS 9 Feb. 57)

“A series of weekly seminars on computer machines and numerical methods will meet beginning Friday, March 15, at 4 P.M. in Biology 116. The series will be sponsored by the I.U. Research Computing Center.” (IDS 13 Mar. 57)

“Eight I.U. chemistry faculty members and graduate students will take part in the meeting of the American Chemical Society ... at Miami, Fla.” Faculty participants included F. T. Gucker, W. J. Moore, V. J. Shiner, L. L. Merritt, W. H. Nebergall, and H. G. Day. (IDS 6 Apr. 57)

F. Haurowitz and H. R. Mahler presented papers at the annual meeting of the Federation of American Societies for Experimental Biology at Chicago. (IDS 16 Apr. 57)

Three comprehensive articles appeared in sequence during four days following the tragic laboratory demonstration explosion that occurred in the Chemistry Auditorium in April 1957. (IDS 26, 27, 30 Apr. 57)

“Jerry Current, senior, received the American Institute of Chemists award Monday night at the Department of Chemistry first combined award-dinner in Union Room E.” Other students who received awards were: Helen Matthews, Odell Raper, Jacob Raab, Larry Sowder, Janna Zoe Peake, Morris Sorrells, and Standiford Cox. The guest of honor was Professor Fritz Arndt. (IDS 7 May 57)

“John W. Ashton, Vice-President and Dean of Students and Educational Services spoke on ‘Alchemists in Literature’ at the Phi Lambda Upsilon installation-dinner Wednesday night ...” (IDS 9 May 57)

“Paul Klinge ... has been appointed co-ordinator for school science, a newly created position at I.U.” (IDS 16 May 57)

Promotions in faculty rank this year included H. R. Mahler from Associate Professor to Professor and W. B. Schaap and V. J. Shiner from Assistant Professor to Associate Professor. (IDS 18 May 57)

F. C. Schmidt “will be visiting professor of physical sciences at a summer institute at the University of Hawaii June 20 to Aug. 14.” (IDS 9 June 57)

H. Shull was scheduled to give “a series of six lectures on use of the magnetic drum calculator of the Indiana University Research Computing Center...” (IDS 18 June 57)

“Harry G. Day has been appointed for a five-year term as chairman of the Department of Chemistry.” (IDS 24 July 57)
"In connection with Homecoming Weekend, a special program for returning alumni has been arranged by the I.U. Department of Chemistry and Bacteriology." Chemistry speakers included: H. T. Briscoe, H. G. Day, F. T. Gucker, E. E. Campagne, and alumni A. M. Borders, H. Grose, C. Alter, W. P. Metzner, D. J. Cook, and R. M. Lingle. Following the I.U.-Iowa football game an open house was held at the Campagne home. (IDS 9 Oct. 57)

Faculty participants in the annual meeting of the Indiana Academy of Science meeting at DePauw University included R. B. Fischer, W. B. Schaap, M. Carmack, E. Campagne, V. J. Shiner, and H. G. Day. (IDS 18 Oct. 57)

"Walter J. Moore ... has been appointed advisory editor in chemistry for the Dodd Mead & Company publishers in New York." (IDS 23 Oct. 57)

E. E. Campagne ... "has been elected treasurer of the division of medicinal chemistry of the American Chemical Society." (IDS 23 Oct. 57)

Riley Schaeffer of Iowa State College spoke on his work at the Chemistry Colloquium. (IDS 29 Oct. 57)

W. W. Bromer, PhD'53, of Eli Lilly and Company was scheduled to speak at the Chemistry Colloquium in Chemistry 203. (IDS 7 Nov. 57)

Chemistry faculty members W. J. Moore, E. J. Bair and R. L. Seifert were interviewed individually and the article was headed “I.U. Research Projects to Help Rocket Design.” (IDS 4 Dec. 57)

H. Eyring was the speaker at the Chemistry Colloquium on "Thermodynamics and Transport Properties of the Liquid State." (IDS 17 Dec. 57)

1958

"I.U. is one of 135 universities and colleges selected by the E. I. duPont deNemours Co. to share in the firms’ $1,150,000 program of aid to education.” (IDS 7 Jan. 58)

"Harrison Shull ... has left for the University of Upsala, Sweden, where he has been invited to spend 18 months in research at the Quantum Laboratory there. He will be on leave from I.U. ... He was a Guggenheim fellow there in 1954-55.” (IDS 4 Feb. 58)

It was announced that Riley Schaeffer will become associate professor of chemistry. (IDS 14 Feb. 58)

V. J. Shiner has received a faculty fellowship from the NSF for 1958-59. “He will study at University College, London, England and the University of Montpellier in France.” (IDS 12 Apr. 58)

Papers will be given at the forthcoming spring meeting of the ACS at San Francisco by E. J. Bair, E. E. Campagne, F. T. Gucker, H. R. Mahler, W. J. Moore, and V. J. Shiner. H. G. Day will speak at the luncheon meeting of the Association of Indiana University Chemists. (IDS 17 Apr. 58)

“Funeral services for Albrecht M. Kronenberger, ’54, chemistry librarian and lecturer, will be today at 11:00 A.M. at the Day Funeral Home with Rabbi Mark Fraenkel officiating.” (IDS 13 May 58)

Alpha Chi Sigma highlighted its meeting in May by the initiation of E. E. Campagne as a professional member of the fraternity. (IDS 6 May 58)
W. J. Moore was scheduled to be one of eight faculty speakers at the second annual Alumni Institute held by the College of Arts and Sciences - Graduate School Alumni Association. He was to participate in a session on “Conquering Space.” (IDS 16 May 58)

“Sixteen I.U. students were honored as outstanding in chemistry at a banquet given Friday night by the Honors banquet Department of Chemistry in the Union Building.” (IDS 17 May 58)

J. H. Billman was scheduled to teach in a high school science teachers institute at the University of Delaware. This was sponsored by the National Science Foundation Institute for Science Teachers. (IDS 22 May 58)

V. J. Shiner and E. Campaigne co-chaired the Conference on Hyperconjugation held on campus 2-4 June. It was attended by nearly 200 scientists. (IDS 12 June 58)

J. H. Billman and H. Shull were advanced in rank to Professor. (IDS 12 June 58)

F. Haurowitz was advanced in rank to Distinguished Service Professor. (IDS 18 June 58)

E. Campaigne, F. Haurowitz, W. Schaap, F. C. Schmidt, and F. Gucker were participants at the semi-annual meeting of the ACS in Chicago. (IDS 11 Sept. 58)

C. S. Rohrer has resigned to become chairman of the Department of Chemistry at East Texas State College. (IDS 19 Sept. 58)

F. Haurowitz “will give an invitational lecture Wednesday in the centennial meeting of the German Society of Scientists and Physicians in Wiesbaden, Germany.” (IDS 30 Sept. 58)

F. Gucker, F. Haurowitz, and E. Campaigne were elected to offices in the ACS at the semiannual meeting in Chicago. (IDS 1 Oct. 58)

H. Day was a speaker “at the formal opening of the new chemistry quarters at Cornell College ...” (IDS 7 Oct. 58)

W. H. Nebergall received a faculty fellowship from the NSF for advanced study and research in Germany during 1958-59. (IDS 12 Dec. 58)

1959

“For the first time duPont awarded the IU Department of Chemistry $5,000 for fundamental research.” This was in addition to its other grants for fellowships making a total of $11,300. (IDS 6 Jan. 59)

M. Carmack participated in a meeting of the postdoctoral fellowship committee of the National Research Council in Washington. He is a member of the committee. (IDS 29 Jan. 59)

H. G. Day was elected chairman of the Committee for Hospital Expansion. “The committee includes members of the Monroe County Hospital Association and the Bloomington Hospital Board.” (IDS 14 Feb. 59)

H. G. Day “is participating in the Program of Visiting Scientists in Chemistry, sponsored by the National Science Foundation and the American Chemical Society.” (IDS 18 Feb. 59)

Three members of the Chemistry faculty (Day, Fischer, Kaslow) participated in the annual meeting of the Indiana Academy of Science at Butler University. (IDS 30 Oct. 59)
“Prof. E. E. Campagne, chemistry, has been appointed a consultant to the U.S. Department of Army on development of methods of treating radiation damage with chemicals.” (IDS 5 Nov. 59)

“Prof. Riley Schaeffer ... has accepted an invitation to address a convention of the Central Association of Science and Mathematics Teachers Sunday at Chicago.” (IDS 25 Nov. 59)

“Prof. Marvin Carmack, chemistry, will spend a year in research at the Commonwealth Scientific and Industrial Research Organization at Melbourne, Australia, under a Department of State Fulbright grant.” (1 Dec. 59)

“Dr. Frank C. Mathers ... will discuss ‘Accidental Discoveries in Chemistry’ at Alpha Chi Sigma’s public meeting today at 7 p.m. in Chemistry 200.” (IDS 17 Dec. 59)

1960

F. Haurowitz was scheduled to address the biochemistry group at a meeting of the New York section of the ACS in New York City. (IDS 8 Jan. 60)

“Alpha Chi Sigma ... will sponsor help sessions for chemistry students Monday and Tuesday evenings.” (IDS 9 Jan. 60)

J. J. Lander of the Bell Telephone Laboratories was appointed visiting professor for one semester “to take over the work of Walter J. Moore ... who will be teaching at Harvard next semester.” (IDS 27 Jan. 60)

“R. Schaeffer ... is making a lecture tour of 14 sections of the American Chemical Society in seven western states.” (IDS 2 Feb. 60)

“The Dow Chemical Company fellowship grant of $2500 will be continued for another year. The current recipient is Linneaus Dorman.” (IDS 5 Feb. 60)

W. B. Schaap will have a NSF faculty fellowship for work at the University of California, Berkeley during 1960-61. (IDS 29 Feb. 60)

F. Haurowitz received the Paul Ehrlich Award at Frankfort, Germany (IDS 15 Mar. 60)

H. Day is to be a visiting scientist of the ACS and NSF in the five high schools of Little Rock, Arkansas. (IDS 15 Mar. 60)

V. J. Shiner is making a lecture tour of 10 local sections of the American Chemical Society in Missouri, Arkansas, Kansas, and Oklahoma. (IDS 19 Mar. 60)

The IDS published a long letter by W. J. Moore deploring professional college athletics. (IDS 12 Apr. 60)

F. T. Gucker was re-elected for a second year as vice-chairman of the policy committee of the ACS. (IDS 23 Apr. 60)

L. L. Merritt gave the presidential address at the annual initiation dinner of Sigma Xi. (IDS 7 May 60)

E. J. Bair and H. G. Day were among the judges at the National Science Fair at Indianapolis. (IDS 10 May 60)

R. B. Fischer and V. J. Shiner were promoted to professor; E. J. Bair to associate professor; and R. A. Bonham and W. L. Meyer to assistant professor. (IDS 22 June 60)

“The Bureau of Institutional Research will be directed by Lynne L. Merritt, Associate Dean of the College of Arts and Sciences, effective July 1...” (IDS 28 June 60)
C. E. Kaslow was the subject of a biographical sketch. (IDS 19 July 60)

A special article was published on the research of E. Campagne and M. Carmack concerning compounds that may protect against radiation damage. It was under the heading “I.U. Chemistry Professors Study Radiation Protection.” (IDS 26 July 60)

A signed special article was published on the first nuclear magnetic resonance spectrometer acquired by the department. It included a two column picture of R. Schaeffer and graduate student L. A. Ross accompanied the article. The equipment cost $50,000. (IDS 2 Aug. 60)

A grant of $344,866 was received from the U.S. Public Health Service to supplement a state appropriation of $2,200,000 and other sources for the construction of an addition to the Chemistry Building. (IDS 4 Aug. 60)

F. T. Gucker addressed the Faraday Society at the University of Bristol, England on the measurement of aerosols. The special article described the research in some detail. (IDS 16 Sept. 60)

“Phi Lambda Upsilon, chemistry honorary, is sponsoring its annual (departmental) picnic Saturday, Oct. 1, at Brown County State Park.” (IDS 28 Sept. 60)

“A visiting professor from London, England, Dr. Y. Pocker, will address a chemistry seminar today at 7:30 p.m. in Chemistry 209.” (IDS 28 Sept. 60)

“The Association of Indiana University Chemists ... will hold its triennial reunion here tomorrow and Saturday.” (IDS 13 Oct. 60)

J. H. Billman began a three-year term as a member of the Fellowships Review Panel of the National Institute of Health Pharmacology and Endocrinology. (IDS 17 Nov. 60)

“Prof. Louis F. Fieser ... will speak today at the Chemistry Colloquium at 4 P.M. in Chemistry 203.” A tea at 3:30 P.M. preceded the event and a dinner at 6:15 P.M. followed. (IDS 2 Dec. 60)

H. R. Mahler presented a paper at a conference sponsored in New York City by the New York Academy of Sciences. (IDS 14 Dec. 60)

1961


A special article was published concerning V. J. Shiner and H. Shull whose selection was announced as recipients of Alfred P. Sloan Foundation Fellows. (IDS 25 Jan. 61)

W. J. Moore was the recipient of an award by the American Scientist for one of the five outstanding contributions of 1960 to this official publication of Sigma Xi. (IDS 26 Jan. 61)

R. B. Fischer became Director of Chemical Laboratories in the department. (IDS 1 Feb. 61)

“Riley Schaeffer ... gave a seminar Tuesday in the Department of Chemistry at the University of Illinois.” (IDS 16 Feb. 61)
Some of the faculty participating in the national meeting of the ACS in St. Louis were the following: E. E. Campaigne, V. J. Shiner, W. J. Moore, J. A. Thoma, F. T. Gucker, H. G. Day, R. B. Fischer, and R. Schaeffer. (IDS 23 Mar. 61)

The research of F. C. Schmidt and W. B. Schaap on amines as solvents has been supported by a new grant of $34,908 from the Atomic Energy Commission. (IDS 11 Apr. 61)

"Six representatives of the department of chemistry will present papers at the annual meeting of the Federation of American Societies for Experimental Biology in Atlantic City." (IDS 13 Apr. 61)

F. C. Schmidt received the Frederic Bachman Lieber Award for distinguished teaching. (IDS 4 May 61)

An extensive account of an interview with W. L. Meyer focussed on his natural products research. (IDS 6 May 61)

R. Schaeffer received an NSF Senior Postdoctoral Fellowship for the 1961-62 academic year. (IDS 16 May 61)

A very extensive article was published on the upcoming construction program. It was based primarily on interviews with C. E. Kaslow representing the department, and D. A. Jones, director of the Bureau of Physical Facilities Studies. They predicted that construction would start within four months. (IDS 17 May 61)

"The annual Honors Banquet of the Department of Chemistry will be at 6:15 P.M. Friday in State Room East of the Union Building." The principal speaker was to be T. Carney, vice-president and director of research, Eli Lilly and Company. (IDS 17 May 61)

"Twelve hundred scientists from all parts of the country will gather here June 25-29 for the Seventeenth National Organic Chemistry Symposium." It was sponsored by the organic division of the ACS. The I.U. committee for this major event included E. Campaigne, V. J. Shiner, C. E. Kaslow, W. L. Meyer, J. A. Thoma, W. H. Nebergall H. G. Day, and J. Dickey. (IDS 4 June 61)

New faculty appointments included Ernest Wenkert and Stanley Hagstrom, to be effective in September. (IDS 28 June 61)

R. A. Bonham was scheduled to speak at a meeting of the American Crystallographic Association in Boulder, Colorado. (IDS 19 July 61)

S. Mathias of the University of Sao Paulo was scheduled to visit the department and speak at a seminar in return for a visit recently made to his institution in Brazil by W. J. Moore, H. Shull, and E. Wenkert. (IDS 22 July 61)

An interview with Professors Moore, Shull, and Wenkert reported in detail their impressions that "Brazilian science is on the verge of entering an era of great advance." The group had just returned from Brazilia and elsewhere in Brazil. (IDS 26 July 61)

"Ernest Wenkert, newly appointed professor of chemistry .... is the recipient of four new research grants totaling $70,150." They were from NSF, Eli Lilly and Company, U.S. Public Health Service, and CIBA Pharmaceutical Products, Inc. (IDS 16 Sept. 61)

H. G. Day was elected president of the Indiana Academy of Science at the Academy's annual meeting at Indiana State College. (IDS 21 Oct. 61)
V. J. Shiner was elected chairman of the Southern Indiana section of the ACS. (IDS 10 Oct. 61)

1962

H. R. Mahler “is on a lecture tour of New York State through Jan. 16, giving talks at seven colleges and universities under auspices of the American Chemical Society.” (IDS 11 Jan. 62)

Many area newspapers reported on the acquirement of the department’s “electron super-microscope” early in 1962. It was made possible by $40,000 from the Advanced Research Projects Agency of the U.S. Department of Defense. “The super-microscope will be utilized in research on the physics and chemistry of materials in solid state, under the direction of Profs. Robert B. Fischer and Walter J. Moore.” (IDS 24 Jan. 62)

“Felix Haurowitz — will play a major role in the 16th Annual Symposium on Fundamental Cancer Research March 1 to 3, in Houston, Texas. He presided at one session and spoke on ‘The Template Theory of Antibody Formation.’” (IDS 22 Feb. 62)

In three long consecutive articles the Indiana Daily Student reviewed J. C. Muhler’s role in the development of CREST toothpaste. (IDS 17, 20, 21 Feb. 62)

A long article announced the awarding of a one year grant of $87,787 by the U.S. Office of Aerospace Research to support the work of the I.U. Research Computing Center under the direction of H. Shull. It stated: “Nearly completed is installation in the center of a new IBM 709 computer without which Prof. Shull’s new project would be impossible.” (IDS 13 Mar. 62)

A long article in the IDS proclaimed that “Indiana University has received five National Science Foundation grants totaling $414,249 for research-participation programs for college and high school teachers. No other institution in the country has received more NSF research participation grants.” Chemistry participated broadly in the program. (IDS 10 Mar. 62)

The IDS and at least 10 other newspapers in Indiana reported in lay language some of the work by W. J. Moore and his group on “hot atoms.” The apparatus “uses ionic beams to produce super-hot atoms which can move through a solid as if it were a gas, meanwhile inducing unusual chemical reactions.” (IDS 22 Mar. 62)

The IDS presented a series of major articles on the I.U. libraries including one on the branch libraries. More space was devoted to the chemistry library than any of the other three libraries. A unique feature of the chemistry library commented on was “the issuance of library keys to all faculty members, postdoctorate and graduate students in the Chemistry Department.” Owing to the mounting abuses in the use of the library within the decade the key privileges had to be withdrawn. (IDS 13 Apr. 62)

L. L. Merritt was one of the nine university faculty members to receive Fulbright awards in 1962. He conducted “research in physical and analytical chemistry at the National Center of Scientific Research, Paris, France in the spring semester of 1962-63.” (IDS 4 May 62)

H. R. Mahler was one of two I.U. professors to receive the prestigious and renewable five year research awards from the Public Health service, a
REORGANIZATION ACTIONS AND BEGINNING OF SHINER YEARS (1962-67)

The continuing growth and development of the department in the late 1950s stimulated the maturing faculty to think about the administrative structure as well as teaching and research. While this was under consideration the funding and construction of the 1960s Addition progressed, and salutary advancements continued in strengthening the standing of the department. It appeared to several faculty members that the department had become too large and diverse in its responsibilities and expectations to operate well without a small elective advisory body of faculty members to counsel with the chairman in greater detail than was feasible in a faculty of nearly a score or more of individuals. There were other considerations. Therefore early in 1960-61 Day appointed a special study committee to make recommendations to the faculty on the organization of the department. H. Shull was the chairman. Virtually all of the subsequent changes in organization were influenced by the committees' recommendations.

They consisted principally in the establishment of a policy committee, reestablishment of the office of Director of Laboratories, and clear establishment of the offices of Undergraduate Adviser and Graduate Adviser. The essence of the changes was spelled out by Day in his report of July 1961 on chemistry committees for 1961-62.

As stated in the report

"The primary responsibility of the (Policy) Committee is to meet frequently with the chairman of the Department and counsel with him on major administrative operations and all matters which are concerned with long-range policy. The committee must keep well
informed through reference to departmental records and contacts with faculty members, staff, students, and the chairman."

The faculty selected Fischer, Shiner, and Shull to be the members of the Policy Committee for 1961-62.

The other three new committees and their stated responsibilities were:

(a) Undergraduate Committee. Shiner (Undergraduate Adviser), Moore (Honors Adviser), Bonham, Schmidt. The charge specified that

"This committee will counsel the Undergraduate Adviser on all matters concerned with his responsibilities. This should include undergraduate counseling, nominations for scholarships and other awards, advising on petitions concerning degree requirements and regulations, maintenance of appropriate student records, and operation of an office for freshmen and other undergraduates. In addition, the committee should counsel the Honors Adviser regarding the operation of the Honors Program."

(b) Graduate Committee. Campagne (Graduate Adviser), Mahler, Nebergall, Schaap, Shull. The charge specified that

"The purpose of the committee is to counsel and assist the Graduate Adviser in the various aspects of graduate admissions, placement examinations, advising on programs of study, appointment of assistants and fellows, administration of the cumulative examinations, supervision of the final examinations of all masters candidates (MA and MAT) and periodic evaluation of the academic status of all graduate students. Also, the Committee will counsel the Adviser in actions concerning (a) dismissal or withdrawal from graduate work in chemistry, (b) warning of unsatisfactory standing, and (c) nomination of students for special recognition."

(c) Space, Services and Facilities Committee. Fischer (Director of Laboratories), Kaslow, Meyer. The charge specified that

"Periodically the committee should appraise all the space of the Department concerning its utilization. Upon this basis the committee will make assignments of space and present recommendations to the Chairman of the department concerning remodeling or other changes that may be useful in meeting our needs. The committee members will advise the Director of Laboratories, on all matters concerning his responsibilities as Director. This will include the supervision of all technical services such as shops and instrument maintenance, and the procurement and dispensing of supplies. Also, it
will include the evaluation of all equipment requests for the department.”

The continuing committees and their membership for 1961-62 were:

Curriculum (Moore, Chr., Campagne, Seifert, Shiner, Thoma)
Colloquium (Haurowitz, Chr., Shull)
Enrollment (Billman, Chr., Kaslow)
Library (Carmack, Chr., Haurowitz, Waddington-Librarian)
Safety (Fischer, Chr., Haurowitz, Hardy - staff)
Master of Arts for Teachers Program (Schmidt - Adviser)
Chemistry Addition (Kaslow, Chr., Seifert, Schaap)
Brazilian Project (Moore, Chr., Mahler, Shiner, Shull, Wenkert - after January 1962.) This Committee continued to explore the feasibility of “the establishment of a joint departmental program, at least at the graduate level, with a suitable and equally interested institution in Brazil.” Finally the effort was discontinued in 1964.

The reorganization involved the discontinuance of the following committees: General Chemistry; Graduate Admissions and Appointments; Graduate Testing and Standards; Honors Program and Special Student Recognitions; Radioactive Materials; Shops; Space Utilization and Assignments; and Technical Services Laboratories, Equipment, and Supplies. The functions of all these committees were included with those of the committees that were continued and with those of the new committees.

The reorganizational changes described conformed with Day’s “Administrative Policy and Goals” as reported to the faculty on 18 April 1961. That report seemed to meet with widespread approval. One faculty member responded “that this is exactly what the department needs at this time.” Another wrote that “it offers a set of concepts which should inspire the unanimous support of the department.” This person added that

“Some mechanism should be established so that at intervals the department can be consulted regarding its views, as a department, on the best choice for the position of departmental chairman.”

This was never employed as a formal procedure but on several occasions the views of individual faculty members were presented and discussed in faculty meetings.

The selection of Day’s successor to the chairmanship came about quietly and without any apparent desire to go outside the department. Day’s second five-year term was scheduled to end the last of August
1962. In November 1961 he wrote to Dean Gucker about the approaching termination. Finally on 26 June Gucker wrote to all the chemistry faculty stating in part:

"After careful consideration I have requested Professor V. J. Shiner to serve as Chairman of the Department for a period of five years beginning 1 September 1962 and he has agreed to do so. At the end of that time you will again be consulted about subsequent arrangements for the chairmanship."

The transition to a new chairman was especially orderly and systematic. Day simply exchanged offices with the new chairman and became the Undergraduate Adviser. At the first faculty meeting under the new chairmanship, on 5 October 1962, one of the new faculty members, D. G. Peters was named the recording secretary. An innovation was the naming of a parliamentarian, W. J. Moore. The topics reported on and discussed briefly included the filling of an opening in physical chemistry, performance of the new graduate students on the placement examinations, pay scale for laboratory technicians, and the prospective need for about 50 graduate assistants in 1963-64 owing to increased student enrollments. Shiner emphasized that the faculty bore much responsibility in good planning for certain changes in the chemistry curriculum that were nearing completion.

The next faculty meeting occurred on 14 December and like the first one it lasted one hour. Much of the attention was given to changes in the curriculum for analytical chemistry and organic chemistry courses. Campagne pointed out that it had been five years since major changes were made in the graduate curriculum. The faculty authorized the Curriculum Committee to develop comprehensive recommendations in that area. The rest of the hour was focused on the general chemistry curriculum. Subsequent faculty meetings followed this pattern.

The problems, achievements, and general status of the department at this time are best summarized in Day's last annual report (13 July 1962) to Dean Gucker for 1961-62 and in Shiner's first annual report (5 July 1963) to the Dean for 1962-63. Some of the highlights were as follows:

In 1961-62 seventy per cent of the superior general chemistry students placed in a special section of organic chemistry in their first year received A and B grades. In 1962-63 the program for such students had been expanded to include special sections in second semester organic chemistry and first semester physical chemistry. Also more emphasis was given to research participation for highly qualified undergraduates. Both reports called attention to the annual honors banquet. Dean Collins spoke in 1962 and Dean Braden was the speaker in 1963.
No new courses were inaugurated in 1961-62 but three were started the next year. Chemistry C430 (previously as C330) was offered with physical chemistry as a prerequisite. Chemistry C443 was started as a new third semester course in organic chemistry and physical chemistry was also a prerequisite. Chemistry C310 marked a major departure from C210 which had been mainly classical gravimetric and volumetric techniques. Some of the older quantitative type procedures in C210 had already been included in the general chemistry laboratory program. Some new equipment (automatic balances, Spectronic 20 colorimeters, and Beckman pH meters) were introduced. As in the other new courses, physical chemistry became a prerequisite. This was Peters' first year in the department and he was in charge of the new course.

In both the 1961-62 and in the 1962-63 reports there were "Improvements and developments in existing courses and areas." A comprehensive revision of the AB and BS programs in chemistry was started in 1961-62 and further developed in 1962-63. The goal was to encourage and permit promising students to complete a large proportion of all the basic courses in the first three years, thus giving greater opportunity for special and independent work in the fourth year.

In 1962-63 the laboratory course in physical chemistry (C363) was extensively modified and the instrumental work in C410 was enhanced by including more advanced instrumental work. This permitted the course to be shortened from a four credit hour to a three credit hour course.

In both 1961-62 and 1962-63 considerable progress was made in starting and completing new facilities. This included in the later year a 50-50 matching grant of $25,000 from the NSF to buy equipment to modernize instruction in general chemistry, analytical chemistry and organic chemistry. An award of $50,000 in academic equipment funds was used to enhance the teaching laboratories ($5,000), the research facilities mostly for new faculty ($25,000) and the facilities for shops and departmental offices ($20,000). In 1961-62 a new laboratory to provide space for one of the NMR spectrometers was constructed in an offset (stairwell). The next year further equipment was procured to improve the NMR and EPR facilities. In 1961-62 equipment for the preparation of liquid nitrogen was installed. The cost was approximately $14,000. Prior to this time such nitrogen was purchased. In the summer of 1962 the basement of Wylie Hall was remodelled for chemistry research and offices. The changes provided space for Bonham and two new members of the faculty (Cordes and Montgomery). The degree of shortage in space by 1961-62 was indicated by the fact that seven professors were sharing office space with non-academic staff members and students.

In the category of "Research started, completed or significantly advanced during the year" in the department's annual report for 1962-63, a special note of commendation was made of the start that had been
made by Peters, Cordes, and Montgomery. Among those identified in 1962-63 for significant advances were Schaeffer for discovering a new and strikingly simple general synthesis of boron hydrides and Campagne for success in synthesizing dithiolium salts. In the report for 1961-62 Mahler and his group were judged to be noteworthy for investigations of the mode of action of dehydrogenases and the Schaap group was cited for providing important new theory and information in polarography and in the nature of non-aqueous systems.

The annual report for 1961-62 specified that approximately 80 lectures and papers at scientific meetings were given by faculty members and their students during the year. Those who gave more than one lecture by invitation away from the university included: Bonham, Campagne, Carmack, Day, Haurowitz, Fischer, Mahler, Schaap, Shiner, Shull, Thoma, and Wenkert. In the 1962-63 report it was recorded that 11 different faculty members gave lectures on research at about 40 different locations.

For a decade or more virtually every year one or more faculty members had received significant honors. In 1961-62 Haurowitz was made corresponding member of the Deutsche Gesellschaft f. Hygiene u. Mikrobiologie. Also, he was vice-president of the Division of Biological Chemistry of the ACS. In 1962-63 he was President. In 1961-62 a major honor was the granting of a Research Career Award to Mahler by the NIH. This was to continue throughout his scientific life with the salary being paid by the NIH. In 1962-63 I.U. gave Schaap the Ulysses G. Weatherly Award for outstanding teaching and Joseph DiSalvo the Teaching Associates Award. Wenkert accepted an invitation to be a Fulbright Lecturer in France.

During the early 1960s as well as in the 1950s there were various conferences and institutes sponsored by the department. These included an Institute for High School Teachers of Chemistry in the summer of 1961 and 1962 which was supported by the NSF. A related Research Participation Program for College Teachers was conducted in the summer of 1962. As usual the department participated in the NSF Summer Institute for High School Students. Nine students did research under chemistry faculty supervision in 1962 and seven participated in 1961. In June 1961 the department hosted the 17th National Organic Chemistry Symposium which attracted over 1000 chemists. The local cochairmen were Campagne and Shiner. The next year, in July, the National Inorganic Chemistry Symposium was hosted by the department. Schaap was in charge of local arrangements.

In the early 1960s at least a majority of the faculty rendered significant public and professional service. Not less than seven participated actively as members of consultant groups or panels of federal agencies such as Air Force, Office of Scientific Research, NSF, NIH, etc. Four or
more served as members of editorial boards of scientific journals. Nearly all refereed papers for such journals. Two (Campagne and Day) were Visiting Scientists in a program sponsored by the ACS and funded by the NSF. The former was active in the Division of Medicinal Chemistry and the latter in the Division of Chemical Education. Shull organized the first Gordon Conference on Quantum Mechanics. The department had come of age.

**Retirement Dinner for H. G. Day**

The faculty members with spouses, joined together in the Federal Room of the Union Building on 17 November 1963 for an honorary dinner in recognition of “Harry G. Day’s Service as Chairman of the Chemistry Department, 1951-1962.” It was a pleasant, relaxing evening of good fellowship and conversation with Shiner presiding and brief talks by several including Campagne, Gucker, and Haurowitz. A high quality camera was presented to the Days. Following the occasion, Day wrote to Shiner, “I do not feel that there was need for it but I am nevertheless grateful and I will always remember it with gratitude.” The printed program included the names of all the active and retired faculty and the new chemistry librarian. All present autographed a copy of the program. They were Bair, Billman, Bonham, Campagne, Carmack, Cordes, Fischer, Gucker, Hagstrom, Haurowitz, Kaslow, Mathers (retired), Merritt, Meyer, Montgomery, Moore, Nebergall, Peters, Schaap, Schaeffer, Schmidt, Seifert, Shiner, Shull, Thoma, Wenkert, Zamnik (Librarian). Three others were absent.

The department continued to move forward.

**References**

Major sources of recorded information were the author’s personal files and the files of the department’s Archives/Alumni office. Specific sources were the minutes of chemistry faculty meetings, reports of chemistry committees, annual reports of the departmental chairman to the dean of the College of Arts and Sciences and to the Committee on Professional Training of the American Chemical Society. There was extensive reference to the departmental and personal correspondence files. In addition there was considerable reliance on the extensive Archives/Alumni Office files of excerpts from the *Indiana Daily Student* and related publications that reported some news concerning the Department of Chemistry. The University Archives continued to be a good source of information.
Chapter X

Overview: 1962-92

Informed recording and surveying of the current scene, as well as events and concepts of the past, give substance for judicious planning. And it enriches intelligent living. But, in general, judgments need to remain tentative until time and consequences have thoroughly tested their relevancy and validity.

Over recent decades the multitude of events and involved persons has been so great it has been necessary to be more selective in naming persons, events, and even programs, than in previous chapters. The first known particularly meaningful judgment on chemistry at this university was recorded and transmitted to the authorities by T. A. Wylie in 1838 after he had been here one year. He requested the "erection of a suitable building" where teaching could be "experimental illustration" (T. A. Wylie, Indiana University from 1820 When Founded to 1890). His request was promptly granted, and for the first time, in 1840, the tiny university had a chemistry and physics laboratory.

In sharp contrast with this limited beginning, in 1988, Chairman Grieco reported:

"For the third year in a row, the Indiana University Chemistry Department (IUB) has awarded more Bachelor's degrees in chemistry than any other university in the United States. Graduate student enrollment, while not the largest in the country, ranks consistently among the top twenty schools in the nation."

Three years later, as reported in Chemical and Engineering News (20 May 1991),
"Last year was the sixth year in a row in which Indiana University produced the most B.S.-level chemistry graduates."

Moreover the same news report stated that in 1991:

"The University of Illinois, Urbana-Champaign; Indiana University; and Ohio State University had the only three departments to appear on last year's top 25 rankings for all categories — bachelor's, certified bachelor's, master's, and Ph.D."

This overview is intended to knit some of the long past events and thoughts with those of the current decades, thus hopefully linking everything into a meaningful whole.

CHAIRMEN

During the past three-decade period the department was chaired by six different persons all of whom had held full time chemistry teaching and research responsibilities before receiving the added responsibilities of administrator. They were: V. J. Shiner, Jr. (1962-65, 66-67), H. Shull, acting chairman (1965-66), R. Schaeffer (1967-72), E. H. Cordes (1972-78), A. Allerhand (1978-81), Shiner (1981-88), and P. A. Grieco (1988-). The first four were appointed to the faculty during the chairmanship of H. G. Day (1951-62). Four others served as chairman from 1938-51: H. T. Briscoe (1938-41), R. L. Shriner (1941-46), F. C. Mathers (1946-47), and F. T. Gucker (1947-51). From 1895 to 1938 the slowly emerging department was under the firm headship of R. L. Lyons. This 43-year period contrasts strikingly with the 4.5 year average service of the other 12 persons who followed Lyons. The latter's years as head of the department were about the same as the combined years of service for the first ten persons who followed him!

Each one of the chairmen since 1938 had national prominence in their fields when appointed and each continued productively in research and/or teaching while performing his administrative and other service responsibilities in the university. Shiner was dean of the College of Arts and Sciences from 1973 to 1978. Shull was dean of the Graduate School, from 1965 to 1972 and he served in other significant capacities before he left this university to serve elsewhere. Likewise, Schaeffer and Cordes left their administrative positions here to hold major responsibilities elsewhere. In his short chairmanship Allerhand fortunately aroused widespread desire (even demand) for the provision of far more learning and research space for chemistry. With emphasis, his was a demand for extensive enhancement of safety and utility throughout the chemistry facilities. Again Shiner, during his second period of service in the chairmanship, became successfully involved in a remarkably extensive
program of construction and rebuilding of the facilities for chemistry on
the Bloomington campus. This was continued throughout Grieco’s first
term (1988-91) and it extended into his second.

ASSOCIATE CHAIRMAN

The appointive position of Associate Chairman was initiated with
the beginning of Grieco’s first term. The appointment was given to Dennis
Peters, the H. T. Briscoe Professor in the department since 1974. His
principal responsibilities centered around chemical education in the de­
partment, including curriculum, teaching assignments, teaching labora­
tory facilities, and general assistance in departmental administration. He
also had a good national reputation in research. His teaching effectiveness
and stimulation of others in teaching was already being noted through
prestigious recognitions. For example, in 1988 he was the recipient of
the Chemical Manufacturers Association National Catalyst Award in
tribute to the quality of his teaching.

This feature of restructuring the departmental administration was
instituted nearly four decades earlier by establishing the position of an
administrative assistant in the chairman’s office. This assistant was re­
sponsible for much of the important and time-consuming duties of these
administrative offices.

POLICY COMMITTEE

In 1988 the Policy Committee, an advisory body for the chairman,
was restructured to consist of five members, representing the five disci­
plines of the department: analytical, biochemistry, inorganic, organic,
and physical chemistry. Each member serves a two-year staggered term
and the chairman and associate chairman are ex officio on the committee.
Formerly the three member committee was elected at-large by the entire
chemistry faculty; in the reorganization each discipline elects its repre­
sentative.

Prior to 1962 the departmental mechanism for advising the chair­
man, and for exchanging views, was through frequent chemistry faculty
meetings. Indeed nearly all departmental decision making occurred
through such meetings. But through a process of discipline representation
it was felt that the advisory role of the policy committee could be effective
in maintaining departmental administration.

THE CHEMISTRY FACULTY

During the latter decades of the twentieth century both the net
number and diversity of the faculty substantially increased. For the first
time in the history of the university an Afro-American, Albert Yates,
PhD'68, was appointed to the regular faculty in 1969. Also, three women with promising credentials were appointed: Judith A. K. Harmony (biochemistry) in 1976(-1980), Joyce Heckman (biochemistry) in 1981(-1988), and Alexandra Newton (biochemistry) in 1988. The only other woman ever appointed to the regular faculty was Mary Bidwell Breed, 1901-06, who also served as part-time Dean of Women (the first in this office).

The accompanying tables list the regular full time faculty members on the Bloomington campus faculty in 1962-63, 1972-73, 1982-83, and 1991-92. Those included in any of the first listings and not appearing in subsequent tables are absent owing to resignation, retirement, or death.
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Chemistry Faculty with Distinguished Academic Rank: By the late 1980s an impressive proportion of the chemistry faculty had been awarded notable titles beyond professor. The first such recognition was to Felix Haurowitz in 1958. In 1974 he was the recipient of an honorary DSc degree from I.U. The rate of increase in proportion during this interval appeared to be larger in chemistry than elsewhere in the university. During the 1980s it was notable. In 1982-83 five percent were in chemistry, then 7 percent in 1988-89, and in 1990-91 it was 8 percent. As indicated in the following table on academic distinctions, during a 15 year period four of the faculty resigned to accept more attractive appointments elsewhere.

Chemistry Faculty with Academic Distinctions Beyond Professor

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<td>Hayes, John</td>
<td>Distinguished Professor</td>
<td>1990</td>
</tr>
<tr>
<td>Hieftje, Gary M.</td>
<td>Distinguished Professor</td>
<td>1985</td>
</tr>
<tr>
<td>Kochi, Jay Kazuo**</td>
<td>Earl Blough Professor</td>
<td>1975-84</td>
</tr>
<tr>
<td>Magnus, Philip**</td>
<td>Distinguished Professor</td>
<td>1988-89</td>
</tr>
<tr>
<td>Mahler, Henry R.*</td>
<td>Research Professor</td>
<td>1966</td>
</tr>
<tr>
<td>Moore, Walter John**</td>
<td>Research Professor</td>
<td>1963-74</td>
</tr>
<tr>
<td>Novotny, Milos</td>
<td>Rudy Professor</td>
<td>1988</td>
</tr>
<tr>
<td>Parmenter, Charles S.</td>
<td>Distinguished Professor</td>
<td>1988</td>
</tr>
<tr>
<td>Peters, Dennis</td>
<td>Briscoe Professor</td>
<td>1975</td>
</tr>
<tr>
<td>Shull, Harrison</td>
<td>Research Professor</td>
<td>1961</td>
</tr>
<tr>
<td>Viola, Victor, Jr.</td>
<td>Distinguished Professor</td>
<td>1990</td>
</tr>
<tr>
<td>Wenkert, Ernest**</td>
<td>Briscoe Professor</td>
<td>1969-74</td>
</tr>
</tbody>
</table>

*Deceased
**Resigned
***Retired

All the listed faculty members received other recognitions, and various others were notable and so recognized in other ways.

In November 1989, in the Tudor room of the Indiana Memorial Union, a large gathering was hosted by the Indiana University Foundation. The purpose was to honor the “Enduring Excellence” of many special faculty who spend their lives teaching and advancing knowledge, and on the myriad individuals and organizations that make this possible.
Forty-six named professorships and fifty-four faculty endowments in the university were identified. Except for a faculty endowment at the Kokomo campus, all the others were for the Bloomington and Indianapolis campuses.

As indicated in the table above, three endowed professorships were in chemistry at Bloomington. The first, named for Herman T. Briscoe, became fully established in 1969. It was first awarded to Ernest Wenkert. Within a year after he left the university in 1974 the professorship was transferred to Dennis Peters who continues to be the recipient. Soon after its establishment, the second, named for Earl Blough (AB 1899), was awarded to J. K. Kochi in 1975. Within a year after he left the university, in 1984, it was awarded to Paul Grieco. The Professor James H. Rudy Professorships are all-campus in their application and prestige. Milos Novotny became a recipient in 1988.

In concluding this reference to the honoring of some faculty members it is especially appropriate to quote from the remarks made by Chancellor Wells:

"A university can have no greater asset than the talented persons who can find in the institution a congenial place in which to realize their own scholarly and personal goals."

**Basic Disciplines of Chemistry**

The major disciplines of chemistry in the department have been for half a century: Analytical, biochemistry, inorganic, organic, and physical chemistry. But many degrees of sustained and varying areas of specialization always exist both within the department and in conjunction with collaborative colleagues in other departments and schools.

**Major Disciplines:** In the last century and throughout much of the first half of this century analytical chemistry laboratory work consumed more of the student’s time than any other discipline. Through the development of instrumental methods of analysis, beginning primarily in the 1940s, it has become more closely integrated with the other disciplines of chemistry. In the last quarter of this century research in analytical chemistry here was so productive that it contributed much to the high national standing the department attained. Strangely though, in the 1950s there were feelings expressed by some that this area should cease to be recognized as a research discipline. Fortunately the counsel did not prevail.

Biological chemistry (biochemistry) came into the department in the 1940s, in part as a service to the School of Dentistry. A reorganization program in the School included the teaching of first year dentistry at the Bloomington campus. Naturally instruction in biological chemistry was
required. Concurrently the reorganization of this discipline of chemistry was underway. Day was appointed to provide instruction. He started a course designed for dentistry. Other courses for advanced undergraduates and graduate students occupied much of his time. Primarily he began research in biological chemistry. With the appointment of F. Haurowitz in the Department of Chemistry effective in 1948 much strength was introduced in biological chemistry. It flourished along with the other four basic disciplines.

Inorganic chemistry began to attain some standing in the department early in the century, particularly through the research of F. Mathers in electrochemistry. In 1918 he made a significant improvement in Moissan’s method for the isolation of elemental fluorine. Twelve years later he became President of the Electrochemical Society. A major surge in inorganic chemistry research occurred with the appointment of R. Schaeffer in the 1950s and M. Chisholm and others in the 1970s.

Organic chemistry attained deserved prominence here with the appointment of R. Shriner in 1941. Several other appointments in the 1940s and later proved to be decisive in giving strength. In 1980 a most comprehensive rebuilding of organic chemistry facilities in the department was completed. Concurrently P. A. Grieco and a few other very promising chemists joined the faculty. The rebuilding program was on the top floor of the 1930s building. The new laboratories and offices embodied the best features in safety provisions and conveniences. They provided ideal working space for about forty research personnel, including offices for five organic chemistry faculty members and a special instruments laboratory. The total cost of the remodeling of this area exceeded the cost of the entire 1930s building! President J. W. Ryan participated in the ribbon cutting ceremony when this new facility for synthetic organic chemistry was officially opened.

Physical chemistry was stimulated greatly in 1947 with the appointment of F. T. Gucker as chairman of the department. More stimulus occurred in 1952 with the activation of the appointment of W. J. Moore, and in 1955 when H. Shull joined the faculty. Others of notable importance came later. Probably the most impressive long range work was by Gucker and his associates in aerosols.

INTERDEPARTMENTAL PROGRAMS

In addition, there are specific interdepartmental programs which have existed for several decades. Within rational boundaries of science, academic administration, and legal restraints this is indeed a desirable circumstance.
In 1990 the specific interdepartmental programs were:

- Biochemistry
- Combined Degree in Medical Sciences
- Chemical Physics
- Environmental chemistry, biogeochemistry, and geochemistry
- Library Science

**Biochemistry:** In 1981 the State of Indiana Commission on Higher Education approved IUB for a BS in Biochemistry. In 1983 eight BS Biochemistry degrees were awarded through this department. In 1984 the number was 24. The remarkable subsequent increase in numbers of degrees awarded is evidence of the importance of the program. Also, the program had an expected impact in enrollments in analytical chemistry courses (C315, C317, C318) and in some other courses. Characteristic of the BS degree in chemistry, it was rigorous and it required 45 hours of chemistry, 10 hours of mathematics (M215, M216), and other strong courses. The new program was designed for students planning to attend medical or dental school, to do graduate work in biochemistry, or to seek employment in industry.

**Combined Degree in Medical Sciences:** This program was initiated in 1958 to give

"selected students an opportunity to pursue the M.S. or Ph.D. degree concurrently or sequentially, with a coordinated and flexible program leading to the M.D. degree."

The programs included biochemistry and several other disciplines. During the first few decades several students in the program elected to work toward graduate degrees in biochemistry at IU-B. After finishing the requirements for a graduate degree, and the prescribed medical courses at Bloomington, they then transferred to the Indianapolis campus to complete the many clinical courses for the MD degree.

**Chemical Physics:** This graduate program is managed by the Chemical Physics Committee. The basic requirements

"are either those of a major in physical chemistry with a minor in physics, or a major in physics with a minor in chemistry."

The dissertation research is under the direction of two persons; a member of the graduate faculty from the Department of Chemistry and one from the Department of Physics. The program has been available to qualified students since 1963.

**Environmental chemistry, Biogeochemistry, and Geochemistry:** This program of importance in chemistry is designed to introduce selected
students to current thought and research "on the nature, causes, and solutions of environmental problems." Clearly it is interdisciplinary, involving specifically the Departments of Chemistry and of Geology as well as the School of Public and Environmental Affairs.

Library Science: See Chemistry Library and Information Services.

SCIENTISTS BESIDES THE FACULTY

A gradually increasing number of scientists and other postdoctoral level persons became affiliated with the department for varying periods of time and they were integral parts of the work group, a few in teaching and nearly all the others were intensely involved in research. Essentially this began in small degree during World War II, but a minor movement in that direction started with Mathers in the early 1930s. He arranged for one student, R. D. Blue, to receive a small industrial stipend for the continuation of his research after his PhD degree was granted in 1932. The sustaining movement started with Shriner who accepted a few newly graduated chemists to devote full time to pressing war research problems. Occasionally, even then a few were indeed mature scientists. Overall their presence and active participation in research, and contacts with younger workers, had a widespread enriching influence.

By 1970 it was common to have 25-35 postdoctorals in the department per year.¹ The number participating with individual faculty members varied greatly. A special case was E. Wenkert who, in 1972, had seven such workers in his group at one time. Other faculty members who had one or more postdoctoral workers in the 1960s included: Campaigne, Carmack, Gucker, Haurowitz, Kochi, Mahler, Merritt, W. J. Moore, Shiner, and Shull.

In the first semester of 1990-91 there were 44 research associates (postdoctorals). They were distributed as follows between the five basic disciplines in the department: analytical 10, biological 7, inorganic 7, organic 11, and physical 9. The following table lists all the research associates in early 1990-91 and the faculty members with whom each was associated:

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¹ In 1971-72 there were 37 such workers and they were associated with 16 different faculty members. The workers were coauthors of at least 30 scientific publications from the department that year.
The roster of generally more senior short-term appointee scientists in the department in 1990-91 reflects the extent of growth and diversity through the 1980s. They included:

(a) Associate Scientists. K. E. Gilbert in organic chemistry and B. Jemiolo in analytical chemistry.

(b) Visiting Scientists. T. Iwata in analytical chemistry, G. Z. Ju in physical chemistry, and E. Lobkovsky in molecular structure.

(c) Adjunct Professors. O. Eisenstein in inorganic chemistry, M. Marsh in biochemistry, W. J. Moore in physical chemistry, and A. Sattelberger in inorganic chemistry.

(d) Faculty Lecturers. G. Hanania in elementary chemistry lectures and laboratory, K. Pressprich in elementary chemistry lectures and laboratory, L. Townsend in experimental chemistry, and R. Barbieri in elementary physical chemistry.

Naturally this large group of specialists with diverse abilities and interests constantly enriched the department and other areas of the university. The total number over the last three decades must have been about 750!

**Visiting Industrial Professorship Program**

A particular form of interaction in the department was initiated in 1968-69 through the Visiting Industrial Professorship Program. This was intended to be mutually beneficial whereby the visiting scientists were
academically renewed and the wide range of students and faculty he/she contacted gained insights of industrial point of view and expertise. As stated by then chairman Schaeffer, the program was to help

"convince the student(s) that good science can be carried out in an industrial environment and that the problems met in industry are at least as challenging as those studied in school" (AIUC Newsletter Fall 1969).

He further pointed out that basically in the program the visiting professors will hold their positions in industry, but will spend at least a week at a time on campus at frequent intervals during a five-year period.

The first visiting industrial professor was Harold H. Zeiss, BS'38. He was then president of Monsanto Research in Zurich, Switzerland. During his first year Zeiss visited here one week at a time in October, February, and April. In the first week he lectured to classes three times (twice to freshmen) and "spent much of his time in informal conversation with faculty members and graduate students." Other visits were similar.

By 1972 four chemists employed by chemical manufacturing companies had been appointed each for five years to visit and contribute to the department in general accordance with the pattern practiced by Zeiss in his first year. The other three appointees besides Zeiss were: Jack Fraser of Lawrence Livermore Laboratory, Max Marsh (BS'47) of Eli Lilly and Company, and Harmon Brown of Varian, Inc. It happened that during Fraser’s tenure he was selected to receive the ACS Award in Chemical Instrumentation.

By 1976 the industrial visitors included eight scientists whose visits to the department were staggered during the year and all of whom lectured at least once per visit. They were:

J. W. Fraser
T. Hirschfeld of Black Engineering
J. Hoeschele of Oak Ridge Laboratories
C. Morgan of W. R. Grace and Company
N. Calderon of Goodyear Tire and Rubber Company
J. McDonald of Kettering Research Laboratories
R. Bader of Aldrich Chemical Company
McConnell, M.M. McConnell of Chromatix Corporation

The program continues, but with fewer participating scientists.

MAJOR CHEMISTRY FACULTY RESPONSIBILITIES ELSEWHERE IN THE UNIVERSITY

From the earliest years of H. B Wells’ presidency the Department of Chemistry was called on to give assistance in university administration. This began in 1937 with the service of H. T. Briscoe on the three-person
Self-Survey Committee. This soon led to the establishment of the office of the dean of the faculties for this university in 1940 with Briscoe serving as the first dean. Then in 1951 F. T. Gucker was appointed Dean of the College of Arts and Sciences where he served until 1965. Later V. J. Shiner, Jr. served in this position from 1973 to 1978.

In the meantime L. L. Merritt, Jr. began many years of administrative service in 1959, first as Associate Dean of the College of Arts and Sciences. Later in 1962 he was transferred to the office of Dean of the Faculties as the Associate Dean. In the same year W. B. Schaap succeeded him as Associate Dean of the College of Arts and Sciences. Also, H. Shull, after serving briefly as Acting Dean of the Graduate School, in 1966 became the dean of that school.

A special responsibility for Merritt began in February 1965 with the establishment of the Office for Research and Advanced Studies. He was Vice President and Dean of the new office. Also, he was director of the Bureau of Institutional Research whose functions were closely related to the new office. In the Office for Research and Advanced Studies Day was the Associate Dean from 1967 to 1972.

Later, with the redistribution of some of the responsibilities of research administration in the university, the Office for Research and Development was established in the early 1970s to focus on such responsibilities at Bloomington. Shull was in charge under the title of Vice Chancellor for Research and Development (1972-76). Day was assigned to this new office in 1973 but, because he was past the retirement age for regular administrative service, his title was Special Assistant to the Vice Chancellor for Research and Development. He continued in that office until 1976 when he fully retired from the university. However, during 1977-78 he served as acting chairman of the Department of Home Economics.

Schaap's responsibilities in the College of Arts and Sciences ended in 1972 when he was transferred to the office of the Dean of the Faculties as Associate Dean. His functions there focused on budgetary administration and planning. Finally an office for this responsibility was established in 1973 and he was made Dean for Budgetary Administration and Planning in 1976. He also served during the summer of 1980 as Acting Vice President for the Bloomington campus.

In essence, during the approximately fifty-year period from 1940 to 1990, seven members of the chemistry faculty (Briscoe, Day, Gucker, Merritt, Schaap, Shiner, and Shull) served varying periods of time in university administration.

Finally, during most of the 1980s and early 1990s Merritt gave much service at the Northwest campus in teaching chemistry. Also during the latter half of 1982 and the first half of 1985 he was Acting Dean for Academic Affairs at Northwest. Subsequently he served as acting chair-
man for Data Processing and Information System at Northwest. Also, during the late 1970s and much of the 1980s he was Special Assistant to the President in various services.

**NAMED FACULTY LECTURESHIPS**

The Named Faculty Lectureships and the Program of Distinguished Lectures are closely related. The special recognition of selected faculty members was begun in 1969 through the gift of an alumna who anonymously wished to honor Professor Emeritus F. C. Mathers. This action was soon augmented by gifts from others after it was determined in the department that a Frank C. Mathers general lectureship should be established. The first lecture was given in 1970. This was followed almost annually. Fortunately Professor Emeritus Mathers lived long enough to attend the first three lectures. It was especially appropriate to begin the lectureship program by honoring Mathers, in part, because he was also a firm practitioner in attending lectures and seminars, whether in chemistry or elsewhere on campus or in the community.

A second near annual lectureship was established in 1974 in memory of Professor Emeritus F. T. Gucker who died the year before. This also was made possible through the gifts of alumni, friends, and relatives. This lectureship was to focus on physical chemistry.

The Professor Emeritus Harry G. Day Lectureship was started in 1987. Friends contributed to the endowment which specified that the lectureship should focus on biochemistry.

The fourth and fifth lectureships honoring faculty were announced during the dedication ceremonies for the 1988 Addition to the Chemistry Building. These were designated to honor Professor Emeriti E. E. Campagne and M. Carmack and both were to be in organic chemistry. Many friends of the honorees and department participated in the establishment of the endowments. Unfortunately the fund raising for all five lectureships terminated before any became comfortably adequate. But each contributed well in strengthening the department.

The following select listing of recent lecturers and lecture topics in each lectureship illustrates the diversity and deep strength of the program:

*Frank C. Mathers*

Roald Hoffman (Cornell U.) 8-10-90 "Making and Breaking Bonds in the Solid State."

Alan R. Fersht (Imperial College of Science and Technology of London U.) 30-10-86 "Protein Engineering of Enzyme Structure and Activity"

Harry C. Gatos (MIT) 22-4-83 "Composition-Structure-Electronic Property Relationships in Semiconductors." (Gatos was one of Mathers’ prize students in the 1940s.)
Frank T. Gucker
Richard E. Smalley (Rice U.) 28-3-91 “Cass: Chapter II.” (As reported in the AIUC Newsletter of August 1991, it “was exciting to all chemists.”)
Richard R. Ernst (ETH-Zurich) 3-3-88 “Elucidation of Molecular Structure and Dynamics by Two-Dimensional NMR.”
Frank H. Stillinger (AT&T Bell Labs) 1-1-87 “Order in the Face of Chaos: Inherent Structure in Dense and Reactive Media.”

Harry G. Day
John Suttie (U. Wis.) 19-10-90 “The Role of Vitamin K-Dependent Gamma-glutamyl-carboxylation in Blood Coagulation.”
Hector F. DeLuca (U. Wis.) 24,25-3-87. (1) “The Vitamin D Endocrine System: From Basic Science to the Clinic”; (2) “The Molecular Mechanism of Action of 1,25-Dihydroxyvitamin D_3.”

Ernest E. Campaigne
Ronald Breslow (Columbia U.) 4-3-91 “The Chelate Effect in Binding, Catalysis, and Chemotherapy.”
Albert I. Meyers (Colorado St. U.) 18-10-89 “Asymmetric C-C Bond Forming Reactions.”

Marvin Carmack

Other Special Recognitions by Indiana University

Several forms of recognition for some chemistry faculty members have been employed by the university over the years. The most notable historically were the naming of the first two major buildings in 1885, at the time of their construction. These were (a) Wylie Hall for T. A. Wylie, the first long-term teacher of chemistry, and for his cousin A. Wylie, the first president of the university; and (b) Owen Hall for Richard Owen, also an early teacher of chemistry, and for his brothers Dale and Robert Owen. The third naming of high significance was in 1965 when the then new Briscoe Quadrangle was given that designation in memory of H. T. Briscoe both for teaching chemistry and for other outstanding accomplishments. A fourth major naming was in 1983 when one of the two principal towers of the Briscoe Quadrangle was named the Frank T. Gucker Hall for this man who contributed much to chemistry and the university.

A more recent recognition was in 1990 in the designation of the newly-remodeled chemistry auditorium the Harry G. Day Lecture Hall. On the same occasion President Ehrlich presented Day the President’s Medal for Excellence.
Two honorary degrees have been given to chemistry faculty. The first was to Felix Haurowitz, an ScD degree in 1974 for outstanding research and international recognition. The second was to L. L. Merritt, Jr., in 1988 for broad range and meritorious service to the university.

**SEMINARS, COLLOQUIA, DISTINGUISHED LECTURE Programs**

Since at least the early 1940s seminars and lectures by visiting chemists have been integral to the exchange of specialized information and stimulation of significant ideas and understanding. Developments in the utilization of this mode of exchange progressed decade by decade. The forms it took were greatly varied ranging from bench-side discussions of serious import to large assemblies of a few hundred persons to hear distinguished lecturers. But always there was the exchange of questions and responses and the stimulation of ideas.

By 1990 the scope of “Our Colloquium Program” was well reflected in the leaflet that year which announced the *DuPont Distinguished Lecture Series in Chemistry 1990/91*:

“...the Department of Chemistry at Indiana University offers a variety of lectures and specialized seminars throughout the academic year. In 1990-91 the Frank C. Mathers Lecture (in all areas of chemistry) and the Harry G. Day Lecturer (in biochemistry) will be given in the fall and the Frank T. Gucker Lecture (in physical chemistry) will be given in the spring. The Ernest E. Campagne Lecture (in organic chemistry) and the Marvin Carmack Lecture (in organic chemistry) will be given in alternate years.”

A significant representation of foci of thinking and research activity in chemistry here and in other major institutions is reflected in the names of the nine different lecturers and their topics for the DuPont Distinguished Lecture Series in 1990-91:


*William H. Orme-Johnson*, MIT. Metallobiochemistry and genetics of Assembly of Nitrogenase

*Marye Anne Fox*, U. Texas - Austin. Controlling Electron Transfer in Organic Media

*James D. White*, Oregon State U. Some New Developments in Synthesis Methodology and Their Application to Natural Products
Robert Bell, Duke University Medical Center. Lipid Breakdown Products and Cellular Regulation
Harry F. Noller, U. California-Santa Cruz. Ribosomal RNA and Translation
Lord Jack Lewis, FRS, Cambridge U. Metal-Metal Bonding in Inorganic Chemistry

Each week nearly every day at least one seminar is held within a discipline or other specialized group. Many of the speakers are workers in the department or from other institutions or industries.

LIBRARY AND INFORMATION SERVICES

It is apparent that throughout all the century and one-half of chemistry at Indiana University — and emphasized by the scholarly T. A. Wylie — chemistry here has been in the forefront in trying to use its resources well in satisfying library needs. But not until the 1940s was it possible to have a staff person primarily responsible for the supervision of the meager chemistry library. Not until Shriner became the chairman, in 1941, was it possible to relieve the departmental secretary of the responsibility of devoting some attention to library supervision!

The department has been fortunate in having excellent chemistry librarians during the intervening years. A brief but valuable informative article on the chemistry library and the beginning of information services is in the November 1977 issue of the AIUC Newsletter.

The Chemistry Library was extensively renovated and markedly enlarged following the completion of the 1960s Chemistry Addition. The "new" library occupied a large proportion of the west quarter of the ground floor of the 1930s building. Perhaps the relative commodiousness of the space was greater than the department will experience in the foreseeable future. John Knego was Director of the Chemistry Library during those years of beneficial change. He was succeeded early in 1976 by Gary Wiggins.

Unfortunately substantial degrees of vandalism and some theft occurred in the Chemistry Library and various places on campus during the wave of activism that swept this campus and others during the late 1960s and early 1970s. Stealth of books and removal of pages of some books was grievous. A consequence of such behavior was the necessity of imposing strict monitoring of the entire library. Of course this affected the operating costs as well as the availability of the facility.

A major beneficial development in the 1970s was the creation of a strong Chemical Information Center. In 1977 the Center had produced several self-tutorial audiovisual presentations on procedures for use of major reference sets such as Chemical Abstracts, Beilstein, card indexes, etc. Many other services were already offered.
Also, the Center offered training and information on customized searches. This new program was used by various persons, who were benefited, and it provided excellent training for students working in the Library under excellent supervision. These services, and the rapidly growing library quickly used the available space and again it was necessary to make contingency plans for getting along in limited quarters.

The interdisciplinary Master of Science - Information Specialist (Chemistry) program was substantially expanded in the late 1970s. This included the use of three chemistry department courses in the new area of chemistry information. The degree program required the equivalent of a 25-hour AB in chemistry.

By the middle of the 1980s the Chemistry Library facilities for literature searching had advanced to the degree that it was possible for unlimited searching of both the bibliographic and the structure files of Chemical Abstracts for an annual fee of $6000 for this special service.

**UNIVERSITY SCIENCE DEVELOPMENT PROGRAM**

In the middle 1960s this university received a major grant from the National Science Foundation under its University Science Development Program (the “center-of-excellence” program). It was specified that

"the basic award of $3,786,000 is to be used to strengthen the physical sciences including especially chemistry, chemical-physics, and physics." (Shiner, Fall 1967 AIUC Newsletter).

The national inception of the overall program was in 1964 and it continued until 1971.

As stated by then chairman Shiner (loc.cit.):

"The award will be used principally to finance acquisition of major equipment items and to accelerate the addition of faculty and non-academic staff. A large university contribution will go mainly to provide building expansion, indirect costs, and additional equipment. The program is designed to compress ten years of normal growth into five — The chemistry department expects to spend, from all sources, about $1,500,000 on equipment during the first three years of the grant and then to maintain annual equipment expenditures thereafter at about $350,000 plus increases each year for normal growth."

In his summary report to the university then Chairman Schaeffer concluded in a letter to Associate Dean Schaap (Dec. 14, 1971):

"A major effect of the Science Development Grant has been the substantial upgrading to a newly modern level of the physical equip-
ment within the Department. Equipment additions have been possible not only through the substantial basic funding from the Science Development Grant, but also through vigorous search for additional funds from outside the university as well as capital funds provided by the university budget in line with the earlier commitment. Expansion of our nuclear magnetic resonance facilities, X-ray facilities and computing operations have been of great benefit in advancing the technical capabilities of the Department."

In this submission for the university’s final report, Schaeffer emphasized that the increasing space shortages of the department greatly hampered the best utilization of the additional funding.

The university’s final comprehensive report to the NSF on the Science Development Grant was dated October 1, 1975 (Chemistry Archives, file room). The total report was 153 pages of which the distribution in pages was: Chemistry, 95; Computer Science, 9; Physics, 30; Cyclotron Project, 15.

Virtually all areas of chemistry were affected, but the least effect was on biochemistry. Perhaps the greatest obvious effect was the emergence of the Molecular Structure Center. It began with the virtually total renovation of the large Quonset hut immediately east of Owen Hall and the extensive refurbishing of the Center with state-of-the-art equipment and safety features in the operation of the equipment. Both grant funds and university funds were extensively used in this development.

In spite of the severe space limitations which continued to increase, seven new chemistry faculty members were appointed at the height of the surge made by the Science Development program. These were effective in 1969-70. They were K. Caulton, J. Hayes, G. Hieftje, J. Kochi, P. Langhoff, R. Roberts, and A. Yates.

The program for Science Development was of inestimable value to chemistry in various ways. This surely included the attraction of more promising students, stimulation of faculty and staff, and the net enhancement of teaching, learning, and advancement of research.

**NON-ACADEMIC STAFF: DIVERSITY, DEVELOPMENT, RECOGNITIONS**

The department became increasingly dependent on non-academic personnel essentially since the 1940s. This increased especially due to the mounting need for technological skills and understanding in nearly every phase of involvement in teaching and research, record keeping, communication, computation, operation of equipment and designing, construction, and maintenance of special apparatus and equipment. Jack Baird (Machine shop - 1947), Earl Sexton (Glass blowing - 1950) and Arthur Clouse (NMR - 1960) were the first three technologists to serve in these capacities. By 1990-91 over 19 were in these roles and over 60
were in the other categories of full time non-academic personnel. When Shriner became chairman in 1941 the total number of nonacademic staff was less than 10. When Grieco was appointed in 1988 it was over 80.

The coordination and supervision of this diverse and specialized staff, under the chairman, evolved from Assistant to the Chairman in 1948 to Director of Laboratories in 1979. With the transfer of R. B. Fischer (faculty) to California in 1963, C. E. Kaslow served as assistant in charge of non academic staff until 1969. He was succeeded by William Streib who served in this part time role until 1979. With his transfer to full time responsibility in 1979 in the program of the Molecular Structure Center the position became full time under a Director of Laboratories. The first in this category was James Waters from the University of Illinois. After one year he left and in 1980 James Allen became the Director of Laboratories (and overall Director of Business Affairs). He had been the Officer-in-Charge of the Naval Ammunition Production Engineering Center at Crane, Indiana.

The development of comfortable understanding of the department and of each person's role in it took various forms. One action was the periodic and brief noon-time luncheon seminars of staff members beginning in 1977 which were addressed by the chairman and several different members of the faculty and staff. The topics focused on the general nature and purposes of research and other activities in the department. Unfortunately the meetings were finally discontinued.

Another activity of continuing interest was the Annual Staff Award for Outstanding Service. This was initiated in 1978. The first awardee was Earl Sexton and it occurred at the departmental Honors Banquet in April that year. The citation stated in part:

"This Award recognizes not only your technical abilities but also your contributions to the development of other glass blowers. Finally your helpful and constructive attitude and your ability to interact constructively with faculty, students, and staff has contributed much to your overall impact in the Department."

The Sexton years came to an end in 1980 when he retired owing to his age but not with a cessation of glass blowing. He blew glass at home as a hobby and produced marvelous specimens of glass objects such as birds. His successor as head glass blower was Donald Fowler, whom he had trained as a youth just graduated from high school. Fowler was hired in 1959. In 1984 he was cited for 25 years of valuable service, and in 1985 received the Award for Outstanding Service in the department.

John Dorsett, head of the departmental machine shop, was the second recipient of the Award for Outstanding Service. This was owing
to his "diverse creative skills and dedication to his work." The presentation was at the Honors Banquet in 1979. He became a member of the machine shop staff in 1963.

In 1980 the annual award was divided between two women, Patricia Stapleton and Patricia Chambers. This also occurred at the annual Honors Banquet. Chambers was employed in the Chemistry Business Office in 1962, four years after it was started. From 1966 to 1976 she served as Graduate Office secretary. Then in 1976 she became a computer data processor responsible for business office records. Stapleton joined the secretarial staff of the Graduate Office in 1975.

Shirley Humphrey was the recipient of the award in 1981. This was in recognition of her outstanding service through the 23 years she had served in the department. Initially she was secretary to the department's Director of Laboratories, R. Fischer. The Business Office gradually developed from that beginning in 1958.

The 1982 awardee for outstanding service was Ron Withnell, Director of Technical Services. The presentation was made at a special afternoon service, with refreshments, and attended by many more staff members than had been occurring at Honors Banquets.

The next presentation, in 1983, was shared between Betty Grubb and Clarice Moser. At that time Mrs. Grubb was research secretary to E. Bair, R. Bonham, J. Reilly, and V. Viola whose offices were in Wylie Hall. She joined the chemistry staff in 1964. When Mrs. Moser received the award she was research secretary to the inorganic chemistry group which included: K. Caulton, M. Chisholm, G. Christou, L. Todd, and R. Wentworth. She first joined the chemistry staff in 1961.

In 1984 Stephen Studley was the recipient of a special honor, the campus-wide university "Staff Member of the Year" award. It consisted of a plaque and $500. At the time he was a mass spectroscopy technician in the research group headed by J. Hayes. He joined the chemistry staff in 1970.

Also in 1984 Shirley Humphrey and Fred Hardy were honored on their retirement with special departmental receptions attended by many faculty, students, and friends. Hardy was also the recipient of the department staff award in 1984. Humphrey began her 26 years of service in the department, in 1958, as secretary to the Director of Laboratories (then R. Fischer). During her last several years she was the well-known payroll clerk. Hardy started in 1946 as a stockroom helper. Then from 1951 to 1961 his primary duties were as an assistant in preparing and conducting lecture demonstrations. During the next 19 years in the department he was assistant to the director of laboratories. Finally the last four years, in the total of 38, his title was (non-technical) supervisor of physical facilities in the department.
In 1986, the year she retired, Betty Beard was the recipient of the Outstanding Staff Award for Outstanding Staff. She had completed 22 years of service in the department at retirement.

In 1987 the Outstanding Staff award was presented to both Robert Ensman and Robin Nordstrom. Ensman had begun as a graduate student under the direction of L. L. Merritt and began work on instruments in the department at that time. In 1963 he was appointed as instrument maker and continues in that capacity. Robin Nordstrom, in 1990 received the campuswide Staff Award in the service-maintenance category. The citation was for meritorious service. She heads the large duplicating services of the department. Nordstrom began in the duplicating office while she was still a student.

Helen (Holly) Willett was the recipient of the Outstanding Staff Service Award in (April) 1988. It was presented by Chairman Shiner. Mrs. Willett had served as an academic adviser in chemistry and director of the Chemistry Placement program since 1976.

In May 1988 Elizabeth Greene was awarded the rare 45-year service plaque at the all university staff recognition ceremony. Presented by Ward Schaap "in recognition for long outstanding service." Three years later she was still rendering the high quality service.

A year later, in 1989, the Outstanding Staff Service Award was shared between Pat Burner, manager of the Chemistry Scientific Stores, and Elizabeth Greene, director of the Chemistry Archives/Alumni Office. The latter joined the chemistry staff in 1942 and the former in 1980. Each was cited for outstanding service.

In 1990 Larry Sexton and Kenneth Bastin were co-recipients of the annual award for Outstanding Service in the mechanical instrument services shop. They were employed in the shop in 1969 and 1971 respectively.

The Outstanding Service Award in 1991 was presented to Judy Johnson, business office manager. The citation referred to her professionalism, dedication, and cheerfulness. She was employed by the university in 1973, but she did not affiliate with the department until 1982.

Again, as stated by chairman Shiner in 1986, and it is applicable to all the non-academic staff members,

“We are very fortunate in having developed strong instrumental support for our research activities, and an especially dedicated and well qualified technical staff to maintain and supervise the use of our major instruments.”

Some Non-Academic Staff Retirements: Jack Baird, senior laboratory machinist, and Earl Sexton, senior glass blower, retired in 1969 and 1980 respectively. They had served in the department approximately 22 and 30 years. Sexton’s work began in 1946, in the general chemistry
laboratory stockroom. In any time that was available he perfected his rudimentary knowledge of glass blowing. Prior to coming to the department this knowledge had been acquired as a laboratory helper in the Department of Physiology. In the chemistry stockroom he had access to the department's very sparsely equipped glass blowing facilities in a corner of the stockroom area. By 1950 he was qualified to be responsible for all of the mounting glass blowing needs of the department. Baird and Sexton were the first specialists in their fields to serve the department.

Some other non-academic staff retirements in this time period included: Harvey Beck (Stores Helper) in 1974, Maurice Williams (Machine shop) in 1976, E. Marie McCoy (Chemical Stores) and Arthur Clouse (NMR) in 1980, Geneva Johnson (Business Office) and Donald Swafford (Machine Shop) in 1985, Betty Beard (Business Office) and Betty Grubb (Research Secretary) in 1986, and John Bill Miller (Machine Shop) and Ron Withnell (Instruments) in 1990. Geneva Johnson and Donald Swafford were both ill at the time of retirement and died within a year afterwards.

**SCIENTIFIC STORES AND SERVICES**

The scientific stores and services are the heart of an effective department of chemistry. Incremental changes occurred in its organization and management from the 1940s onward in time, but by far the most dramatic and effective transformation occurred from approximately 1964 to 1967. This was made possible through various cooperative efforts, particularly through the coordinating supervision of Don McMasters. The event was well described in the *Fall 1967 AIUC Newsletter*:

"The stockroom has undergone a complete reorganization and is now operating on a computer-based system which makes the buying, accounting, and inventory control much more efficient. Even its name is different — Chemistry Scientific Stores — indicating that its service can be extended further to meet the scientific needs of the entire campus. The changeover, which was effected July 1st (1967), involved a tremendous amount of work by the stockroom personnel, since every item in stock had to be inventoried and cataloged and future needs had to be anticipated. The compilation of the catalog alone was a mammoth task including as it does more than 5300 chemicals and at least 7500 supply and equipment items... Faculty, graduate students, and certain other personnel have been issued credit cards to be used for obtaining items listed in the catalog.

The complex operation involves personnel who work in different areas of the intricate chemistry building, as well as in the central rooms of the Scientific Stores. All of it is managed by Mrs. Pat Burner."
Special Facilities for Research and Teaching

Both research and advanced laboratory instruction in chemistry are much dependent on state-of-the-art instrumentation and computer technology. As Chairman Grieco wrote (The Graduate Program in Chemistry, Indiana University Bulletin 90/92):

"The department continues to make a major effort not only to secure the best available commercial instrumentation but also to develop a first class group of technicians to maintain equipment in top working condition and, when necessary, to construct new instrumentation. Our research programs are greatly strengthened through a strong, supportive nonacademic staff who manage our nuclear magnetic resonance facility, x-ray (molecular) structure facility, and mass spectroscopy laboratory."

Integral to virtually all of the research are the departmental computer facilities and the central computing network on campus. Significant developments in both instrumentation and computer facilities started in the 1950s. Both were stimulated and developed through Merritt and other colleagues in this department.

Another pioneer was the graduate student Dana Mayo. He had transferred here with Carmack from the University of Pennsylvania, when Carmack joined the faculty in 1953. Mayo's graduate research in organic chemistry was greatly benefited through the use of the Beckman DU spectrophotometer and new commercial instrumentation through determinations of infrared spectra. His enthusiasm and careful work, plus rapid developments in commercial applications of spectrometry, quickly excited the interest of many others in the department.

Pioneering in the advancement of state-of-the-art facilities and personnel for research has been a characteristic of the department, especially since the Gucker influence became notable in the middle of the century. In spite of general limited funding in the 1950s the W. J. Moore group pioneered in the introduction of research requiring mass spectrometry and related physical facilities. By the late 1980s the powerfulness of this resource had greatly expanded. For example, there was available a Kratos MS80 RFQQ with computerized data collection, and a double-focusing high resolution GC/MS system with a wide range of ionization methods including F.A.B., E.I., C.I., and +VE and −VE ions. Such equipment was maintained under the care of a full-time mass spectrometrist. Different types of such equipment existed in some other areas of the department.

Other facilities that were especially notable and used by various faculty members in the 1960s-1980s included NMR, X-ray diffraction, and computational chemistry. All of this would not have been possible.
without the completion of the 1988 Addition and the accompanying renovation of other areas of chemistry.

**Nuclear Magnetic Resonance Facilities:** In the late 1950s and early 1960s nuclear magnetic resonance appeared as a remarkably promising tool in the armamentarium of the modern department of chemistry. R. Schaeffer had recently joined the faculty, in 1958. His prolific research in the chemistry of inorganic hydrides could be enhanced through NMR spectrophotometry. He and others quickly sought to have such facilities made available. Through much effort in 1960 the original NMR spectrometer for this department was obtained at a cost of $60,000. Fortunately a promising undergraduate student, Arthur Clouse, desired to be employed part time as a technician in the operation of the spectrometer. While in recent military service he had specialized in electronic service that had given him basic facility in such new work. He was appointed. Following his graduation he was employed full time. It turned out so well that he remained in the department until his retirement in 1980. His service had been so productive that, even without any graduate work, he was made associate professor of chemistry in 1973! All conceded that it was a merited appointment. Through Clouse, several faculty members, and others, the NMR laboratory was kept updated with modern facilities. Prodigious amounts of good research and instruction came from it.

A recent acquisition, in 1985, was a Varian XL-300 superconducting NMR spectrometer. This made it possible to perform such state-of-the-art NMR experiments as two-dimensional scans on molecules containing $^1$H and $^{13}$C nuclei. The equipment cost $250,000.

**Molecular Structure Program and X-Ray Diffraction Facilities:** The department’s Molecular Structure Program, through the study of X-ray diffraction patterns, developed progressively from the pioneering work begun here by L. L. Merritt in the late 1940s. As pointed out in a 1969 review,

> "In more recent years the detailed study of diffraction patterns from single crystals has become one of the most powerful methods of determining molecular structure." (AIUC Newsletter, Fall, 1969)

In 1969 the facilities included precession goniometers to record single crystal diffraction patterns on film. They also included equipment that permitted the recording of diffraction at very low temperatures such as could be produced with liquid nitrogen. Thus it was possible to observe diffraction from single crystals of compounds that require such low temperatures. Of high importance, the resources included computer facilities which permitted the measurement of intensities of the diffracted X-ray beams. Typically at that time a few thousand beams were measured and analyzed per structure determination. The resources were located in var-
ious laboratories in the chemistry building. In the 1960s the maintenance and instruction in the use of the facilities were largely the responsibility of J. C. Huffman then a graduate student and part-time technician in the department. The principal faculty users were L. L. Merritt, R. Schaeffer, and W. E. Streib and his wife Kirsten Streib.

As recorded by M. Carmack in a 1979 review of the program (AIUC Newsletter, Nov. 1979)

"Former Department Chairman Riley Schaeffer began the process of organizing a unified Structure Center about 1973 and obtained financial support."

This came primarily through a multimillion dollar grant from the NSF in the late 1960s for the University Science Development Program. Also, a major factor in the development was, as concluded by Carmack,

"...the joint effort of Professors Merritt and the late Marshall Wrubel (Astronomy) which led to the establishment of the Wrubel Computing Center."

Without readily available and excellent computer facilities the molecular structure advances would have been markedly stunted.

In the mid 1970s the Structure Center acquired the two-story quonset hut located immediately east of Owen Hall. It had been used by the Aerospace Research Application Center. In preparation for the molecular structure work the Center was well equipped with three Picker goniostats and other facilities to meet the research needs. As pointed out by Carmack in his review,

"Much of the design of this equipment and programming to interface the equipment with computers has been carried out within the Chemistry Department by William Streib and Ray Sporleder."

Also of much importance, Carmack wrote

"By means of a Remote Job Entry (RJE) unit, data can be transmitted rapidly to the Wrubel Computing Center."

The speed was 32 times faster than had been possible before the establishment of this linkage. Besides this, there were other important advantages, especially the sharper defining of structures.

At the time of the reorganization in 1974 Huffman became the Director of the Molecular Structure Center. W. E. Streib and Kirsten Streib continued as Staff Crystallographers.
The high importance of the Center in the enhancement of research can be expressed in different ways. For example, many of the departmental scientific publications include as coauthors Huffman and/or one of the Streibs. During the period of 1981-84 the numbers were respectively: 38, 34, 34, 50. The total was 156 papers and there were 155 different authors and coauthors. Director John Huffman was the coauthor of virtually all, and senior author of a few. The contributors sharing in five or more papers were, in descending order of numbers, respectively: M. Chisholm, K. Felting (Streib), K. Caulton, R. Wentworth, A. Sattelberger, J. Kochi, P. Grieco, and P. Magnus. In the more recent years the importance and level of activity seemingly remained undiminished.

Gratifyingly Huffman and the many coworkers were presented with the *Polyhedron*’s Best Paper Awarded for 1987. As reported that year in *Polyhedron* 6, 741-757, the work was declared to be the most significant advance in inorganic and organometallic chemistry.

**Chemistry and Computing Services at Indiana University:** In the middle 1950s Merritt began to point out developments in the emerging computer science field he believed were of importance in chemistry. Even prior to 1965 he was active in the creation of the university’s Research Computing Center. In the development of the NMR spectrometer for graduate research a time-averaging computer was obtained about 1967 to facilitate measurements made on the DP-60 NMR spectrometer. This greatly extended the resolution of the facility.

Then in May 1968 “Scientific data System Sigma 2” was installed. Steps were being taken to provide connections with research instruments such as the mass spectrometers and NMR spectrometers. The workers were hoping that within another year or so, through the Sigma 2, there could be direct access to the computer, CDC 3400-3600 computer at the Research Computing Center.

The development of calculational chemistry was enhanced through a cooperative work-shop here in August 1979. The cooperators were the National Resource for Computation in Chemistry located at the Lawrence Berkeley Laboratory (LBL) in Berkeley, California, and this department’s Quantum Chemistry Program Exchange (QCPE) group. The workshop used a Control Data Corporation 7600 computer located at LBL. R. Counts of QCPE concluded that the computer programs the workshop used represented the most comprehensive available at that time. The participants in the workshop represented academic institutions and large industrial organizations.

Early in the 1980s the department acquired a new computer system with a list price of $1.5 million. Central to the system was a Computer, VAX 11/780 computer with 8 megabytes of memory, 1.2 gigabytes of disk storage, and numerous terminals and communication links. There were many other components for the enhancement of computations and
information searching. Funding for the new system came from NSF and NIH grants and from Indiana University. The supplier provided substantial discounts.

*Quantum Chemistry Program Exchange (QCPE):* Harrison Shull recognized that as the first solid state computers began to become available it would be feasible to attempt to obtain chemical information from first principles, i.e. from direct calculations based on the ideas of Quantum Mechanics. He also recognized that everyone needed roughly the same type of software and unless necessary action was taken the same piece of work would be repeated several hundred times in different laboratories. Out of this consideration, he started QCPE on his own and with no direct support. Having numerous contacts and the ability to explain his ideas well he obtained funding through the Air Force Office of Scientific Research at a very modest level.

Working with Shull was an English postdoctoral student, Keith Howell. He was actually the first person who ran QCPE. Following Keith came Frank Prosser who is now on the faculty of the Computer Science Department at I.U. Prosser's replacement was Richard Counts.

Through QCPE workers in the field of computational chemistry would deposit the software which they developed with QCPE and the office would make it available to other workers. QCPE in essence became the guarantor of the software. It started with some 23 small pieces of software which were mostly subroutines. In 1992 QCPE holds some 725 pieces of software and much of it is now large systems consisting of 100,000 lines of FORTRAN.

NSF provided a fixed amount of funding to cover a three year period to allow QCPE to be financially independent at the end of the three year period. Since 1973 QCPE has operated fully on its own revenues.

Currently QCPE distributes about 2500 pieces of software per year. The basic publication, *The QCPE Bulletin*, now has a primary readership of some 1850. References to QCPE Software can always be found in some of the major journals. Calculations in publications of all types in the field of chemistry contain computational components with such frequency that it is now taken for granted as a part of the practice of chemistry.

There are now journals which are wholly dedicated to the computational practice of chemistry. The best known is the *Journal of Computational Chemistry*. *The QCPE Bulletin* of this department is regarded as a journal because it includes research articles.

*Quarters and Specialized Facilities for the Davidson Group and Other Chemistry Theoreticians:* Alumnus E. Davidson was appointed to the faculty effective in 1984, but before this distinguished chemical theoretician and his group could take up residence it was necessary to provide
fully adequate space and facilities for the new group as well as other theoretical chemistry faculty and their coworkers. This included the Quantum Chemistry Program Exchange.

Through funding by the NSF and other sources it became possible to remodel completely the second floor of the chemistry building's (1931) west wing. This was promptly accomplished, thus providing a more suitable localized area for theoreticians, their students, and other coworkers. This became the computational chemistry center. It began to function in 1985.

The inauguration of the Chemistry Computational Center marked its opening with a symposium on theoretical chemistry and a formal ceremony headed by President John W. Ryan. Davidson coordinated the symposium.

Duplicating Services: Throughout the years from the 1950s duplicating services expanded enormously. Every function of the department seemingly felt the need for extra copies of nearly every written communication. Teaching, in myriad ways, strongly felt the needs, especially in the distribution of learning materials in the classroom. Innumerable grant applications, research reports, interoffice communications, communications with alumni and others, etc. all required copies. Even in the early 1950s the standard copying resource was a mimeograph machine which required the preparation of a typed stencil for every new page to be duplicated. A hand-operated crank was the source of power and unevenness in the quality of the product was normally expected. Briefly "thermofax" operations intervened, but the product lacked desired uniformity and the copies were fragile. Xeroxing with marked improvement in quality and convenience intervened in the early 1960s. But the cost was excessive for mass production.

By this time it became prudent for the department to begin the acquisition of costly duplicating equipment which also required skilled operators. By the late 1960s this transition had been effected. It became certain within a few years that the quality, dependability, and convenience of such service in the department offset the cost. The principal operator of this service since 1977 has been Robin Nordstrom. It has proved to be an invaluable adjunct to modern teaching and research.

CHEMISTRY ARCHIVES/ALUMNI OFFICE

The semblance of a departmental archives appeared in 1931 with the outfitting of a chemistry museum for the new chemistry building early in the 1930s, and with the initiation of systematic preservation of basic student academic records in the department. Through the encouragement of F. T. Gucker in his first year here (1947-48) a more orderly focus on chemistry alumni began with the organization of the Association of In-
diana University Chemists (AIUC) and with the publication of periodic newsletters for the AIUC, both starting in 1948.

Prior to approximately 1962 these functions were primarily handled in the departmental chairman's office, but thereafter they became the primary responsibility of the advising offices for undergraduates and for graduate students. Concurrently the basic records of students who had left the university were accumulated and preserved in the office for undergraduate advising. By this time, in the early 1960s, this office had been delegated principal responsibility for the department in placement services. With further growth in departmental size, and increasing specialization, and with increasing attention to chemistry alumni, record keeping and the maintenance of liaison with the alumni became a specialty. The chemistry archives and alumni office continued to evolve and became generally recognized by the mid 1970s.

Another factor in this evolution was the retirement of Day and E. M. Greene from responsibility for undergraduate advising and placement service in the 1970s. Day fully retired from university administrative service in 1972 and from teaching in 1976 — except for some special assignments. Greene continued to meet his secretarial needs and that of a few other faculty members. Concurrently more attention was devoted to the development of departmental archival records and their appropriate use throughout the department. Also, in cooperation with various members of the faculty, displays of current research projects were prepared and exhibited in certain museum cases that had remained near the main entrances to the 1931 chemistry auditorium.

During this interval of the late 1970s and much of the 1980s Day and Greene devoted much time to the systematic accumulation of records concerning the history of this department. Day devoted some of his time to the writing of a history of the department. All of this led to extensive interaction with the personnel of the University Archives, especially with the then Archivist, Dolores Lahrmann.

Through the decades of the 1960s and 1970s widespread interest in making periodic enrichment gifts to the department here was furthered through the AIUC Newsletters and in other ways. This occurred in part through the regular encouragement of chemistry alumni and faculty to make periodic gifts to the Indiana University Foundation for the support of the expanding Newsletters and for various other enrichment needs. This Friends of Chemistry program led to a firmer linkage between the alumni and the department. Thus it became clear that an office in the department should be maintained specializing in mutually helpful relationships with the alumni.

Administratively the Chemistry Archives/Alumni Office became an entity during the early 1980s, with E. M. Greene serving as the archivist.
The office functioned in close relationship with the University Archives as well as with the department and its alumni.

Of primary interest, the system of orderly preservation of records gives assistance from time to time in protecting the department and others from misunderstandings that occasionally arise. Also, the records are an indispensable resource in providing firm grounds for nominating former students for deserved recognitions. The archives are the vital link with the past; without the link much is lost forever.

**UNDERGRADUATE CHEMISTRY PROGRAM**

By far the largest chemistry enrollments are always in general chemistry. In 1980 there were approximately 1000 students in the different beginning courses. The five different laboratory programs required 50 to 60 different sections. In 1979 Rupert Wentworth became Coordinator for General Chemistry and he devoted a large proportion of his time to teaching and this responsibility. Virtually all the lecturing was done by chemistry faculty members and none by associate instructors.

The department's multidecade recognition of the primacy of good teaching was exemplified in the planning for the 1988 addition and the remodeling of the older structures that followed. All of the undergraduate laboratory instruction was planned for the east portion of the new structure and the totally rebuilt east sections of the 1931 building. A notable feature was the safety emphasized in every aspect of the laboratories.

Also, the facilities included a high utility Learning Resources Center of approximately 2000 square feet. This provided 19 computer terminals, individual study desks and tables. Such equipment and related facilities were provided through a gift of $260,000 from the Dow Chemical Company Foundation. An attractive atrium separates the Center from the most attractive and safety-featured laboratories for general chemistry. Near these areas in the remodeled older building there are a few mini-lecture areas which facilitate meetings with groups and classes up to a maximum of 120 persons. These are ideal for discussion groups and seminars.

A short distance from these areas are the highly functional undergraduate offices and conference rooms, as well as the quarters for the placement services of the department. All of this is on the ground floor.

The laboratory work for upper class students was provided for in space directly above the laboratories for beginning students. This included equally elegant and safety-featured laboratories for organic chemistry, chemical measurements, and physical chemistry. In addition the totally rebuilt chemistry auditorium (Harry G. Day Lecture Hall) is on this floor and near the laboratories. With the well designed balcony it provides
350 attractive seats, all the desirable audio-visual aids, and excellent lecture demonstration facilities.

The number and distribution of baccalaureate degree students in chemistry is always of interest. Over the decades of the 1960s through the first half of the 1980s the trend has been upward, but in 1986 it began to decline appreciably. This is illustrated as follows:

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During this period the department became prominent for the number of baccalaureate degrees awarded. According to Chemical & Engineering News (21 March 1977) it ranked fifth among the top institutions in the country in the total number of baccalaureate degrees awarded. By 1987-88 the ranking had become first place.

Of the 135 graduating chemistry majors in 1984, forty four went on to medical school, twelve to dental school, eight to graduate school in chemistry, eight to graduate school in other science areas, and forty-two took jobs in industry. Small numbers went into MBA and other programs.

Cooperative Chemistry Education and Internship Program: For many students earning money while in school is essential, and gaining work experience is an advantage. The two have been combined in various ways for many generations of students. In 1980 this department was one of six chosen nationally in the Cooperative Education Development Model Competition of the ACS. A cooperative program was begun here to allow interested students opportunity to pursue a baccalaureate degree in chemistry while working in a chemical company, or gaining related experience, during several short intervals, largely during summers. The
primary direction was through the Indiana University Career Development Center.

During the first 8-10 years some of the work experiences and internships were gained in the: Ball Corporation, Dow Chemical Company, General Motors Corporation, Inland Steel Company, Mead Johnson Company, National Bureau of Standards, U.S. Department of Commerce, and the U.S. Drug Enforcement Agency.

The Chemistry Undergraduate Office always worked closely with the participating students. One or more representatives of the office always met with the students individually prior to and periodically during the co-op experience. They reviewed supervisor's and students' periodic reports and the student’s final written report on their co-op experience. Co-op students usually required five calendar years to complete the baccalaureate degree. In 1991 thirteen chemistry majors were participating in the co-op program.

_Honors Program:_ During the late 1980s dramatic restructuring and revitalization of the honors program occurred. A skills assessment test was instituted in which, prior to the start of the fall semester, the 50-60 incoming students who achieved the highest assessments were invited to enter the honors lecture and laboratory sequences (S105-S125 and S106-S126). The continuance of the promising students in the second year was marked by heightened interest in organic chemistry (S341-S342-S343-S344). This interest continued and accounted in part for greater numbers of such students who graduated with honors degrees in chemistry and biochemistry.

Such developments were accompanied by promising efforts to attract funding for over $1.7 million in new instrumentation in general, organic, analytical, bioanalytical, inorganic, and physical chemistry. A gift of $250,000 from the Eli Lilly Company in 1991 gave a major boost to the effort to achieve this goal.

**GRADUATE PROGRAMS**

During the 1960s to 1990 the graduate work in chemistry focused almost entirely on earning a doctoral degree with the concentration in one of the five basic areas: analytical, biological, inorganic, organic, or physical chemistry. Also, most of the graduate credit was earned in the major area with a minor in a second area or in some cases outside the department. The program emphasized

"the attainment of a high level of competency in a specialized area of chemistry but also requires the development of broad knowledge and experience."

Also, it was made clear that
“By the time the degree (Ph.D.) is earned the student should show promise of becoming a capable and independent investigator in chemistry.”

A primary measure of progress in the doctoral program was performance in the qualifying examinations. This was instituted in the early 1950s. As emphasized in the admissions literature

“....a student must pass monthly cumulative examinations at the prescribed rate: one by the end of the second semester, three by the end of the third semester, and five by the end of the fourth semester....”

Throughout several decades doctoral level students were encouraged to conduct research even in the first year, with enrollment in “Introduction to Research” (C500). At the end of the two semester experience the student could be continued in the same research or changed to something different if that seemed to be in his/her best interest.

For many decades nearly all the graduate students in chemistry were expected to “serve not less than one year as an associate instructor” thus broadening their experience and providing stipends for virtually all. After the first two semesters quite a large number of students received fellowships through grants by industrial companies or governmental agencies.

In 1984-85 the industrial fellowships sources included the Berlex Laboratories, General Electric Foundation, Lubrizol, Monsanto, and Procter and Gamble. Five years later the sources included the Amoco Company, General Electric Foundation, Lubrizol, Procter and Gamble, and Harris Corporation. Others included the National Science Foundation, American Chemical Society, and Indiana University Graduate School.

A feature of the 1960s was training grant support for graduate study. For example, in 1963 the department received a grant of $94,000 from the National Institutes of Health for four years. It was to furnish subsidies (fellowships) for graduate work leading to doctoral degrees in biological chemistry. Later it was renewed.

Comparable subsidies were furnished by the National Science Foundation for the training of teachers who enrolled in a Summer Institute for High School Teachers. In 1966 the NSF renewed its sponsorship for a three-year period. This program was successful in attracting favorable attention to the enhancement of science teaching in the high schools and in colleges.
CHEMISTRY PLACEMENT SERVICES

Throughout its many decades as a department the chemistry faculty were the principal channels in the placement of chemistry majors desiring employment or other placement — such as admission to graduate schools or professional schools. Following the end of World War II, and the explosive increase in student enrollments the departmental chairman's office became the focal point for placements. By approximately 1955 the semblance of a placement service had developed. Within another decade it had become rather well recognized by students, faculty, and industry. The representatives of prospective employers were aided in the interviewing of prospective employees. Appropriate records of such prospective employees were processed and made available to the scheduled interviewers. Elizabeth Greene, the principal secretary in the chairman's office, was primarily responsible in handling the logistics. In 1975 this responsibility was transferred to Holly Willett.

During the period from approximately 1955 to 1990 the service continued to grow. For example in the past five years the following data illustrate the change:

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<th>1990-91</th>
<th>1988-89</th>
<th>1986-87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Recruiters</td>
<td>48</td>
<td>42</td>
<td>25</td>
</tr>
<tr>
<td>Total student interviews</td>
<td>607</td>
<td>574</td>
<td>256</td>
</tr>
<tr>
<td>Total Undergraduate Resumés</td>
<td>31</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Total Students and Postdoctoral Resumés*</td>
<td>34</td>
<td>42</td>
<td>26</td>
</tr>
</tbody>
</table>

*Refers to follow up action after interviews.

The Chemistry Placement Office has operated for several decades in conjunction with the Undergraduate Chemistry Office. It serves all students as well as postdoctoral workers in the department. Job descriptions are posted on the Job Information Bulletin Board and copies are kept in a master folder. Other means are taken to provide helpful information.

HONORS BANQUET

The Honors Banquet program was started in the 1950s and it has been continued every year since, always in the Memorial Union building and with only moderate deviations from the format that was established after the first few years. It celebrates achievement, expresses appreciation, cements friendships, and widens understanding of purposes and goals.

Throughout nearly all of the 1962-1992 period the banquet was held in the Solarium or Frangipani Room. Both selected undergraduates and graduates were the principal honorees, but in some instances a few other members of the department were honored. Appropriate musical
entertainment was featured as a part of the program until the last ten- 
fifteen years of this period. Special speakers were not included following 
the first decade of the program. These deletions seemed to be desirable 
owing to the increasing amount of time required to honor the growing 
number of recipients.

The scope and nature of the awards throughout this thirty year 
period are reflected in those for the years of 1970, 1980, and 1990. They 
reflect the growth and development of the program.

1970

Undergraduate Recognitions:
Top freshmen in C105, C106, S107 (5)
Dow Scholar - Peter Clare
Second year
   Merck Index Awards (3)
   Dow Scholar Thomas Britton
   Honor Roll (12)
Third year
   Courson-Greeves Award Mary K. Johnson
   Dow Scholar Vaughn Davidson
   Honor Roll (18)
Fourth Year
   Outstanding Senior Award Lisa Sanders
   Courson-Greeves Award for 1969-70 Lisa A. Sanders,
       Lynn Vanetta
   Dow Scholar William Thayer
   Honor Roll (14)
Phi Beta Kappa (15)
Undergraduate Research Participation (6)
Regional Meeting, Student Affiliates (7)
Honors Program Students (9)

Graduate Students Recognitions:
Graduate School Fellowships (5)
NDA Title IV Fellowships (8)
NSF Traineeships (10)
NSF National Graduate Fellowship William Coleman
NASA Traineeship George Bodner
Educational Opportunity Fellowship Walter Delphin
Ford Foundation Fellowship Jose Canchucaja, Paco Paratore
Mead Johnson Fellowship Alan Dinner
PHS Biochemistry Trainees (12)
PHS Fellowships (8)
American Chemical Society Fellowships Laurence Cox,
   William Dowd
Brazilian Government Scholarship Armi Nobrega
1980

Undergraduate Recognitions:
Top freshmen in C105, C125, S105, S125, C106, C126,
I Semester, 1979-80 (6)
Honor Roll Class of 1982 (28)
Honor Roll Class of 1981 (16)
Honor Roll Class of 1980 (21)
Honors Program (19)
Phi Beta Kappa (34)
R. J. Grim Scholarships:
Class of 1980 (8)
Class of 1981 (3)
Class of 1982 John N. Caviness
Merck Index Awards (3)
Ira E. Lee Summer 1980 Scholarships (7)
Dow Chemical Company Summer 1980 Scholarships (4)
Courson-Greeves Prize Francesca Perugini
Frederic C. Schmidt Award Marc Jones
Joseph B. Schwartzkopf Award Peter D. Amour
ACS Award Gregory Georgiadis
Senior Award Charles Moore

Graduate Students Recognitions:
Saudi Arabian Educational Mission Ahmed Al-Mutairy
Venzuelan Fellowships (4)
Lubrizol Fellowship George P. Lahm
Medical Scientist Scholarship (Insurance Medical Scientists
Scholarship Fund) Richard D. England, Kerry L.
Blanchard
Molecular Cellular Biology Fellowship Mary E. Brauner
Foundation Stiftelsen Blanceflor Boncompagniludovisi,
Fodd Billt Giovanni Lipari
Graduate School Fellowships (9)
Associate Instructor Awards (5)
Robert Chernin Memorial Award Jeffrey A. Joens
Dow Corning Award David W. Chandler
William Nebergall Memorial Award John A. Marsella

1990

Undergraduate Recognitions:
Top students in C105, C125, S105, S125, C106, C126 First
Semester 1989-1990 (6)
Honor Roll Class of 1992 (35)
Honor Roll Class of 1991 (24)
Honor Roll Class of 1990 (31)
Honors Program Seniors (15)
Honors Program Juniors (13)
Honors Program Sophomore Joseph R. Schulz
R. J. Grim Scholarships
   Class of 1990 (4)
   Class of 1991 (5)
   Class of 1992 (4)
Bill Mays Award Denessa R. Luckett
Cooperative Education Program Certificate (3)
Harry G. Day Academic Year Scholarship (1989-90) (7)\(^1\)
Verling M. and Elizabeth Votaw Award Judith A. Stenftenagel
Merck Index Awards (3)
Research Scholarships 1990 (9)
Harry G. Day Summer Scholarships (1990) (5)\(^2\)
Ira Lee Summer Scholarships (5)
The Lilly Undergraduate Summer Research Scholarship for 1990 (2)
Courson-Greeves Prize John G. Nutt
William H. Bell Award Eyal H. Barash
Frederic C. Schmidt Award (2)
Joseph B. Schwartzkopf Award (2)
American Chemical Society Award (2)
Senior Award (2)

Graduate Recognitions:
Second Semester Research Fellow (Graduate School) Barbara Ross
Dissertation Year Fellowship (Graduate School) John W. Benbow
National Science Foundation Fellowships (3)
American Chemical Society Fellowship Debra Luffer
Amoco Fellowship Sherry J. Yennello
General Electric Foundation Kyle R. Gee
Lubrizol Fellowship Jinping Lin
Procter & Gamble Fellowship Otto T. Berg
DuPont Associate Instructor Awards (3)
Robert Chernin Memorial Award Jon L. Collins
Felix Haurowitz Memorial Award Jinping Lin
Henry R. Mahler Memorial Award Linda Martin
William Nebergall Memorial Award Stephanie Chacon
Reilly-Upjohn Award Paul J. Galley

\(^1\) Provided by Chester Davis '44.
\(^2\) Ibid.
The number of students honored each year grew almost continuously. It was approximately 140 in 1970; 194 in 1980; and 187 in 1990. Likewise many especially loyal and dedicated alumni and friends contributed generously both individually and through corporations or other organizations they represented. At each banquet attended by recipients of awards, parents, spouses, friends — indeed every person present surely experienced the feeling that achievement in chemistry is exceptionally worthy. All who participate — even in the recognition of excellence — are benefited.

A special feature of the Honors Banquet in 1982 was the presence of the entire Minos Georgiadis family, five of whom at some time received degrees in chemistry from Indiana University. This began with the father who received his PhD in chemistry in 1963. Two of the four children had been born before this milestone was reached. Later the family returned to Greece where Dr. Georgiadis was a member of the faculty of the Agriculture University of Athens. As the children grew old enough to enter Indiana University, each majored in chemistry and each excelled. All are now chemists except the oldest who, starting with chemistry, became a physician. Sometime the mother should be honored for her fortitude and excellence. What a family!

**HONORS AND AWARDS TO FACULTY: 1962-1992**

The importance of the faculty members to teaching, research, and other service to the University is judged in part by the different kinds and numbers of honors and awards they receive. There is no feasible way to quantify such attributes of service or worth, but objective approximations are of prime value in making judgments.

One of the most concise and available summations of honors and awards is the compilation of brief faculty biographical sketches in recent editions of *The Graduate Program in Chemistry*. The edition of 1990/91 gives sketches of all the active faculty in 1990. Such sketches list a large proportion of all the honors and awards. Absent from the record cited are the sketches of faculty who were here at some time during the past 30 years and had either terminated their appointments or had died. Nevertheless the compilation has high value as a ready source of useful information.

The record up to 1990 was indeed impressive. For example, in 1990, at least nine had been the recipients of Guggenheim Fellowships, twelve had been Alfred P. Sloan Fellows, five had received Fulbright Awards, thirteen had become Fellows of the American Association for the Advancement of Science, and at least twelve were on editorial boards of major scientific journals. Two former members of the faculty J. Kochi and H. Shull were elected fellows of the National Academy of Sciences.
while they served here. F. Haurowitz was elected several years before he died. Ernest Davidson was elected after he transferred to I.U. M. Chisholm became a fellow of the Royal Society of Great Britain after he joined the faculty here.

The wide range and number of meritorious awards and prizes are also impressive. Illustrative are some of the many research awards to four of the faculty:

- **Distinguished Professor M. H. Chisholm:**
  - Akron Section Award of the ACS, 1981
  - Alexander von Humbolt Senior Scientist Award, 1988
  - 1987 Royal Society of Chemistry (Great Britain) Award for the Chemistry and Electrochemistry of Transition Metals, 1988
  - ACS Award in Inorganic Chemistry, 1989

- **Earl Blough Professor of Chemistry P. A. Grieco:**
  - Ernest Guenther Award in the Chemistry of Essential Oils and Related Products, 1982
  - Akron Section Award of the ACS, 1982
  - National Cancer Institute Merit Award, 1988
  - ACS Arthur C. Cope Scholar Award, 1990
  - ACS Award for Creative Work in Synthetic Organic Chemistry, 1991

- **Distinguished Professor of Chemistry and Environmental Sciences G. M. Hieftje:**
  - Anachem Award, 1984
  - ACS Chemical Instrumentation Award (Analytical Division), 1985
  - 1986 Pittsburgh Analytical Chemistry Award
  - ACS Award in Analytical Chemistry, 1987
  - Tracy Sonneborn Award, Indiana University, 1987
  - ACS Award in Spectrochemical Analysis, 1989

- **Rudy Professor of Chemistry M. V. Novotny**
  - M. S. Tswett Medal for Chromatography (Advances in Chromatography), 1984
  - ACS Award in Chromatography, 1986
  - ISCO Award in Biochemical Instrumentation, 1988
  - ACS Chemical Instrumentation Award by Division of Analytical Chemistry, 1988
  - Society of Analytical Chemistry of Pittsburgh, Keene P. Dimick Award in Chromatography, 1990

The recognitions for exceptional effectiveness in teaching are also notable. A prize example is the record of H. T. Briscoe, especially in the 1930s. In the 1962-92 decades several were impressive. Three were exceptional:
• Distinguished Professor C. S. Parmenter:
  Indiana University Standard Oil Foundation Teaching Award, 1968
  Spiers Memorial Lecture Medal, Faraday Division, The Royal Society of Chemistry (Great Britain), 1983
  Tracy Sonneborn Award, Indiana University, 1990
  Chairman, Division of Physical Chemistry, ACS, 1987

• Herman T. Briscoe Professor of Chemistry D. G. Peters
  Ulysses G. Weatherly Distinguished Teaching Award, 1969
  College of Arts and Sciences — Graduate School Alumni Association Distinguished Teaching Award, 1984
  Chemical Manufacturers Association National Catalyst Award, 1988
  ACS Division of Analytical Chemistry Award for Excellence in Teaching, 1990

• Professor Emeritus W. B. Schaap
  Ulysses G. Weatherly Distinguished Teaching Award, 1963

The overall recognition of merit is the awarding of an honorary doctoral degree to a member of the faculty. Two chemistry faculty members received that distinction:

• Distinguished Professor Emeritus F. Haurowitz, Hon. D.Sc. 1974
• Professor Emeritus L. L. Merritt, Jr., Hon. D.Sc. 1988

During the 1960s - 1980s period more than one half the faculty were in demand in this country and abroad to lecture before professional peers and others. The instances are too numerous to record. But some instances will suffice to illustrate the breadth of faculty involvement and nature of the hosts:

• A. Allerhand lectured in 1969 at the University of Louisville and at Northern Illinois University.
• R. Bonham in 1983 lectured at a Conference in West Berlin, in Rome, and at a workshop at the Argonne National Laboratory.
• E. Campagne in 1983 was elected Speaker of the Year by the Indiana Academy of Science. At the plenary session of the Academy he lectured on “Drugs and the Mind.” This was given during 1983-84 at several colleges and universities in Indiana.
• K. Caulton in 1989 lectured at the Exxon Corporation, two universities in Utah, and at Grinnell College. Also, he lectured in France and Italy. Each year for several years he lectured extensively abroad as well as in this country.
• M. Chisholm in 1983-84 gave more than a dozen lectures at universities and noted industrial laboratories.
• F. Haurowitz, in 1968, gave the first lecture in the Landsteiner Centennial Symposium of the New York Academy of Sciences. In 1969-70 he lectured at the University of Pennsylvania Medical School, and the Michigan Biochemical Society. During summer
1969 he addressed the Symposium of the Czechoslovak Academy of Sciences. Later he spoke at a symposium of the Leopoldina Academy of Scientists in Halle.

- J. K. Kochi presented the prestigious Reilly Lectures at the University of Notre Dame in 1977.
- Peter Langhoff, while on leave during part of 1982-83 was Visiting Professor at the University of British Columbia. He visited other campuses and conferences where he lectured and collaborated with other scientists.
- H. Mahler in 1967 lectured at the Gordon Conference on nucleic acids. Also he lectured at meetings of the Czechoslovak Biochemical Society, the Czechoslovak Academy of Science, and the Belgian Chemical Society. The next year he lectured at Harvard University, University of Pittsburgh, University of Notre Dame, University of Pennsylvania, Illinois Institute of Technology, Northwestern University, Stanford University, and University of California at Davis. He even gave other lectures.
- W. J. Moore, in 1968 lectured at the University of Kentucky, Miami University, Oregon State University, University of Arizona, University of Hawaii, Fresno State College, California State Technological College, and the University of Nevada.
- M. Novotny was notably involved during 1982-83 giving lectures on many aspects of chromatography. The lectures were given in The Netherlands, Italy, West Germany, Switzerland, England, Scotland, Australia, and China. There were also several lectures at universities and industrial companies in this country.
- V. J. Shiner gave the Daims Memorial Lecture at the University of Kansas.
- E. Wenkert, in 1968-69, gave lectures at the University of Wisconsin-Milwaukee, University of Chicago, Virginia Polytechnic Institute, Xavier University, and the Cincinnati Section of ACS. Practically all the faculty gave one or more invited lectures nearly every year.

Visiting Scientists Program Following Sputnik

The visiting scientists program was initiated nationwide by the American Chemical Society soon after the great stimulus created by the Soviet Launching of Sputnik in late 1957. It was conducted by the ACS Division of Chemical Education through funding by the National Science Foundation. In this program authorized colleges, universities, and certain high schools could be hosts to approved university chemistry faculty members of their choice. In each visit such faculty members would give at least one lecture and confer with teachers and students. The primary
purpose was to emphasize the importance of science in career planning and in the national welfare. The most active period of the program was in the late 1950s and early 1960s. Campaigne and Day were the two participants from Indiana University.

Campaigne’s visits and lectures were from 1961 to 1964. They included Western Carolina College, Milliken University, Vassar College, Texas Women’s College, Marquette University, New Mexico State University, Gustavus Adolphus College, University of South Dakota, and Greenville College. During this period and for over two decades thereafter, Campaigne accepted many other invitations to lecture before local sections of the American Chemical Society, university seminar groups, and industrial research groups.

Day’s visits and lectures in this program extended from 1958 to 1972. They included visits to 21 states where he represented chemistry in 38 colleges and universities and 32 high schools. The high schools were in Arkansas, Connecticut, Massachusetts, Minnesota, North Dakota, Ohio, and Texas. The colleges and universities were in Alabama, Arkansas, Illinois, Iowa, Kentucky, Michigan, Missouri, Montana, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, and Virginia.

Each speaker used several topics, but Campaigne’s most frequent lecture was on “Drugs and the Mind.” Day’s was “Science in a Liberal Education.”

Although the program was not intended to direct students to any specific institution for further education it is notable that in Day’s visit to Central College, Pella, Iowa, his designated student host was Wendell Roelofs. Soon Roelofs did his graduate work at Indiana University under the mentorship of Campaigne. Later he became renowned for his creativity, productivity, and recognitions in the field of insect pheremones.

AIUC NEWSLETTER

Since 1977 all the issues of the Association of Indiana University Chemists Newsletter were 8½ x 11 and they were twelve or sixteen pages. The attractiveness gradually improved, with attendant increases in cost of production. Of course this was deemed to be clearly justifiable. Most of the time the publication occurred annually, but occasionally two issues per year were published. It was for graduates and faculty of the Department of Chemistry and others who were interested. The publishing was by the Department of Chemistry and the I.U. Alumni Association, in cooperation with the College of Arts and Sciences - Graduate School Alumni Association. Generally approximately 5000 copies were printed and distributed gratis to the recipients. Each issue contained the names
of a few hundred donors of money to the Indiana University Foundation for Friends of Chemistry during the prior year.

The coverage of each issue always included a commentary by the chairman of the department. Illustrative of the content of newsletters in the 1980s, the following were major news categories in the 1990 issue:

- Letter from Chairman Grieco
- Report by Engineer Baker on Renovation Progress
- New Developments in the Chemistry Program, by Associate Chairman Peters
- Shull Honorary Symposium
- News of Faculty, by E. Campagne
- New Faculty, by E. Campagne
- Chemistry Library News, by Gary Wiggins
- Fall Inorganic Symposium and Picnic
- Dennis Peters Gets Award for Excellence in Teaching
- Alexandra Newton is Searle Scholar
- Staff News, by Loyd Hudson
- Campagne Lecture in Organic Chemistry
- Graduate News, by Pat Stapleton
- Undergraduate News by W. T. Jenkins, H. W. Willett
- Novotny Distinguished Research Lecturer
- News of Former Faculty
- Visitors to the Alumni/Archives Office
- Archival Items Available to Alumni Donors
- Social Hours
- News of Alumni, by H. G. Day and E. Greene
- Necrology
- Chemistry Department Donors (240 listed by name)

FRIENDS OF CHEMISTRY

In May, 1969 a fund number was established in the records of the Indiana University Foundation: Friends of Chemistry. The purpose was

"to receive gifts from individuals, companies and/or corporations who are interested in advancing the Chemistry Department activities at Indiana University."

The fund account described the objectives in broad terms which included scholarships for undergraduates, fellowships for graduate students, special equipment, and travel grants for faculty and students. It was specified that all expenditures from the fund required the approval of the departmental chairman or his successor. Later then Chairman Allerhand in 1979 established a Board of Overseers to advise the chair-
man on the use of this fund and related restricted funds in fulfilling the terms of the account. This board was to be composed of chemistry faculty members and alumni of the department.

In the 1970s the income for the Friends of Chemistry fund began to be significant. The fund soon replaced the Association of Indiana University Chemists as a vehicle for the receipt of gifts intended to aid and enrich programs such as described in the objectives of Friends of Chemistry.

A stimulating factor in this movement was a special fund drive initiated by Chairman Allerhand. The funding was greatly needed as quickly as possible to extensively remodel the entire top floor of the 1930s chemistry building. This was necessary to provide good laboratories for enhanced research in synthetic organic chemistry. The remodeling cost was $700,000. It was estimated that the department would need about $100,000 over and above other sources. The challenge was to ask the alumni and many other friends to meet this need. A special fund drive edition of the AIUC Newsletter was mailed in July 1980. Included in the appeal was a message from the newly formed Board of Overseers.

In less than a year after the fund drive was started ten donors had each given $500 or more; thirty had each given $100 or more; and 87 had each given less than $100. During the next ten years the average number of contributors to Friends of Chemistry was approximately 200 per year. Many exceeded $100 per person. All the gifts were to the Indiana University Foundation for Friends of Chemistry. A large proportion were repeated contributions. Annually the names of all the current donors, but not the amounts, were reported in the AIUC Newsletter.

INFORMATIONAL PUBLICATIONS ABOUT THE DEPARTMENT OF CHEMISTRY

Three principal kinds of publications were started at different times to give information about the Department of Chemistry. These were: the periodic AIUC Newsletter, the annual Scientific Publications of the Department of Chemistry, and the periodic publication of brochures giving information to prospective students interested in majoring in chemistry at Indiana University.

The compilation of scientific publications was started in 1951. The publications of each faculty member were listed in the order of author(s) names, title of article, and journal reference. Listing included books, patents, etc. This annual publication was discontinued in the mid 1980s because it was believed that other more efficient means were available.

The periodic AIUC Newsletter was started in 1948 when it was nothing more than a few pages prepared with the aid of a mimeograph.
machine. It has become the major source of news information exchange between the department and the chemistry alumni.

The first definitive informational publication about the department of chemistry was a 36 page bulletin entitled *Chemistry at Indiana University: Manual of Information for Prospective Students of Chemistry*. It was primarily for students preparing to work in chemistry as undergraduates or as graduate students, and for their advisers. The valuable publication appeared in 1949. Following its revision in 1954 subsequent revisions gave primary attention to the interests of prospective graduate students. However in 1974, under E. H. Cordes as chairman, a brochure entitled *Undergraduate Program in Chemistry* was published. It emphasized that “Students who desire to be useful in the world should become informed about the nature and power of chemistry.” The brochure proceeded to present well organized advice and information to students. The emphasis was on making good course selections for a major in chemistry, but there was much additional information.

In 1979 the succession of brochures discontinued specific information about chemistry for undergraduates. From this year forward the emphasis was on *The Graduate Program in Chemistry*. This first issue was 53 pages. This and subsequent issues were replete with detailed information on:

- Graduate Degree Programs
- Interdepartmental Programs
- Financial Aid
- Colloquia and Seminars
- Employment Opportunities
- Cultural and Recreational Opportunities
- Research Service Facilities
- Computing Facilities
- Chemistry Library
- Student Housing
- General Information
- Faculty

Following this issue the Graduate Program bulletins were published in alternate years. They were most impressive in appearance and content. In the 52-page issue for “90/92” Chairman Grieco wrote:

“Research in chemistry is strongly dependent on state-of-the-art instrumentation and computers. The department continues to make a major effort not only to secure the best available commercial instrumentation but also to develop a first class group of technicians to maintain equipment in top working condition and, when necessary, to construct new instrumentation. Our research programs are greatly strengthened through a strong, supportive non-academic staff....”

The text, 62 multicolor pictures, and everything else concerning this issue reflected excellence.
ASPECTS OF THE PLANNING AND CONSTRUCTION OF THE 1988 ADDITION

The 1968 AIUC Newsletter proclaimed that

"The most exciting development recently has been the start of planning for the second addition to the Chemistry Building.

But it was not until 1979 that the University authorized an architectural/engineering study of all the chemistry facilities on the Bloomington campus. The firm was Harley Ellington Pierce Yee Associates. The study included interviews with members of the faculty and visits to chemistry facilities at several other universities and industrial laboratories. A Proposed Building Project was submitted by this firm in August/September 1981. By 1983 the firm had finished the preliminary design phase for the prospective chemistry addition and the remodeling that was to follow.

Through the March 1983 AIUC Newsletter departmental chairman Shiner announced

"Everything is now in order awaiting the action of the Indiana General Assembly.

The request for construction authorization was not then approved. However, by that time it had already been determined that the construction and remodeling would be financed through the university’s (tax exempt) bonding authority when approval was granted.

Concerns about the genuinely urgent needs for better safety in the chemistry facilities was the impelling factor in moving toward the extensive construction and remodeling program during the rest of the 1980s and early 1990s (Nov/Dec 1982 Indiana Alumni Magazine). There were also urgent needs for much more space that was properly designed.

During the three years that Allerhand was chairman of the department he brought the issue of safety to a dramatic head and then precipitously resigned. Shiner was again appointed chairman effective in November 1981. A large proportion of the major university decisions on chemistry construction and remodeling were made in the 1980s. But some important implementation decisions did not occur until the early years of the Grieco chairmanship starting in 1988.

A major factor in precipitating action toward construction and remodeling was the widespread attention given to comment by Allerhand published in the Indiana Daily Student in October 1981. Concerning this the Indiana Alumni Magazine in 1988 then wrote in part:
"... on the basis of safety he (Allerhand) would advise chemistry students to go to Purdue. 'It was an urgent matter,' he says, and the department had waited long enough for a positive response. The published reports of unsafe conditions in IU's undergraduate chemistry laboratories did focus public attention on the problems but the (State's) Higher Education Commission had decided to table the funding request. Allerhand felt that it was necessary for him to resign as chairman if the project was going to proceed successfully from that point."

The extensive account in the *Alumni Magazine* also stated:

"The department's plea for additional space and modern safety equipment began long before the fall of 1981. In the 1960s (actually in the late 1950s) it requested $5 million to build the Addition, an amount that would have been adequate, Allerhand says. But only $3 million was appropriated (actually it was less and a substantial proportion was from NIH and NSF grants) and many corners had to be cut to build an addition the same size as one at the University of Illinois chemistry department, which cost $5 million."

Finally, in 1984 the General Assembly authorized $17.9 million for the Addition. The design phase for the Addition had been completed. Contracts for construction were soon awarded. Before the construction had been completed the General Assembly authorized the university to proceed with the very extensive remodeling program already substantially planned for the 1964 Addition and the 1930 building.

As summarized in the very attractive brochure prepared for the dedication of the Addition to the Chemistry building, on 21 October 1988:

"The addition to the Chemistry Building is built of reinforced concrete with a limestone veneer exterior that blends with the original 1931 portion of the building and wrap around the 1964 addition. The addition includes six teaching laboratories, thirteen research laboratories, four faculty office suites, scientific stores, a glass shop, and a student machine shop. The lecture hall in the 1931 building and several teaching laboratories were also remodeled."

The architect was Harley Ellington Pierce Yee Associates, Inc. and the General Contractor was Glenroy Construction Co., Inc.

*Dedication of 1988 Chemistry Addition*: The dedication of the impressive 1988 Chemistry Addition on 21 October 1988 was the greatest specific event in the history of the department since the dedication of the 1931 building on 2 April 1931. The most factual and succinctly comprehensive account of the event was published in the March 1989 issue
Main entrance to 1988 Wing to Chemistry Building
of the Association of Indiana University Chemists Newsletter. The complete article is reproduced herewith:

The dedication of the new addition to the Chemistry Building was a gala affair, held on October 21, 1988, in the new Chemistry auditorium. The festivities began at 1:30 p.m. with tours of the new facilities, conducted by members of Alpha Chi Sigma as tour guides. At 3:00 p.m., President Ehrlich presided over the dedication ceremonies. These included presentation of the Building Addition by D. M. King, AIA, Senior Vice President of the architectural firm of Harley Ellington Pierce Yee Associates, acceptance by Harry L. Gonso, Vice President of the Board of Trustees, and responses by Dean Lowengrub, Chairman Paul Grieco, and chemistry student Lucinda R. Hittle.

Honorary degrees of Doctor of Science were awarded to Frank Popoff (AB and MBA’59) president and chief executive officer of Dow Chemical Company, to Wendell L. Roelofs (PhD’64), Liberty Hyde Bailey Professor of Insect Biochemistry at Cornell University, and to Peter Guy Wolynes (AB’71), Professor of Chemistry and Physics, University of Illinois.

An added highlight in the ceremonies was the presentation of the 1988 Chemical Manufacturers Association National Catalyst Award to Professor Dennis G. Peters, in tribute to the quality of his teaching. The presentation was made by Frank Popoff, as a member of the Board of Directors of the Chemical Manufacturers Association.

The event was attended by nearly 300 friends of the IU Chemistry Department, including many alumni, former postdoctorals, and a group of some 50 college chemistry faculty from schools which have sent IU graduate students in recent years. Among the visitors was Mrs. Eleanore Gucker, widow of Dean and Department Chairman Frank T. Gucker. Eleanore came from her new home in South Carolina. Probably the person who came the farthest was Dr. Robert Degeilh from Rechimet-St. Gobain, France. He received his PhD degree in 1955 under the direction of Lynne Merritt.

The department was especially pleased by the presence of such distinguished alumni as Dr. Herbert Gutowsky (BS’40,DSc’83) and Mrs. Gutowski, Distinguished Alumni William LeSuer (PhD’48) and Arlene, David K. Barnes (PhD’47) and Burt Appleton (PhD’58) and Jack Gill (PhD’63) and his family. Mr. and Mrs. Curt Muser (she is the daughter of Earl Blough, AB’99, DSc’31) were here, and the department was especially honored by the participation in all events of the dedication by Herman B Wells.

Following a cocktail party at Woodburn House, and a banquet in the Frangipani Room, a Forum on “Trends in Undergraduate Chemical Education” was held in the Chemistry Auditorium at 8:00 p.m.
A panel of chemical educators, William F. Coleman (Wellesley College), Michael P. Doyle (Hope College), John C. Kotz (SUNY-Oswego), William S. Mungall (SUNY-Buffalo), and Steven Russo, was moderated by Dennis G. Peters.

On Saturday morning, October 22, after a continental breakfast served in the atrium of the new chemistry addition, a symposium on Chemical Research at Indiana University was held. The speakers were George Christou, “The Photosynthetic Water Oxidation Enzyme,” James P. Reilly, “Ultrasensitive Methods of Laser Spectroscopy,” William R. Roush, “Recent Developments in Organic Synthesis,” and R. Mark Wightman, “Chemical Microscopy.”

The festivities wound up with a luncheon in the Solarium of the Memorial Union, followed by a chemical magic show put on by Steve Russo and Dennis Peters, and tours of the research and teaching facilities. Each attendant received a copy of “The First 150 years of Chemistry at Indiana University,” a history of the department prepared by Harry G. Day for the occasion.

Many striking comparisons can be drawn between the costs of the structures, status of American chemistry, and status of the department at the time of the two events. The 1931 building cost a little more than one half million dollars, and the cost of the 1988 structure was about thirty times this amount! In 1931 the first American Chemical Society Award in Pure Chemistry was presented to Linus Pauling for his research on chemical bonding. In 1931 the department was scarcely recognized as a significant entity outside Indiana. Amazing progress in the status of the department occurred during this 57 year interval. For example, even in the same issue of the AIUC Newsletter that reported the dedication, three chemistry faculty members (Chisholm, Novotny, Parmenter) were cited for the major national recognition that each had received near the time of the dedication.

**LOOKING AHEAD**

Events and experiences of the past, thoughtfully and comprehensively appraised, are the surest guides in attempting to view the future. The extensive investment in construction and remodeling in the 1980s and early 1990s was necessary. The strong and unified attitudes toward purposeful learning can surely be expected to yield superiorly educated students. This, linked pervasively with constructive zeal for research, will promote balanced development and attitudes in all the students, faculty, and staff. Understanding of the common goals must prevail in all for superior learning and advancement in newer knowledge to occur.
References

A large proportion of the data and other facts was obtained from the files in the Archives/Alumni Office of the Department of Chemistry and personal records of Day and of Greene. In addition, as indicated in the text, much reliance was placed on many issues of the AIUC Newsletters and informational publications of the department such as The Graduate Program in Chemistry. All of these are on file in the Archives/Alumni Office.
Indiana has more than a score of baccalaureate-degree granting institutions. Four are tax supported and all the others are private, being dependent entirely on tuition, endowments, gifts, and/or religious denominations. In addition, Indiana University and Purdue University have IUPUI (Indianapolis) and IUPUFW (Fort Wayne) and regional campuses through which baccalaureate degrees are awarded. The developments to degree granting status at IUPUI, IUPUFW, and on the regional campuses have been so recent and so closely related to the parent universities that they will not be surveyed as separate institutions.

Indiana University is the oldest of all baccalaureate level public institutions in Indiana. Hanover College, founded in 1827, is the oldest of the private institutions. All institutions in the state suffered vicissitudes of various kinds in the struggle to become strong and dependable contributors to higher education.
During the latter quarter of this century Indiana University has exceeded all institutions in Indiana in the number of baccalaureate degrees granted in chemistry. Recently it has been among the top institutions nationally in this category. In 1981-82 it was second nationally in the total number of such degrees (134) and it was tenth in the number of certified (by the American Chemical Society) bachelors degrees (37). Also, nationally Indiana University and Purdue University have ranked high in the number of doctoral degrees awarded in chemistry. In 1981-82 the degrees awarded were 23 and 33 respectively (C&EN, 18 April 1983).

The relatively high standing of several private Indiana colleges in chemistry in the state and the nation can be shown in different ways. One significant measure was reported in 1982 by the Office of Institutional Research at Franklin and Marshall College. This study has been refined by Alfred E. Hall of The College of Wooster. The report of the analysis has been provided by Byron L. Ferguson, AM'50, Indiana University. The refined study ranked the top 101 undergraduate institutions in chemistry from the rankings of 837 institutions. The refinement was based on calculating the proportions of graduates in chemistry at each school during 1916-1976 who received research doctoral degrees between 1920 and 1980. The basic data were obtained from files maintained by the National Research Council. However, before approximately 1947 in many institutions the number of graduating seniors in each discipline was not recorded. Although Hall at the College of Wooster attempted to obtain comprehensive information it was not available for more than about one-half of the institutions. Therefore, the rankings were based on nine academic years for which almost complete data were available at approximately four-year intervals: 1947-48, 1950-51, 1953-54, 1957-58, 1959-60, 1963-64, 1967-68, 1971-72, and 1976-77. For these years, the data were complete for 92 to 101 of the institutions.

The refined rankings were determined by calculating the average number of doctoral recipients for each institution during 1920-1980 and the average number of graduating seniors with majors in chemistry for the nine academic years indicated above. An index was calculated by dividing the average number of graduating majors in chemistry by the average number of doctoral recipients for each institution.

In this analysis Swarthmore College had the highest rating. It was estimated to have had 4.07 graduating seniors in chemistry during 1947-1976 for every graduate who received a research doctoral degree in 1920-1980.

The private institutions in Indiana included in the study and their ratings are as follows:
A calculation of rankings based on the average number of chemistry majors per year during 1920-76, even though less comprehensive, showed that DePauw University and Wabash College retained approximately the same high standings, and Valparaiso University remained in the select group, but at a low level. Earlham and Manchester Colleges were in the intermediate range. None of the other private institutions were rated.

Although this mode of evaluating the quality of work in chemistry has significance, it is clear that other factors than the earning of research doctoral degrees are important. Quality surely has not remained constant. In some institutions the quality has indeed become better in time and in some it has ebbed.

In 1984 the following institutions in Indiana held accreditation by the American Chemical Society for professional training in chemistry:

- Ball State University
- Butler University
- DePauw University
- Earlham College
- University of Evansville
- Indiana State University
- Indiana University
- Indiana University at South Bend
- Indiana University-Purdue University at Fort Wayne
- Indiana University-Purdue University at Indianapolis
- University of Notre Dame
- Purdue University
- Purdue University at Calumet Center
- Rose-Hulman Institute of Technology
- St. Mary's College, Notre Dame
- Valparaiso University
- Wabash College

To aid in the preparation of this survey all the chemistry degree granting institutions in Indiana were requested to provide historical information about developments in chemistry. Many responded generously, but owing to inadequate information some institutions could not be
included in the survey. I am very grateful to each cooperating institution for all the information provided.

**BALL STATE UNIVERSITY**

Ball State University began as a private school in 1898. The first stage of the evolutionary process to a modern university was designated Eastern Indiana Normal University. This was changed to Muncie Normal Institute and later it became the Muncie National Institute. The site for these schools was roughly 70 acres at Muncie, Indiana. In 1918 the latter school was transformed to a public institution, Indiana State Normal School, Eastern Division. In 1929 the name was changed to Ball State Teachers College. It remained so until 1965 when marked changes were initiated which have led it to university status. The primary role of each of the evolving institutions was the education of teachers. This remains an important role of Ball State University.

Before 1965 there were no separate science departments at Ball State. Each science discipline was a division of the Science Department. In 1965 chemistry and the other sciences became separate departments. A Science Hall was completed by 1924. Chemistry was taught in this building until the completion of the Robert H. Cooper Science Complex in 1967. At the time of the move to the new quarters in 1967, the Chemistry Department had 3 teaching laboratories, a few instruments to provide a physical chemistry laboratory, and no space for research. After 1967 there were 6 classrooms, 33 research laboratories for students, and some research space for the faculty.

Some chemistry was taught during all the stages of development at Ball State. Jay Howard Johnson taught chemistry and physics from 1918 to 1920 when he was replaced by Frank V. Graham. In 1944 Graham died and he was replaced by Robert L. Shelley (PhD'29, I.U.). Shelley was joined by Park A. Wiseman in 1947. In 1956 these two were joined by Gerald E. Doeden (PhD'65, I.U.). The next year the small group was joined by Richard Lawrence who taught both physics and chemistry. Lawrence completed his doctorate degree in physical chemistry at the University of Arkansas in 1964. Further strength in chemistry was added that year with the addition of Dr. LeRoy A.McGrew. In the same year Dr. Jack Montague and Gerald Alexander (AM'40, I.U.) were designated members of the Chemistry Division. Thus in 1964, as they prepared for reorganization as a department, there were 7 faculty members in the division.

Expansion was accelerated in 1965 with the change to university status. Wiseman became the first department head. He served four years in this crucial building period. Three others were appointed to the faculty: in biochemistry, Dr. William Bowman; Dr. Ralph Joyner, in inorganic
chemistry; and Mr. Jack Bateman, in general chemistry. Bowman left in 1968. Dr. Richard Copland joined the department in 1967 and left three years later. Dr. Pang Fai Ma was appointed in 1969.

Under Wiseman's leadership the new department's goal was to establish a sound professional program and to have it well recognized. Accreditation for professional training was granted in 1969 by the ACS. In 1967 the department moved to the new $4,000,000 Physical Sciences and Mathematics Building. It received equipment grants from the NSF and the university totaling approximately $200,000.

In 1969 Dr. Robert Van Atta followed Wiseman as head. He served in this role until 1979 and retired in 1986. In 1970 the department benefited from a College Science Improvement grant through the NSF. With matching funds from the university this stimulated the development of an undergraduate research program. The grant has remained a hallmark of that program. Both the undergraduate and the master's level programs were much benefited.

During this decade the analytical chemistry curriculum was strengthened and a science library was established in the Physical Sciences and Mathematics Building. Additions to the faculty were: Dr. John Meiser (physical chemistry) in 1969, Dr. Bruce Storhoff (inorganic chemistry) in 1970, Dr. Paul Bock (organic chemistry), and Dr. John Mosho (inorganic chemistry) in 1973, Dr. Eric Johnson (biochemistry) in 1976, and Dr. Lynn Sousa (organic chemistry) in 1978.

From 1979 to 1986 Storhoff served as chairman instead of head. He was followed as chairman by Dr. Ralph Joyner from 1986 until his retirement in 1988. Faculty additions during this nine year period were: Dr. James Rybarczyk (analytical chemistry) in 1981, Dr. Mohammad Behforouz (organic chemistry) in 1982, Dr. James Pyle (organic chemistry) in 1983, Dr. Joseph Thompson (analytical chemistry) in 1986, and Dr. Patti Lang (physical chemistry) in 1987.

In 1988 Dr. Scott Pattison replaced Joyner as chairman — the year that Joyner retired. Pyle's primary role is University Director of Research for the university.

A few of the more successful chemistry graduates from the department include Jack P. Young (BS'50, Ball State; PhD'55, I.U.), Larry N. Lesh (BS'59, AM'66, Ball State) and Anthony J. Infante (BS'72, MS'72, Ball State; PhD'77, MD'78, I.U). Young is Senior Scientist at the Oak Ridge National Laboratories. He is the author of more than 100 scientific publications. Lesh is the science department chairman at Memorial Park Middle School in Fort Wayne, Indiana. Infante is Director of the Immunodeficiency Clinic at the University of Texas in San Antonio, Texas.

In early January 1991 the faculty members in the Department of Chemistry at Ball State University were:
Dr. Scott Pattison, Biochemist and Chairperson
Dr. F. Keith Ault, Chemical Educator
Dr. Mohammad Behforouz, Organic Chemist
Dr. Paul Bock, Organic Chemist and Administrative Assistant
Dr. Eric Johnson, Biochemist
Dr. Terry Kruger, Organic Chemist
Dr. Patti Lang, Physical Chemist
Dr. John Meiser, Physical Chemist
Dr. James Pyle, Organic Chemist and University Director of Research
Dr. James Rybarczyk, Analytical Chemist
Dr. Lynn Sousa, Organic Chemist
Dr. Bruce Storhoff, Inorganic Chemist

This information was taken from a brief history of chemistry at the institution kindly prepared and given to me by Professor Emeritus of Chemistry Ralph Joyner, to whom I am indebted.

**BUTLER UNIVERSITY**

Butler University came into existence in 1850 in Indianapolis as North-Western Christian University. The original charter was drawn up by Ovid Butler. After moving to a more favorable location in 1875 the institution found by 1923 that another move, to the present 250 acre property, was highly desirable. The move was made in 1928.

Originally there were six schools or divisions, including the School of Natural Sciences. The first faculty appointments were in 1855 and four were selected at the beginning. Robert Milligan was the first professor of natural sciences and John Young was designated director of the school. From 1855 to 1858 he was acting president. Between 1871 and 1877 the School of Natural Sciences became two departments: natural science, and physics and chemistry. It has not been determined when physics and chemistry became separate departments.

The catalog of 1888-89 includes chemistry as a department of study. Students could enroll in chemistry in the junior year. Remsen's "Introduction to the Study of Chemistry" was used. There were three recitations and laboratory for two hours per week in the first term. The second term was largely qualitative analysis with at least four hours of laboratory and one of recitation or lecture. This was continued in the third quarter. In the senior year an elective course was given. It included quantitative analysis, organic chemistry, and examination of waters.

Ten years later, as shown in the catalog for 1897-98, the additional courses were: advanced qualitative analysis, advanced inorganic chemistry, and "special work."

Other added courses and the years that they were added, were:
1903    Inorganic Preparations
1904    Radioactivity
1906    Gas Analysis
1912    Physical Chemistry
        Advanced Organic Chemistry and Qualitative Analysis
        Industrial and Synthetic Chemistry
1917    The Rarer Elements
        History of Chemistry
        Industrial Analysis
        Metallurgy including Assaying and Metallography

Some of the former chemistry faculty included:

John A. Young                  *Keith Morton Seymour
Thomas M. Ided                  Martin Allen
William J. Karslake            James W. Ferguson
Richard Bishop Moore           Frank J. Welcher
Guy Howard Shadinger           H. Weldon Baker
James Brown                    R. Lowell Hicks
John Ralph Kuebler             Richard P. Pioch
William Jacobs Cotton          Harry A. Rose
*Earl H. C. Davies             *Ralph K. Birdwhistall
Karl Stone Means               Joseph T. Morrison
Elmer C. Payne                 John H. Smith

Those who were head of the department, when known, are shown with an asterisk.

The chemistry faculty members in 1984-85 were: Merle W. Carlson, Sidney A. Kilsheimer, Joseph L. Kirsch, Shannon L. Link, Robert A. Pribush, and Paul R. Quinney. The latter was John Hume Read Professor of Chemistry and Head of the Department.

The most outstanding graduate in chemistry was Arthur C. Cope, a native Hoosier who received his baccalaureate degree at Butler in 1929. After serving on the faculty at Bryn Mawr and at Columbia he joined the chemistry faculty at MIT in 1945 and soon became head of the department where he served until 1965, one year before he died. He discovered the organic chemistry rearrangement reaction known by his name and published excellent research prodigiously in organic chemistry. For many years he was a leader in the American Chemical Society, including one year as president. He received many prestigious honors including the Roger Adams Award. He was a member of the National Academy of Sciences.

Much of this information was generously furnished by Dr. Kilsh-eimer through the cooperation of Dr. Quinney.
DePauw University

The First Annual Catalog of the Officers and Students of Indiana Asbury University (changed to DePauw University in 1884) was published in 1839 and construction of the first building began in 1837. The institution was founded at Greencastle, Indiana. The catalog listed a required course in chemistry to be taken in the second semester of the junior year. The professor was Matthew Simpson, a Methodist minister, who became president of the institution. He was followed in 1841 by William C. Larrabee, as Professor of Mathematics and Natural Science, and in 1842 Charles G. Downey became responsible for instruction in chemistry. The 1860-61 catalog noted that the first course was followed by work in qualitative analysis with some attention to quantitative analysis.

In 1874 Philip S. Baker was made responsible for teaching chemistry. He graduated from Asbury in the same year. While teaching there he received an MD degree from Indiana Medical College in Indianapolis in 1889. He became the first professor of chemistry at DePauw in 1883 and continued in that position until his death in 1901.

William M. Blanchard succeeded Baker in 1902. He continued as head of the Department of Chemistry until his retirement in 1940. His PhD degree was received at Johns Hopkins University. Following this he spent one year on the faculty at Rose Polytechnic Institute in Terre Haute before his appointment to DePauw. The appointment began a forty-year tenure of such quality that DePauw became recognized for outstanding strength in chemistry and science education.

Following Blanchard’s retirement he was succeeded by Jessie L. Riebsomer who was at that time a member of the chemistry faculty. After five years Riebsomer became head of the Department of Chemistry at the University of New Mexico. He was followed in 1945 by a member of the DePauw faculty Jervis M. Fulmer. His service as head of the department continued until his retirement in 1964. The next head was Donald J. Cook who received his PhD degree in chemistry at Indiana University in 1944. After one year as an industrial chemist Cook joined the DePauw faculty in 1945. He retired from the headship of the department in 1980, but from 1967 to 1970 this responsibility was held by Howard B. Burkett who also had been a member of the DePauw faculty before receiving the headship. Cook’s successor in 1980 was John A. Ricketts who received his BS in chemistry at Indiana University in 1948. Like all the other heads of the department, he had been a member of the chemistry faculty before receiving the top appointment.

The number of chemistry faculty members to staff the department gradually increased from 1 in 1900 to a total of 7 in 1981.

From 1902 until 1972 chemistry was housed in Minshall Laboratory, an imposing building for chemistry and physics which was made
possible by a gift from D. W. Minshall of Terre Haute. In 1972 the
department moved into a commodious new building which in 1980 was
ceremoniously designated the Julian Science and Mathematics Center.

As indicated elsewhere in this chapter, DePauw ranks very high
nationally in the proportion of its graduates in chemistry who have earned
doctoral degrees in chemistry. Many have become distinguished contrib­
utors to progress in science, health professions, and business.

The many distinguished graduates include:

Ross Allen Baker (1906) who became head of the Department of Chem­
istry, College of the City of New York.

John Machlin Buchanan (1938) became noted in biochemistry at the
University of Pennsylvania, at MIT, and at other outstanding in­
stitutions. He has honorary degrees from DePauw and the Univer­sity of Michigan. He is a member of the National Academy of
Sciences and he has been recognized in various other ways.

George L. Clark (1914) who pioneered in the use of X-rays as an ana­
lytical tool and for the elucidation of chemical structure. From
1927 to 1953 he was head of the Division of Analytical Chemistry
in the Department of Chemistry at the University of Illinois.

Percy L. Julian (1920) who was the first black person to hold an ap­
pointment at DePauw. While he was in the Department of Chem­
istry as research fellow from 1931 to 1936 he determined the
structure of physostigmine. From 1936 to 1954 he was Director
of Research for Glidden Company. In 1953 he founded the Julian
Laboratories. He was recognized in different ways including mem­
bership in the National Academy of Sciences and the awarding of
honorary degrees to him by DePauw University and Indiana Uni­
versity.

Merrill E. Fenske (1925) who became noted in practical aspects of pe­
troleum chemistry. From 1959 to 1969 he was head of the De­
partment of Chemical Engineering at Pennsylvania State University.

Herbert E. Carter (1930) who had a distinguished career in biochemical
research and as an administrator at the University of Illinois and
at the University of Arizona. He has honorary degrees from De­
Pauw, University of Illinois, Indiana University, and Thomas Jeff­
erson University. He is a member of the National Academy of
Sciences and he has received numerous prizes and awards for re­
search. He has served on various major boards and commissions.

The principal information for this review was generously furnished
by Professor Emeritus Donald J. Cook. The compiled source, authored
by Dr. Cook, was printed by the DePauw Association of Chemists in
EARLHAM COLLEGE

Earlham College, at Richmond, Indiana, is the successor to Friends Boarding School which was founded in 1847 at Richmond by the Religious Society of Friends. It became a college in 1859.

As pointed out in a letter in 1981 by the College’s Archivist J. Arthur Funston, “The teaching of chemistry occupied an important place in the curriculum from the very beginning of Earlham College.” The first collegiate instruction was in summer 1860. The first catalog grouped the offerings under three divisions: English, Mathematics, and Classics. For freshmen the courses under English were Physical Geography, History, Astronomy, and Chemistry. Stockhardt’s textbook was listed for the latter. For the sophomore year chemistry was continued in the English division and the textbook was by Youman. This subject was not continued in the junior and senior years. Before 1874, for reasons of dire financial necessity, the teaching of English was combined with other subjects including those listed in the English division.

In addition to the regular college program, the first catalog stated that:

“a Scientific Course has been established in order to accommodate those who wish to pursue any subject embraced in it to a greater extent, and to become more familiar with the use of apparatus than is practicable in an ordinary College course. The subjects taught are Chemistry, Geology, Botany, Civil Engineering and Astronomy; any two of which will require a period of two years study.”

In 1863-65 the catalog specified that there were offerings in Qualitative Analysis and General Principles of Quantitative Analysis. A note in each instance declared that the courses were “elective for female students.” Thus in this regard Earlham was ahead of Indiana University because the latter did not admit women to classes until 1867. In 1866-67 the Scientific Course was increased from three to four years. This made it equal in length to the Classical Course. The statement for 1873-74 noted that

“In Chemistry, Botany, and Geology the students in the Scientific Course do double the amount of work done by those in the Classical Course.”

Austerity and inconveniences in the early decades were commonplace. There was no endowment. The salaries of the very small faculty were dependent almost solely on the uncertain income from students. Equipment, chemicals, library resources, and space were inadequate by any standards. For a long time there was only one building for everything
including living quarters for the students, recitations, lectures, study, library, college offices, museum, and laboratory. Even after the first twenty years the president's office and the treasurer's office were both in the same room.

In the early years of the college, beginning in 1869 Joseph Moore AM was listed as "Teacher of Natural Science." This included chemistry. He continued this responsibility part of the time after 1870-71 when he became president of the college as well as curator of what was later known as the Joseph Moore Museum of Natural History.

As reported by the Archivist Funston in 1981, Joseph Moore was followed by Erastus Test, MS, MD, as professor of natural science. After one year Test was listed as professor of chemistry and botany. He was followed by Morris F. Wright, AB, in the same area. After a year, in 1873-74, Wright was followed by David W. Dennis, AB, as "Instructor in Chemistry." Dennis served as professor of chemistry and later in biology until he died in 1916. His son, William C. Dennis, became President of Earlham in 1929.

A measure of Earlham's poverty for a long time is shown in the announcement of "Officers of Instruction and Government" in the catalog for 1873-74. Only five, including President Moore, are listed. There is one person for mathematics, one for modern languages and history, one for Greek and Latin, and one - Dennis - for chemistry. President Moore is shown to be responsible for moral philosophy and geology. No other subjects were in the curriculum that year.

Like others at Earlham who had any responsibility for teaching chemistry prior to the twentieth century, Dennis had virtually no professional training in the subject. However, he became broadly interested in chemistry and in botany. Apparently he acquired considerable knowledge in both fields. He published "A Qualitative Chemical Analysis" and numerous scientific articles in the Proceedings of the Indiana Academy of Science, and various botanical journals. He was president of the Indiana Academy of Science in 1901 and he became a Fellow of the Academy as well as Fellow of the American Association for the Advancement of Science.

The most prominent of chemistry faculty members was Harry N. Holmes who received his PhD degree in chemistry at Johns Hopkins University in 1907 and then served as head of Earlham's chemistry department until 1914. Next he was head of the department at Oberlin College until his retirement in 1945.

In spite of the starkly limited resources that extended well into the twentieth century, Earlham became widely esteemed for some of its graduates. Among these were Nobel Laureate Wendell M. Stanley who majored in mathematics and chemistry. He graduated in 1926, but until about that time he was primarily interested in football. The experience
at Earlham must have been good for him because he received a PhD degree in chemistry three years later at the University of Illinois and, with Professor Roger Adams his mentor, he published 13 papers on his graduate research.

Laurence E. Strong, for many years head of the Department of Chemistry, and Funston, J. Arthur Funston, Archivist, kindly supplied valuable information.

UNIVERSITY OF EVANSVILLE

Evansville College opened in 1919 and became the University of Evansville in 1967. During the first two years Andrew J. Bigney, who had studied at Johns Hopkins and Harvard, gave the lectures in chemistry and Charles D. Dilts, a high school teacher, directed the laboratory work. From 1921 to 1954, when he retired, Dr. Alvin Strickler headed the teaching of chemistry. He was noted for his constructive participation in civic and public affairs, as well as for his enthusiastic and meticulous involvement in chemistry. Through him the department of chemistry became one of the strongest in the college. He was followed by Norman O. Long, who left in 1957. Lowell E. Weller then became head of the department. He received his PhD degree at Michigan State University in 1956. He was productive in research as well as in the modernization of teaching. Other chemistry faculty members have included Andrew Sherlockman, Philip A. Kinsey, and Clifford G. Shultz.

Robert C. Gore was one of the earliest graduates to receive a baccalaureate degree, in 1929, and then to receive a doctoral degree in chemistry at Indiana University, in 1933. Ralph L. Seifert received his AB degree at the University of Evansville in 1934. He became one of the most productive graduates.

Information concerning chemistry at the University of Evansville was kindly furnished by Professor Weller.

HANOVER COLLEGE

In 1832 Hanover Academy was named Hanover College. The college is located at Madison, Indiana. The first published curriculum was in 1832-33. One chemistry course was available from the beginning. By 1892 this had been increased to two courses per year. In 1912 it became four courses, and six courses in 1926. In 1879-80 a listing of organic chemistry first appeared in the catalog. This was changed to two semesters in 1926. In 1888 analytical chemistry was added. In 1930-31 a one semester physical chemistry course was started and in 1933-34 this was changed to two semesters.

A listing of developments in science at Hanover prepared in 1953 by Professor Ned Guthrie states:
“In 1856 Professor Stone, reported to the trustees that he had received and spent sixty dollars for chemicals. In 1871 an appropriation of $2000 was made by the trustees for the purchase of scientific equipment.”

Apparently no teacher of chemistry at Hanover was really specialized in the subject prior to the appointment of Professor Ned Guthrie in 1926. However, Andrew H. Young, who was a faculty member from 1879 to 1926 had interests and responsibilities in chemistry as well as in botany during that long period. Professor Guthrie stated that “Prof. Young has been the most outstanding teacher ever connected with Hanover College.”

Professor Guthrie received a BS degree in chemistry at Illinois Wesleyan University in 1925. In 1926 he was awarded an MS degree in chemistry at the University of Illinois. After beginning his long tenure at Hanover he returned to the University of Illinois for further work in chemistry in seven summer sessions. He did not complete the requirements for the doctoral degree.

Apparently virtually all of the chemistry teaching was done by Professor Guthrie from 1926 until about 1947. Other faculty in chemistry beginning in 1947 included Wm. F. Wager for two years, Erle S. Huse from 1949 to 1952, and Dale E. Woerner who started in 1953.

A science building, which included chemistry, was completed in 1948.

In summarizing the status of science, including chemistry, through more than the first 90 years at Hanover Guthrie wrote:

“...too much of the science teaching was performed by ministers who had but little training in the field of science. The laboratory method of teaching was little used due to lack of facilities. Much of the learning was rote memory. Science courses were text book courses”

This situation prevailed well into this century at many of the educational institutions in Indiana.

Guthrie gave devoted attention to chemistry at Hanover throughout his long tenure on the faculty. He was succeeded by H. K. White, PhD’54, at Indiana University. White, in 1957, became head of the Department of Chemistry. He has remained at Hanover since that time. Scarcely any research contributions in chemistry have been made throughout the history of Hanover. One of the most notable graduates, who received a degree in 1867, was Harvey W. Wiley. He was the first professor of chemistry at Purdue and he was State Chemist from 1874 to 1883.

From 1883 to 1912, when he resigned, Dr. Wiley became increasingly influential in the development and enforcement of regulations on
the purity and safety of foods and drugs. During this period he was chief of the Bureau of Chemistry of the U.S. Department of Agriculture. He is best known for his major role in the development and passage of the Pure Food and Drug Act of 1906. During 1893 and 1894 he was President of the American Chemical Society. On the 50th anniversary of the passage of the Pure Food and Drug Act, Wiley was pictured on a commemorative postage stamp issued by the United States.

Other chemistry alumni who became rather widely known included the following:

Carl P. Sherwin (1909). He received an AM degree in chemistry at IU in 1911, an MD at Fordham University in 1920, and he received other degrees. His research included many studies on detoxification processes.

Julian L. Culbertson (1917). He received an AM degree in chemistry at IU in 1918 and an ScD degree in chemistry at the University of Michigan in 1933. He was head of the Department of Chemistry and Chemical Engineering at Washington state College from 1947 to 1960.

Frank A. Guthrie (1950). His PhD degree was received at IU in 1962. He has been chairman of the department of Chemistry at Rose-Hulman Institute of Technology.

Much of the information was taken from a detailed handwritten record prepared by Ned Guthrie in 1953 and helpfully loaned to me by Dr. H. K. White in 1981.

**INDIANA CENTRAL UNIVERSITY**

(UNIVERSITY OF INDIANAPOLIS)

Indiana Central University developed from Indiana Central College which was established in 1902. It is located in Indianapolis, Indiana. Although some attempt was made to teach chemistry throughout the first five decades there was apparently no sustaining program until Dr. Robert Brooker joined the faculty in 1951. Dr. Brooker retired in 1968 and he was succeeded by Dr. Kenneth Borden. During more than thirty years the relatively new department has offered basic courses in chemistry and several graduates have become productive professional chemists.

The limited records show that a small chemical laboratory was used at least as early as 1909. During the period from 1905 to 1951 ten different persons are on record as being responsible for some level of instruction in science. It is presumed that chemistry was included, at least most of the time. It is known definitely that beginning in 1946 chemistry has been taught by chemists.

The information for this summation was provided by Dr. Borden and the archivist Mr. Merrill Underwood.
INDIANA STATE UNIVERSITY

Indiana State University began as Indiana State Normal School in 1870. It is located at Terre Haute, Indiana. The first catalog appeared in 1870-71. In 1929 the Normal School became Indiana State Teachers College. Later, in 1961, the designation was changed to Indiana State College and in 1965 it was named Indiana State University.

The first teaching of chemistry was by Dr. J. T. Scopvell who was primarily interested in collecting botanical and geological specimens. During his tenure from 1873 to 1881 he taught chemistry with laboratory exercises and physics without a laboratory program. The content of the courses and the textbooks are not known. Between this time and 1904 about the only information is that in 1886 Professor Gillum became head of physics and chemistry.

In 1904 it is reported that Edwin M. Bruce was made assistant professor of chemistry and that in 1897 he had received an AB degree in chemistry at Indiana University. He “offered six courses in chemistry in 1904, non-metals, metals, organic, advanced chemistry, quantitative analysis and complete quantitative analysis (sic).”

When a new science building was opened in 1916-17 chemistry had quarters on the third (top) floor. The offices, laboratories, and furniture were comparable in quality to other newly equipped college departments in Indiana at that time.

Following the establishment of higher requirements for teacher certification in the state in 1946 some graduate courses in chemistry were developed. Up to that time and for the next twenty years the major function of the Department of Chemistry was to act with other departments in the preparation of students to teach in the high schools. This included the provision of “service” courses in home economics, industrial arts, etc., as well as special training for those who would teach high school chemistry.

In 1921 Professor Bruce was followed by Dr. P. D. Wilkinson as head of the department. By the time he retired in 1963 various progressive developments had occurred in the addition of professional chemists to the faculty and the provision of suitable physical facilities and library resources. From 1963 to 1965 Professor W. G. Kessel was the head of the department.

In 1965 Dr. W. B. Bunger became the departmental head. He had a broad background of experience in governmental and industrial work in chemistry, thus providing direction in the broadening of chemistry at Indiana State. He received his PhD degree in chemistry at Kansas State University in 1949.

Some of the chemistry faculty members with Bunger received degrees in chemistry at Indiana University. These include Melvin Druelinger, Clarence J. Hull, and Joseph R. Siefker.
Some of the information about Indiana State University was furnished by W. G. Kessel who received his EdD degree at IU.

**MANCHESTER COLLEGE**

Manchester College at North Manchester, Indiana, was founded in 1889. It has been sponsored by the Church of the Brethren since 1895. The devotion of its faculty and the church to education and training as ways to serve humanity seems to have favorably influenced developments in the sciences, including chemistry virtually from the beginning of the institution.

The earliest records available concerning the place of chemistry in the curriculum are catalogs of the college. The catalog for 1905-06 has a division for science in which courses are described in physics, chemistry, physiology, zoology, botany, and physical geography. There were two courses in chemistry, the first dealing "mostly with inorganic chemistry" and including "the essential elements of organic chemistry." The second course was qualitative analysis. One of the three teachers of science, including chemistry, from 1905-1911, each for only one or two years, was John N. Martin who received his AB from Indiana University in 1907.

The intermediate phase in the progress toward a definable department of chemistry was greatly influenced by Edward Kintner who began to teach chemistry and other subjects in 1911. He remained at Manchester College the rest of his long life except for periods of time from 1911 to 1914 that he spent at Ohio State University completing the work for his AM degree. Later he was awarded an ScD degree. From 1911 to 1923 he had charge of practically all the science courses at the college. After 1923, when chemistry and physics became departments, he gave most of his teaching time to the biological sciences. In addition, Kintner was a major figure in the Church of the Brethren both on campus and throughout Indiana.

Kintner was clearly a patriarchal figure at Manchester College. Although he was about 75 years younger than Theophilus Wylie, the two had somewhat comparable roles at their respective institutions. Each devoted virtually all of his professional life to teaching a wide variety of subjects, to administrative work, to preaching and other forms of religious service, to faithfulness in assisting his institution through adversities, and living to experience high levels of recognition by colleagues and the institution. At Manchester College a science building erected in 1963 was named after Kintner and one of his pupils Dr. Carl W. Holl. Of course at Indiana University the first new science building on the present campus, Wylie Hall, was completed in 1885 and named after Theophilus
Wylie and his cousin, the first president of Indiana University, Andrew Wylie.

Holl, like Kintner and his successor, Dr. Harry R. Weimer, received his baccalaureate education at Manchester College. After receiving his PhD degree in chemistry at Ohio State University in 1923 he became head of the department and continued in that role until 1957. From 1927 to 1950 he was dean of the college. After retiring as chairman of the department he continued to teach chemistry until his death in 1961. He holds the distinction of being the first faculty member of the college with a doctoral degree. When he joined the faculty of the college in 1923 the catalog listed 11 courses in chemistry including two in general chemistry, one in qualitative analysis, three in quantitative analysis, two in organic chemistry, one in inorganic chemistry, and two in physical chemistry. He was the only teacher for all of the work in chemistry!

One of the distinctive honors for Holl and the college was his selection by the American Chemical Society as one of six college teachers that year to receive the Manufacturing Chemists Association Award for outstanding teaching of chemistry at the undergraduate level. In addition to his academic contributions to the college Holl performed various community services, including membership on the school board of North Manchester, teaching service in his church’s Sunday School, and active membership in the local Kiwanis Club. In addition to his active membership in the American Chemical Society and some other national professional organizations, he was active in the Indiana Academy of Science.

Holl was followed by Harry R. Weimer as chairman of the Department of Chemistry. Weimer was also a graduate of Manchester and his doctoral degree was from Ohio State University. He joined the Manchester faculty in 1938 and he became chairman of the department in 1957. This service continued until his death in 1970. Like many of his faculty colleagues in chemistry at Manchester College and other Indiana institutions, he was an active, member of several professional societies including the American Chemical Society and the Indiana Academy of Science.

Weimer was succeeded as chairman in 1970 by Dr. Edward G. Miller.

Several of the chemistry majors at Manchester College have made distinguished contributions in chemistry and many have brought honor to the school through their work as scientists, physicians, or in other professions or in business.

The most outstanding graduate is Paul J. Flory who received a BS degree in chemistry at Manchester in 1931 and his PhD degree in chemistry at Ohio State University in 1934. Following outstanding academic and industrial successes, especially in polymer chemistry, in 1974 he received the Nobel Prize in Chemistry. The college was naturally over-
joyed. Less than a year later it celebrated by holding a chemistry symposium to recognize the event and honor Flory who gave the principal address. Three other outstanding chemistry graduates from Manchester gave addresses in which their major contributions in polymeric science were described. These speakers were Roy J. Plunkett who discovered Teflon in 1939; Allan R. Sholtz, who was the first of Flory’s students to receive a doctoral degree; and Rex B. Gosnell a specialist in aerospace applications of polymeric materials. Plunkett has been recently elected to the Inventors’ Hall of Fame.

To round out the celebration, which was the most important ever in chemistry at Manchester, four other chemistry graduates were designated to give short papers. They were: Philip Kinsey, '53, University of Evansville; Wendell Dilling, '58, Dow Chemical Co.; Judy Driver Hruschka, '64, who had been with John I. Thompson Co.; and William Harshbarger, '63, Bell Laboratories.

The celebration was planned and directed by all the chemistry faculty members in 1975. They were: Edward G. Miller, Wilson B. Lutz, James T. Streator, and Stanley R. Weller.

Other outstanding Manchester chemistry alumni include:
Clem O. Miller (1930). After more than 30 years in academic and industrial positions of responsibility, Miller in 1957 became the first Executive Secretary of the Division of Chemistry and Chemical Technology of the National Academy of Sciences — National Research Council. After four years he assumed comparable responsibilities at the National Institutes of Health. Later he became Committee Management Officer in the U.S. Food and Drug Administration. He had various administrative responsibilities in the FDA and in various professional organizations. In 1967 he received an honorary ScD degree at Manchester College.

Clarence M. Neher (1937). After receiving his PhD degree at Purdue University in 1941 he joined the Ethyl Corporation and finally became one of three Senior Vice Presidents. In 1970 he became a member of the Board. He has over 20 patents and several technical publications.

Paul E. Weimer (1942). In 1948 he joined the Ethyl Corporation. By 1977 he had become Corporate Vice-President with the responsibility of directing the Corporation’s budget. Although much of his work eventually became somewhat remote from chemistry the first seventeen years of industrial work was in Research and Development.

Wendell W. Meyer (1957). Like some other notable Manchester alumni this man was a native of North Manchester. Before completing his Ph.D. at Indiana University in 1962 he was a bench chemist a short
time in the Ethyl Corporation. Since 1962 he has been a chemist in the Dow Chemical Company at Midland, Michigan.

Much of the information was generously furnished through the cooperation of Dr. Edward G. Miller.

UNIVERSITY OF NOTRE DAME

The University of Notre Dame at South Bend was founded in 1842 by the Reverend Edward Sorin. A catalog published in 1850 is extant but possibly one or more earlier issues were produced. A comprehensive but succinct record of science at Notre Dame was published by the university in 1965 in celebration of “The Centennial of Science at Notre Dame 1865-1965.” Dr. Lawrence H. Baldinger was the principal contributor of the historical record.

Apparently Thomas McKinnis, MD was the first to teach chemistry. He was listed as professor of chemistry in 1852, but he probably had other teaching responsibilities. How long he continued is not given in the centennial record. In 1858 Reverend Thomas L. Vagnier was designated professor of chemistry and he continued to 1875. In 1874 Reverend Joseph Carrier introduced a course in qualitative analysis. This was the year that Dr. Thomas C. Van Nüys began his tenure as professor of chemistry at Indiana University. Dr. Van Nüys also emphasized qualitative analysis.

In 1875 Reverend John A. Zahm followed Father Vagnier as professor of chemistry and physics. The next appointee in this position, in 1891, was Reverend James A. Burns who later became president of the university. Reverend Joseph Maguire joined the chemistry faculty in 1898, and in 1904 Reverend Julius A. Nieuwland came to Notre Dame for work in botany and chemistry. Father Nieuwland continued in this dual capacity until the early 20’s when he became director of research in organic chemistry and gave all of his time to teaching and research in the Department of Chemistry.

Although some degree of administrative and academic organization on a departmental status in the university was begun in the latter part of the last century, it was not until 1905 that the university was organized into four divisions. These included the College of Science. This was an outgrowth of the slightly structured division of science which was established in 1864. In 1865 provision was made for curricula in science leading to the degrees of Bachelor of Science and Master of Science.

In 1920 the college was reorganized into departments. A somewhat comparable reorganization occurred at Indiana University in the 1880’s.

The quasi departmental status had been recognized for chemistry long before 1920. In 1906 a reassignment of space for engineering programs and chemistry resulted in the transfer of the chemistry laboratories
to a building which had been designated as Technological Hall. A fire in this building in 1916 resulted in the construction of a new and much larger chemistry building, which was started in 1917. It became designated Chemistry Hall. An annex to this building was constructed just prior to World War II to house the Department of Chemical Engineering. Chemistry became the first department of the university to have a separate building to serve its needs. The department at Indiana University acquired its building for almost its exclusive use 14 years later, in 1931.

The administrative reorganization of the university in 1920 made Professor Henry B. Froning head of the Department of Chemistry and Chemical Engineering. In 1940 the joint administration of the two departments was discontinued. One year later Dr. Andrew J. Boyle succeeded Froning. Then in 1945 Dr. Charles C. Price became head of the department. He was followed in 1954 by Dr. G. F. D'Alelio. After six years Dr. Frederick D. Rossini became dean of the College. After four years, in 1964, Dr. Ernest L. Eliel became head of the department and served until 1967. He was followed by John L. Magee who served until 1970 and then became more active in the Radiation Laboratory. He was followed by J. P. Freeman who, like some of his predecessors, had his undergraduate work at Notre Dame. The short term rotating chairmanship had been functioning for some time but he served from 1970 to 1979. The next chairman was R. K. Bretthauer who held the position until 1982. He was succeeded in 1982 by T. P. Fehlnor.

For many decades various areas of organic chemistry were the focus of research and publications from the department. Research in physical chemistry started about 1930 and in inorganic chemistry it began about 1940. The activity in analytical chemistry and biochemistry was always at a low level.

For several decades chemistry at Notre Dame has been enriched by interdisciplinary programs and certain individuals in other departments. A major contributor has been the Radiation Laboratory which evolved from special programs at the university connected with World War II. Some of the chemical faculty connected with the laboratory included Dr. Milton Burton, Director, and Dr. John L. Magee, Associate Director. The latter was Director from 1971 to 1975. After this he became a senior staff member of the Laurence Radiation Laboratory at Berkeley.

The most notable chemical research at Notre Dame over the years is attributed to Father Nieuwland whose research on acetylene before 1925 proved to be fundamental in the development of various polymers including rubber substitutes. As stated by Dr. Baldinger in “The Centennial of Science at Notre Dame 1865-1965” (p. 30):

"Father Nieuwland was responsible for putting Notre Dame on the map, chemically speaking, when as an invited lecture at the first
Organic Chemistry Symposium in 1926 at Buffalo, he disclosed his now-famous catalytic polymerization of acetylene which gave rise to the basic patents in the manufacture of Neoprene."

The royalty income from Father Nieuwland's work contributed in different ways to the enrichment of science at Notre Dame, including a major part of the construction of Nieuwland Science Hall. Father Nieuwland died in 1936.

At least a score of other past or current members of the chemistry faculty have been major contributors in teaching and/or research.

**Purdue University**

In 1865 Indiana accepted the Federal donation of land made available through the Morrill Act of 1862. Proceeds from the sale of the land, a gift by John Purdue of $150,000 and 100 acres of land, and a gift of $50,000 from Tippecanoe County together with other gifts by the citizens of Battle Ground, led to the sound establishment of Purdue University at Lafayette, Indiana. From the beginning the institution's purpose was to provide agricultural and technical education. M. G. Mellon (J. Chem. Ed., 8, 1208-15, 1931) wrote "That the value of chemistry in such a school, as early recognized, is evidenced by the fact that, from the beginning, the science occupied an important place in the curriculum."

Instruction began in the new state institution in 1874. The first professor of chemistry was Harvey W. Wiley who had graduated from Hanover College, the Medical College of Indiana, and Harvard University. Also, in 1874 Indiana University appointed the first person here to have the title Professor of Chemistry, Thomas C. Van Nüys. Moreover, Van Nüys had received extensive training in chemistry at the Fresenius Institute and elsewhere in Germany. At Indiana University in chemistry the focus was on analytical chemistry and extensive laboratory work. At Purdue Wiley also emphasized analytical chemistry and much laboratory work. Van Nüys was primarily interested in the analysis of water, air, and urine; Wiley's greatest interest was sugar and the detection of adulteration of foods. In 1880 Wiley became state chemist as well as professor of chemistry, thus establishing that office at Purdue. The office has been continued by the state. About that time Wiley's propensity for innovation, administration, and promotion was manifested in his advocacy of a School of Chemistry. Other information concerning Wiley is in the review of Hanover College.

In 1883 Wiley was followed as head and state chemist by R. B. Wazler who after four years went to Howard University. From 1887 to 1889 John U. Nef held the top position. During his tenure the Mechanical Laboratory was built. After spending three years at Clark University he
Virtually from the establishment of the institution chemists who became noted for their contributions were on the faculty. The first was William A. Noyes, Sr. who became professor of chemistry in 1886. He had completed his PhD degree under Ira Remsen at Johns Hopkins. While at the Institute he had a leave of absence from 1888 to 1889 to work under A. von Baeyer at Munich. In 1903 he left the Institute to become the first chief chemist at the National Bureau of Standards. During his 17 years at the institute he taught all the chemistry courses and directed the research for seniors.

In 1907 Noyes was appointed head of the Department of Chemistry at the University of Illinois. He won many high distinctions including the Priestley Medal and presidency of the American Chemical Society. In 1898 before leaving the institute, a son, William A. Noyes, Jr., was born. He also became highly distinguished in chemistry.

From 1901 to 1903 Austin M. Patterson was a member of the institute's chemistry faculty. He also received his PhD degree under Remsen at Johns Hopkins. In 1903 Patterson left the institute to become chemistry editor of "Webster's New International Dictionary." This led to his selection as associate editor of Chemical Abstracts in 1908 and as editor in 1909. During the next several decades he became distinguished in chemical documentation.

Professor Noyes was succeeded at the institute by John White in 1903 and White remained on the chemistry faculty until 1936. During the last decade he was chairman of both chemistry and chemical engineering. He, like Noyes, received his PhD degree at Johns Hopkins. He served as acting president, vice-president, and on the institute's board.

White was succeeded in 1936 by Ralph K. Strong who remained at the institute until 1952, the year that Frank A. Guthrie joined the chemistry faculty. Guthrie received his PhD degree at Indiana University the same year. He was chairman of the department at Rose from 1969 to 1972. Another active member of the chemistry faculty was Oran M. Knudsen who served from 1947 to 1975. He was head of the department from 1951 to 1969.

Among the outstanding graduates in chemistry from Rose are Norman Cromwell, BS'35, and Ernest R. Davidson, BS'58. Both were born at Terre Haute. Davidson received his PhD degree at Indiana University in 1961. Cromwell has had a distinguished career, mostly at the University of Nebraska. Davidson's career was established at the University of Washington and it is being enhanced at Indiana University, starting in 1984.

Much of the information concerning Rose-Hulman was helpfully furnished by Dr. Frank Guthrie.
TAYLOR UNIVERSITY

Taylor University, at Upland, Indiana, issued its first catalog in 1892. It was preceded by the Fort Wayne Female College which was organized in 1846 by the then Indiana Conference of the Methodist Episcopal Church. In 1890 control of the college passed to the National Association of Local Preachers of the Methodist Episcopal Church in honor of Bishop William Taylor.

In 1981 apparently the most knowledgeable person on the early history of chemistry at the university was G. Harlowe Evans who was in charge of chemistry from 1933 to 1941. Apparently he was the first holder of a PhD degree in the department. Prior to his time, the following were the only faculty members known to be responsible for chemistry: Olive May Draper, ?-1926, who had been the professor of chemistry in the department long before Evans went there in 1920 as a student Gilbert Ayres, 1926-27
T. A. Werkenthin, 1927-29
Everett J. Titchie, 1919-30
C. O. Bush, 1930-33

Others who followed Evans were: Keith D. Crane, 1941-46; Gordon Krueger, 1946-79; and Stanley L. Burden, 1979-

Burden received his PhD degree in chemistry at Indiana University in 1966.

A considerable proportion of the alumni who majored in chemistry became physicians.

Most of the information on Taylor University was furnished by G. Harlowe Evans, Professor Emeritus of Chemistry, and transmitted to me by Dr. Burden.

VALPARAISO UNIVERSITY

Valparaiso University is an outgrowth from a succession of small schools at Valparaiso, Indiana, all of which were educationally weak for-profit institutions. In 1925 it became a Lutheran institution and it began to operate on a not-for-profit basis in the tradition of many other church related colleges and universities.

The first institution was Valparaiso Male and Female College which opened in 1859. Financial adversities and other problems led to its sale to Henry Baker Brown in 1873. The name was changed to Northern Indiana Normal School and Business Institute. Brown was a wealthy, benevolent autocrat with strong religious convictions who wanted to provide a new pattern of practical scientific education for the masses. He aspired to become at least moderately successful in this enterprise. During the school's existence the few faculty members were required to teach any and all courses in the curriculum. The sciences naturally played
a minor role, but enrollments mounted phenomenally. This resulted in part through Brown's policy of widespread advertising.

In 1900 the name of the school was changed to Valparaiso College. After seven years it was changed to Valparaiso University. By 1907 the enrollment, including duplications, had reached about 5000. This made it next to Harvard University in enrollment and far above the other institutions in Indiana. By 1915 various changes had occurred in attitudes and expectations concerning higher education. These factors and the entrance of the United States into World War I in 1917 caused marked decreases in enrollment. The death of Brown added greatly to the troubles of the institution. The deterioration continued until 1925 when it became possible for the Lutheran Church to become owners with total authority in the governance and operation of the university.

After four years the necessary reorganization, financing, restaffing, curriculum revision, and other basic changes had progressed to the degree that accreditation in some areas became possible. As emphasized by John Strietelmeier in his book *Valparaiso's First Century*, published in 1959,

"The College of Liberal Arts was early singled out for grooming as the nucleus of the future University."

By 1929 there were many departments including chemistry. Thus in 1929 when the North Central Association of Colleges accredited the university's College of Liberal Arts the Department of Chemistry was given necessary recognition.

Prior to about 1929 chemistry at this university was surely of questionable significance. An alumnus of the Department of Chemistry at Indiana University, Byron L. Ferguson, AM'50, has thoroughly researched the work in chemistry at Valparaiso from the beginning of the institution. He has reported that chemistry is listed in a third year course in the 1857-60 catalog. Apparently there was no laboratory work prior to 1874. Analytical chemistry was listed for the first time in the 1878-79 catalog.

When a program in pharmacy was introduced in 1892 some work in chemistry was necessarily included. In 1897 dean of the School of Pharmacy J. N. Roe privately published *Practical Chemistry*. In 1916 J. D. Timmons, who was listed as professor of chemistry, published *Experiments for an Introductory Course in General Chemistry*. Dean Roe in 1898 was the first at Valparaiso to have the title professor of chemistry. At that time Timmons was listed as assistant professor of chemistry.

A thorough restructuring and reorganization started with the acquisition of Valparaiso University by the Lutheran Church. The new head of the Department of Chemistry was Albert F. O. Germann, AM'10,
Indiana University, who acquired an ScD degree in Geneva, Switzerland in 1912. After a short time he left the university.

The new faculty appointed in 1926-27 included H. V. Fuller in chemistry. He headed the department from 1931 to 1933. Walter E. Thrum became a member of the chemistry faculty between 1928 and 1930. He succeeded Fuller as head in 1933 and continued until his death in 1951. His doctoral degree was received at the University of Missouri in 1917.

The next head was Raymond G. Larson who received his PhD degree at Purdue in 1937. He was head from 1951 to 1956.

In 1956 the departmental leadership was changed from head of the department to chairman of department. At first the appointment was for one year. However in 1961 the terms were increased to three years but with renewable appointments.

The first chairman was Alvin Meibohm, who served in 1956-57 and in 1961-64. He received his doctoral degree at Tulane in 1950. He was followed in 1957-59 by Theodore C. Schwan who was awarded his PhD degree by Notre Dame in 1953. From 1955 to 1961 the chairman was L. Oliver Smith whose PhD degree was received at the University of Rochester in 1947. Again in 1964-65 Dr. Smith was chairman of the department. From 1965 to 1970 John F. Deters was the chairman. His doctoral degree was received at Notre Dame in 1964.

Finally in 1970 A. Gilbert Cook was made chairman. He received his PhD degree at the University of Illinois in 1959.

The many chemistry faculty members over the years at Valparaiso include Byron L. Ferguson who completed his AM degree at Indiana University in 1950. Ferguson went immediately to Valparaiso, his alma mater, to teach the courses of Professor Thrun who was ill. Upon the death of Professor Thrun in 1951 Ferguson continued on the faculty.

At least two of the graduates of Valparaiso, Edith Schroeder Lessor, AB'52, and John H. Goldbeck, AB'71, received doctoral degrees in chemistry at Indiana University.

The outstanding chemistry alumni of Valparaiso include Lowell P. Hager who received his AB degree there in 1947. He became head of the biochemistry division at the University of Illinois in 1967.

Byron Ferguson generously supplied information and gave encouragement in the preparation of summaries of history of chemistry at institutions in Indiana.

WABASH COLLEGE

Wabash College, the only all-male college in Indiana, had its beginning at Crawfordsville, Indiana in 1832. The 1836 catalog lists Edmund Otis Hovey as professor of chemistry and natural science. He began
his service at Wabash as professor of rhetoric. Following 1836 the catalogs listed him as professor of chemistry and geology. In 1841 he was described as professor of chemistry and natural science. In the early years chemistry was listed as a course taken in the junior year. Beginning in 1848 the catalog showed that it was offered in the first term of the senior year.

Early in Professor Hovey’s years on the faculty, while he was aiding President White, he wrote as recorded by Osborne and Gronert in their book on Wabash’s first hundred years:

“My labors at College commence at 8 o’clock in the morning and close at 4 P.M. My first recitation is in Moral Philosophy, by the Senior Class; from that I go to Chapel prayer, after which I hear a class in Analysis and English Composition. These occupy me until ten o’clock at which time I repair to my Chemical Laboratory and Lecture Room to prepare my lecture and experiments to illustrate it. The lecture with experiments is given at three o’clock on three days of the week, Mondays Wednesdays and Fridays. At four o’clock Chapel Prayers....”

Like Theophilus Wylie at IU, Hovey had various faculty responsibilities over several decades including primary responsibility for teaching chemistry. This extended from the mid 1830’s to the mid 1870’s.

Professor Hovey and his wife were instrumental in the attraction of substantial gifts to Wabash College. About 1858 Mr. Chauncey Rose of Terre Haute contributed $10,000 to establish the Rose Professorship of Chemistry and Botany. Rose’s interest in becoming a benefactor was stimulated through the fact that his wife’s brother and his wife were friends of the Hovey family. Subsequently other benefactions were made by Rose. They finally amounted to nearly $100,000. One gift in the amount of $50,000 was made in 1873 when Professor Hovey visited Rose in Terre Haute.

In 1874 Henry R. Thomson gave up his responsibilities in the Latin Department and became associate professor of chemistry. Three years later he became professor of chemistry and continued in this position until his death in 1884. He was succeeded by E. R. Lewis in 1885.

During Thomson’s tenure in chemistry Peek Hall was dedicated, in 1878. Chemistry and some other departments shared the new building. For chemistry there were two laboratories, one for qualitative analysis and one for quantitative analysis. There were also a lecture room and storerooms. During 1878-79 the lagging equipment needs of chemistry were met thus making chemistry comparable with the Department of Natural Philosophy.

In 1867 Wabash departed from the policy of granting a uniform AB degree. The faculty voted to grant a BS degree at the completion of
a prescribed course of study. This became a three year program made possible by the omission of all Greek courses from the BS degree requirements and the reduction of Latin to one year. After one year the new degree requirement was extended to four years. The added courses included bookkeeping, engineering, and history.

Apparently Lewis was followed in chemistry by Alexander Smith in 1892. As stated by Osborne and Gronert (1932), Smith had come from Edinburgh to begin the tradition of chemistry as one of the strongest departments at Wabash. However he remained only two years going on then first to Chicago and later to Columbia. Smith was followed by William E. Chamberlain who was professor of chemistry only in 1894-95.

In 1895 William Oren Emory was placed in charge of chemistry and he remained five years. He had received his PhD degree in Germany during the same period that Robert E. Lyons was receiving his degree in Germany. Lyons also became head of the department at I.U. in 1895. Emory left Wabash owing to a conflict with one of the trustees on a question of ethics in dealing with some commercial work he was doing for a business managed by the trustee. It was concluded by Osborne and Gronert that

"his department through those years was in every one's opinion one of the strongest in the college, as well as one of the most popular."

James Bert Garner, a Wabash graduate in 1893, was made assistant professor of chemistry in 1901, thus following Emory. He had received his doctorate at the University of Chicago in 1897, under Alexander Smith. Garner was characterized as a producer of chemists. He believed strongly in developing specialists and in focusing on the department for the inculcation of esprit de corps in the students. Professor Garner resigned in 1914 to accept an appointment at the Mellon Institute.

The successor to Garner was James M. Breckenridge who was trained at the University of Wisconsin. He remained until 1918 when he left to take up war work. The available records are unclear as to his successor.

In 1921 Charles H. Johnson joined the chemistry faculty and served in a junior capacity until he left Wabash in 1924. He was succeeded at that time by Frederick C. M. Smithson, a graduate of Illinois Wesleyan University, who began his appointment as assistant professor. After three years he entered the University of Chicago and returned to Wabash in 1930 with a doctoral degree. At that time he became associate professor of chemistry.

An obvious turning point in the quality and standing of chemistry at Wabash was initiated with the appointment of Lloyd B. Howell in
1924. He was chairman of the Department of Chemistry from 1924 to 1949. As stated by President Byron K. Trippet in his book *Wabash on My Mind* (1982), during this period none of the Wabash faculty "had a larger or more devoted following among his former major students." Dr. Howell exemplified the attitudes and relationships to students that were characteristic of his predecessor J. B. Garner. Trippet stated that during Howell's chairmanship of 25 years he ran the Department of Chemistry with an iron hand. His impelling interest was in giving depth to the training of future chemists and others who would make good use of chemistry in their professions. He gave much attention to the placement of graduating chemistry majors in promising graduate schools. He had received his doctoral training at the University of Illinois and he encouraged some of his most promising graduates to go there for graduate work in chemistry.

Edward L. Haenisch succeeded Howell as chairman in 1949. He had received his undergraduate and graduate training in physical chemistry at the University of Chicago. Before going to Wabash he was head of the department of Chemistry at Villanova College. He was physically large, affable, articulate, and intellectually dominating. Thus he continued the emphasis on chemistry established by Howell, but his influence was much broader at Wabash and in state and national chemical circles. He was particularly influential in the Division of Chemical Education of the American Chemical Society. Haenisch also held leadership roles in some other scientific organizations including the Indiana Academy of Science. Illness and physical incapacitation caused his premature death in December, 1977. Paul C. McKinney, who joined the faculty in 1958, was chairman from 1978 to 1981. He became dean of the college in 1982.

Roy G. Miller succeeded McKinney as chairman of the department. He received his doctoral degree in organic chemistry at the University of Michigan in 1963. This was followed by faculty positions in chemistry at the University of North Dakota before going to Wabash. Currently and for several decades there have been other chemistry faculty members with ability who have given depth and breadth to the program in chemistry.

Many of the Wabash alumni in chemistry have made significant contributions in science and in the professions such as medicine. Several have made exceptionally significant records. These include: Dr. Thomas W. Mastin who in 1972 became President and Chief Executive Office of the Lubrizol Corporation; Dr. Richard S. Schreiber, Vice President for Research and member of the Board of the Upjohn Company; Dr. William J. Haines, Director and Executive Committee member of the Johnson and Johnson Company; and Dr. David M. Gibson, Grace M. Showalter
Professor of Biochemistry and Chairman of Department, Indiana University School of Medicine, Indianapolis.

The relatively large number of Wabash chemistry majors who have gained recognition in science is indicated by the listings in *American Men and Women of Science* 1979 edition. Sixty-seven are included, three of whom have doctoral degrees in chemistry from Indiana University. These are William E. Kreighbaum, Joseph R. Siefker, and Donald L. McMasters. In 1984 fifteen Wabash graduates were chemistry majors.

Dr. Miller kindly furnished information and references concerning Wabash College.
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<p>| Chemical Stores       | A. Lewin                        | School         | New Position                  |
| Chemical Stores       | Scheffer                        | School         | New Position                  |
| Chemical Stores       | Shull                           | School         | New Position                  |
| Chemical Stores       | Main/Graduate Office            | Aslan Studies  | New Position                  |
| Chemical Stores       | Main Office                     | SPEA           | New Position                  |
| Chemical Stores       | Scheffer                        | Pregnancy      | New Position                  |
| Chemical Stores       | Hufnson                         | School         | New Position                  |
| Chemical Stores       | F. S.                           | Psychology     | New Position                  |
| Chemical Stores       | Left Bgttn                       | New Position   | New Position                  |
| Chemical Stores       | Business Office                 | Retired        | New Position                  |
| Chemical Stores       | Kochl, Shinler, Nightmon        | Left Bgttn      | New Position                  |
| Dental Clinic         | Jenkins                         | Left Bgttn      | New Position                  |
| Dental Clinic         | Jenkins                         | Pos. ended      | New Position                  |
| Dental Clinic         | Chemical Stores                 | RIF            | New Position                  |
| Dental Clinic         | Main Office                     | Jane Schatzlein| New Position                  |
| Dental Clinic         | Left Bgttn                      | Claire Hall    | New Position                  |
| Dental Clinic         | Venkert                         | Cheryl Kuckuck | New Position                  |
| Dental Clinic         | Campagne                        | Pregnancy      | New Position                  |
| Dental Clinic         | Left Bgttn                      | Al Chesrow     | New Position                  |
| Dental Clinic         | Left Bgttn                      | Arlene Dootson | New Position                  |
| Dental Clinic         | Chemical Stores                 | Died following a full day's work | New Position                  |
| Dental Clinic         | Chairman's Office               | Larry Coniff   | New Position                  |
| Dental Clinic         | Chairman's Office               | L. Crum,S. Williams, | New Position                  |
| Dental Clinic         | Main Office                     | N. Sattelberger, V. Otto | New Position                  |
| Dental Clinic         | Left Campus                     | June Ewing     | New Position                  |
| Dental Clinic         | Left Campus                     | Marcia Horst   | New Position                  |
| Dental Clinic         | Business Office                 | Stay home      | New Position                  |
| Dental Clinic         | Jastenas,Jenkins,               | Private business | New Position                  |
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*Remarks:*
- **Left Begin**: Left the beginning of the position.
- **School**: School position.
- **New Position**: A new position has been taken.
- **Transferred**: Transferred to another position.
- **Getting Married**: Getting married.
- **Pos. Ended**: Position ended.
- **Left Country**: Left the country.
- **Left Begin**: Left the beginning of the position.
- **Pos. Ended**: Position ended.
- **New Position**: A new position has been taken.
- **Africa**: Africa position.
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<td>Name</td>
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<td>Willett, Holly</td>
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<td>1973-76</td>
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<td>Electronics Tech.</td>
<td>1974-76</td>
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<td>Secretary</td>
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<td>1977-78</td>
<td>E. Schaeffer, W. Moore</td>
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<td>Secretary</td>
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<td>Wise, Pamela</td>
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<td>Chemical Stores</td>
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<tr>
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<td>1980-81</td>
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<td>1980-81</td>
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<td>Young, Connie</td>
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<tr>
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<td>Electronics Tech.</td>
<td>1980-81</td>
<td>Instruments</td>
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<td>Lab. Tech.</td>
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<td>1980-81</td>
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<td>1980-81</td>
<td>Student Health</td>
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<td>1980-81</td>
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<td>1980-81</td>
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<td>1980-81</td>
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</tbody>
</table>

### Chemistry Librarians

<table>
<thead>
<tr>
<th>Name</th>
<th>Years at IU</th>
<th>Highest deg.</th>
<th>Prior Affiliation</th>
<th>Later Affiliation</th>
<th>Date of Birth</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Ballou, Mary Olive</td>
<td>1941-43</td>
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<td>Johnson, Norma</td>
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<td>Kretzschmar, Carl</td>
<td>1946-50</td>
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<td>Kronenberger, Albrecht</td>
<td>1950-58</td>
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<td>Maurice, Jewell</td>
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<td>Zumik, Frances</td>
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</tr>
</tbody>
</table>

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1. First full time librarian but lacked training in library science for chemistry.

2. Lacked library science training for chemistry; had been a school teacher.
Index

AAAS, 60
Fellows, 547
A.B. in Chemistry, 540-541
requirements for, 132, 191, 232, 444, 503
Academy
University of Pennsylvania, 12
Indiana of Science, 177-178
Accreditation for professional
Training in Chemistry, 286-291, 293, 295, 390
Academic Affairs, Northwest Campus,
Acting Dean, 521
Acetone, 113
Acoustics & mechanics, 25
Adams
Benjamin Franklin, Jr., 57
Esther Weber, 174, 228
Roger, 283, 286, 572
Addinall, C. R., 397
Addition
Agents, 164, 359-360
Building, 409
1960s, 473-485
Administration and Budgetary Planning, Dean of, 383
Administrative Assistant to Chairman, 510
Committee, 477
Council, 277
Studies office, 475
Travel Funds, 398
Advisory Panel in Electrochemistry, 358
Aerosols, 375, 421-424, 489, 496, 516
Aerospace Research Application Center, 534
Agricultural Chemistry, 2, 20-24
Air Conditioning, 311-312, 476, 483-484
Force Academy, 362
Pump, 8
Ake, Robert, 446
Aker, Marion, 202
Akron Section, ACS, Award, 548
Alaskan gold, 138
Albjerg, V. L., 33-35
Albrecht, Grace, 279
Alcohol, 181, 186
Aldred, Jacob W. H., 178
Alexander
Gerald, 564
von Humbolt Senior Scientist Award, 548
Report, 234
W. A., 234
Alford, Helen, 38
Alizarin, 46
Allee, Mr., 100
Allen, Craig, 513
James, 528
Martin, 567
Allerhand, Adam, 290, 374, 508, 512-513, 549, 552, 556
Allgood, Delbert, 414
Al-Mutairy, Ahmed, 545
13th biennial national conclave, 204
Suite of Rooms, 131
Alpha Epsilon Delta, 425
Alter, Chester M., 210, 493
Aluminum, 168, 357
Bars, 362
Powdered, 471-472
Archives Office, 460, 537-539, 552, 560
Association, 218, 274
Linkages, 429-430
Quarterly, 86, 143, 148
Hall, 337
Amato, George, 519
American Assoc. for the Adv. of Science, 178, 487
Association of University Professors, 380
Chemical Journal, 92
Awards, 545-546
Cincinnati Section, 550
Committee on Professional Training, 286-295, 317-322, 436
Chemical Education, Division, 550
Diamond Jubilee, 435
Examinations Committee, 446-448
Fellowships, 544
Indiana Section, 112, 142, 171, 174, 267
Southern Indiana section (local section), 401-403
Student Affiliates Chapter, 206, 268, 270, 272, 277, 313
Visiting Scientists Program, 494, 550-551
Council on Education, 322
Crystallographic Association, 497
Electrochemical Society, 112, 167, 178, 186, 205, 260, 289
Electroplaters’ Society, 277, 356
Institute of Chemists’ Award, 445
Institute of Nutrition, 218, 320
Medical Association, 163, 275, 306
Men and Women of Science (formerly American Men of Science), 119, 211, 374
Optical Company, 348
Silver Producers Association, 167
Society of Biological Chemists, 218

Amines, 497
Ammen, Jacob, 17
Ammonia, 173, 180
Amoco Company, 542
Fellowship, 546
Amour, Peter D., 545

Amylopectin, 342
Amylose, 342
Anachem Award, 548
Analytical
Balances, 228, 322
Graduate degree (A.C.), 583
Laboratory, 30
Recent Developments, 300
Anatomy, 264, 296
Animal care facility, 275, 323-324
Anthocyanins, 313
Antibiotics, 426
Antibodies, 376, 401, 428
Antifluoridation groups, 465
Antifreeze, 181
Antigen, 376, 408, 428
Antihistamines, 340
Antimalarials, 305, 315
Antimetabolites, 487
Antimony, 181
Antioch College, 178, 450
Apparatus and Cabinet, 19, 52, 77, 262, 294
Apple
Darwin, 202
Syrup, 360
Appleton, Burton, 559
Arbogast, Joseph, 393
Arbutus, 280
Archives
Alumni Office, Chemistry, 89, 249, 280, 430, 505, 527, 530, 537-539
University, 89, 249, 280, 505, 539
Arco Company, 291
Arendshorst, W., 325
Argonne National Laboratory, 549
Arkansas, University of, 437
Armour and Company, 210
Army, Specialized training program (ASTP), 300-304, 311
Arndt, Fritz G., 440-442, 489
Arnold, R. T., 443
Aromatic compounds, 341
Arrhenius theory of ionization, 110
Arrick, Byron, 202
Arts and Sciences, 260, 284, 390-392, 414, 444, 459
Associate Dean, 521
Dean of the College, 297, 318, 381, 407, 415, 422, 429, 435, 508
Graduate School Alumni Association, 494
Teaching Award, 549
The Review, 468
Arvin, P., 325
Asbury College, 568
Asdell, Bernard K., 183, 202
Asher, Dr., 171
Ashton, John W., 318, 327-331, 339, 368, 373, 475, 492
Assistant Director of Chemistry Laboratories, 319
Purchasing Agent, 319
Associate Chairman of Department, 510
Instructor, 542
Association of Indiana University Chemists (AIUC), 429-431, 459, 496, 537-538, 553
List of Officers, 430-431, 460
Newsletters, 460, 525, 534, 538, 551-553
Objectives, 431
Reunion, 489, 493
Astronomy, 3, 27, 62-63, 164
Athens, Agriculture University of, 547
Athletics, 206-207
Atkinson, R. C., 381
Atomic
And molecular chemistry, 87
Bombs, 301, 339
Energy Commission, 408-409, 486, 497
Weights, 46
Atterbury, Camp, 362-363
Atwater, Amzi, 36, 50, 64, 74, 136
Audio-Visual Center, 405-406
Audrieth, L. F., 402
Ault, F. Keith, 566
Austin, Calvin, 472
Ax, Alan, 204
Ayres, Gilbert, 585
Bachelor's degree, 508, 540-541
Bachelor of Science, 19, 23-24, 39-40
in Biochemistry, 517, 540
in Chemistry, 444, 506, 508, 540
Requirements for, 392-393
Bacher, H. J., 440
Bachman, G. B., 397
Bacteriology, 84, 89, 92-93, 113, 157, 228, 258, 265, 274, 279, 296, 298, 324, 336, 341-342, 361, 417, 426
Bader, R., 520
Badertscher, Darwin E., 202, 210, 213
Bailar, John C., 445, 453
Bair, Edward J., 437, 490, 493, 495, 505, 512-513, 529
Baird, Jack, 363, 379, 384, 412, 421, 527, 530
Stephen, 366
Bakelite, 202, 241
Baker H. Weldon, 567
Jack, 552
Philip S., 568
Robert, 446
Ross Allen, 569
Baking powders, 138
Baldinger, Lawrence H., 579-580
Ball Corporation, 541
State Teachers College (University), 564-566
Ballantine, Elisha, 15, 22, 40
Hall, 470
Ballard, S. S., 343-344
Ballou, Mary Olive, 157, 279, 298
Bancroft, Wilder D., 142, 172-173
Band
First, 11
Instruments, 356
Bank closures, 195
Banta, Judge David, 3-6, 8-9, 17, 67, 85
Banting, Frederick, 155
Barash, Eyal H., 546
Barber shop, 134
Barbieri, R., 519
Bardwell, E.P., 405, 473, 477-480
Barnard, H. E., 174
Barnes
David K., 305, 431, 558
Earl, 35
Bartmess, John, 513
Bartow, Virginia, 200
Bastin, Kenneth, 414, 530
Basu, S., 422
Bateman, Jack, 565
Battery separators, 106
Baxter, Neal E., 207
Baylor University, 274, 307
Beadle, G. W., 402
Beard, Betty, 530-531
Beaumont, Davis W., 289, 364, 382, 392, 400
Beaver, G. E. 131
Beck, Harvey, 531
Becker, Charles, 428
Beede, Lucille, 198
Beeders, Herbert, 486
Behforouz, Mohammad, 566
Beilstein, 525
Beldon, Shirley, 367
Bell
R. P., 398, 489
Award, 546
Robert, 525
Telephone Laboratories, 438
William H., 149, 174, 415
Benbow, John W., 546
Benham, J. F., 80
Benkeser, Robert A., 582
Benzer, S., 496
Berchtold, Glenn, 491
Berg, Otto T., 546
Berkowitz, Bernard, 269
Berlex Laboratories, 542
Berlin, University of, 48
Berliner, E., 443
Berry, John W., 215
Beryllium, 175
Best, Charles, 155
Bicknell, C. F., 113
Biehl, W. Joseph, 215
Bigney, Andrew J., 572
Billings, Erle M., 290, 328-329
Billman, John H., 256, 284, 287, 305, 308, 313, 320, 339, 342, 362, 393, 423, 426-427, 429, 431, 486, 490, 494, 496, 505, 512
Binkley, Francis, 440
Biochemistry, Selected Topics in, 300
Biological
Stains, 332
Systems, 46
Biogeochemistry, 517-518
Biology, 377
Hall, 240, 361
Libraries, 157
Biophysics, 512
Birdwhistall, Ralph K., 567
Birge, E. B., 241
Bituminous limestone, 17-18
Black
Claude J., 311-312, 319, 344, 415
Chemists, 485
Janitor, 60
Pastor Clay, 216
Students, 60, 216-217, 450-451
Blackman, Allan, 519
Blair, William T., 85
Blakeslee, Howard W., 167
Blanchard
A. A., 269
H. B., 112
Kerry L., 545
William M., 568
Blatz, Lawrence A., 215
Blew, Michael J., 117, 142
Bloomington
Campus, Acting Vice President, 521
Chamber of Commerce, 222
Common Council, 470
Courier, 53
Evening World, 248
Saturday Courier, 68
Telephone, 84, 86
Water supply, 221-222, 470
Blough, Earl, 89, 117, 121, 176, 241-242
Professorship, 514, 548
Blowpipe Analysis, 56
Blue, Robert D., 167-168, 179, 202, 211, 213, 305, 518
Board of Overseers, 553
Trustees, 3, 6-7, 20
Visitors, 6
Bock, Paul, 566
Bockstahler, T. E., 289
Bodner, George, 544
Boehne, J. W., 271
Bogert, Marston T., 127
Boisen, Herman, 38
Bollman, Lewis, 8
Bonham, Russell A., 438-439, 495, 497, 499-500, 504-505, 512-513, 529, 539
Books, List of chemistry, in catalog 1853-54, 19
Borden, Kenneth, 574
Borders,
   Alvin, 167, 200, 215, 430, 460, 493
   Don, 486
Bordner, Harvey A., 78, 83, 93, 103, 139
Bordwell, F. G., 440
Bornstein, Alan M., 445
Boron
   Carbide, 182
   Hydrides, 504
Borosilicate glass, 415
Botany, Department of, 189, 235, 258, 264
Bothwell, Marvin, 366
Boucher
   Phyllis (Rutan), Mrs. Ray, 397
   Ray, 367
Bougie, Daniel, 519
Bouwman, Elizabeth, 519
Bowles, Homer, 93, 100
Bowman, William, 564
Boyd, G. E., 397
Boyer, Robert, 366
Boyle, Andrew J., 580
Braden, Samuel, 446, 502
Bradley, D. F., 496
Bradt
   Rex H., 213
   Wilbur E., 177, 197, 205
Brandau, Louise B., 274
Brandeis University, 437
Brande's Manual of Chemistry, 19
Branner, John C., 64
Brass, 181, 357
Brauner, Mary E., 545
Brazilia, 497
Brazilian Government Scholarship, 544
Breakage fees, 93-94, 196
Breckenridge, James M., 589
Breed, Mary Bidwell, 102-104, 113, 116, 511
Breitmeier, Paul, 166, 201
Breneman, William R., 265, 268, 490
Breslow, Ronald, 523
Brethhauer, R. K., 580
Bridges
   Ralph, 131, 202
   Ralph, II, 202
Bridgwaters, Elizabeth, 217
Bright, William L., 211, 213, 219
Briscoe,
   Residence Center, 431, 523
   Named faculty's dean, 272-273
Ora Cole, 169
Prof. and Mrs. Herman, 198-199, 276
Professorship, 438, 470, 510, 515, 549
Britton, Thomas, 544
Brochure

“Chemistry at Indiana University”, 413, 418-419

“Manual of Information for Prospective Students”, 412, 458-459

Brockman, C. J., 349
Brockmann, Max, 309
Bromer, William W., 493
N-Bromosuccinimide, 340
3-Bromomethylthiophene, 340
Brooker, Robert, 574
Brookhaven National Laboratory, 428
Brooks, H. H., 484
Brown
Alice Saveland (Mrs. O.W.), 107
Alice (Mrs. William Pawlec), 107
County State Park, 366, 490, 497
Edward, 107
Henry Baker, 586
Howard, 415
H. C., 584
James, 568
Joseph, 367
Oliver (Son of O.W.) 107
Sylvester, 417
University, 382
W. H., 350-355
Broyles, Ralph, 197
Brubaker, Charles L., 213
Bruce,
Edwin M., 120, 575
Michael, 519
Brundage, J. Tilman, 177, 197, 201
Bryan
Hall, 265, 279
Bryant
James, 22
J. T., 313
Bryn Mawr, 103, 386
Brzychczyk, Janusz, 519
Buchanan, John Machlin, 569
Budde, Walter, 367
Budgetary
Administration and Planning, Dean for, 521
Resources, 291-292
Addition (1964), 403-405, 413, 473-485
Gross area, 483
Humidity control, 484
No formal dedicatory exercises, 484
Planning, 473
Remodeling, 555
Total cost, 482
Addition in 1980s, 405, 539-540, 556-557
Dedication Oct, 1988, 523, 557-560
1931 building, 241-246
Occupation of, 240
Remodeling, 540, 555
Radiochemistry, 408-409
Storage Vault, 406-407
Bulbenko, George, 431
Bulletin on The Graduate Program in Chemistry, 419-420
Bunger, W. B., 575
Bunsen
Burner, 76
Robert, 194
Bunting, George W., 69
Burden, Stanley L., 585
Bureau of
Institutional Research, 495, 521
Physical Facilities Studies, 497
Burgess, C. F., 106, 110, 112, 137
Burkett, Howard B., 568
Burlage, H. M., 149
Burner, Pat, 530-531
Burns, Rev. James A., 579
Burroughs, Carroll, 201
Bursar, 161, 226
Burton, Milton, 397, 580
Bus service, 221
Bush
  C. O., 585
  G. C., 120
  Howard, 204
Business
  Manager, 319
  Office, 531
  School of, 155, 313
Butler
  Ovid, 566
  University, 240, 429, 494, 567-568
Butter, George, 366
Butyl Rubber, 314
Cadmium, 217
Cafeteria, 195-196
Calcium, 160
  Chloride, 181
  Cyanamide, 180
  Phosphate, 355
  Phosphide, 186
  Pyrophosphate, 468
Calco Chemical Division, 108
Calderon, N., 520
Caldwell
  Robert, 5
  Desk, 130
  William, 413-414
California
  Institute of Technology, 256, 374, 402-403, 437, 442
  University of
    Berkeley, 438, 524
    Los Angeles, 476
Calorimetry, 421
Calumet Extension Center, 285
Cambridge
Mechanics Physics and Optics, 10
University, 525
Lectureship, 523
Campbell
  Arthur W., 204
  C. M., 48
Campus, old, 69
Canchucaja, Jose, 544
Carbolic acid, 256
Carbonic acid, 57
Carborundum, 182
Career Development Center, 541
Careers for Scientists, 324
Carleton College, 383
Carlisle, Paul J., 211
Carlson, Merle W., 567
Carmack, Marvin, 436, 440, 458, 488, 490, 494-496, 504-505, 512, 518, 522-523, 532, 534
Lectureship, 522-523
Carnegie
  Foundation, 249
  Institution of Washington
    Fellowship, 419
  Institute of Technology, 104, 149, 209-210, 403, 430
    Dept. Chemical Engineering, 209
    Retirement system, 247-248
Carney, T., 446, 497
Carotene, 218
Carpenter
  C.C., 121
  Gene, 397
Carr, Arthur N., 202
Carrick, Leo L., 107, 117, 149, 153
Carrier, Rev. Joseph, 579
Carter
  Edgar B., 139, 175, 326
  Herbert E., 332, 398, 569
  Carving of chemical symbols, 246, 471
Casati, Ray, 480-482
Case School of Applied Science, 210
Cash, R. V., 431, 460
Caswell, Daniel J., 3
Catalog (Bulletin)
At other Schools, 566-567, 570-572, 588
Catalysis, 106, 182, 217, 318
Cates, Harold, 201
Cathcart, William, 197, 202
Catherwood, Florence, 198
Cathode rays, 60
Catholic University, 436
Cattell, J. M., 119
Cauliton, Kenneth, 512-513, 519, 527, 529, 535, 549
Cavallite, C. J., 440
Cavanaugh
Robert E., 219-220
Robert M., 204, 219
Caviness, John, 545
Cayton, Roger, 519
Cellophane, 155
Cellulose, 187
Centers-of-Excellence, 526
Central College, Pella, Iowa, 551
Centrifuge, 46-47, 275, 322
Century of Progress Fair, 183
Ceramics, 284
Chacon, Stephanie, 546
Chairmanship, 435, 508-510
Office description, 385
Plan, 233
Chakravorty, Subhas J., 519
Chamberlain, William E., 589
Chambers, Patricia, 529
Chandler, David W., 545
Chapel, 3, 9, 24, 32, 50, 56, 66, 72-73, 87, 110, 235
Chaplain, 71
Charles, A. A., 120
Chelate Complexes, 408, 490
Chemical
Abstracts, 161, 526
Analysis of blood and urine samples, 225
And Engineering News, 290, 506, 540
And philosophical apparatus, 8
"Chemical Magic" show, 435
Element symbols, 471
Engineering, 112, 231, 300
Laboratory, first, 15-17, 52
Lectures, 16
Manufacturer's Association
National Catalyst Award, 510, 549, 558
Philosophy, 10
Physics, 512-513, 517
Scientific Stores, 531
Computerized system, 531
Warfare, 284
Service, 143, 146, 462
Chemistry
At Indiana University brochure, 361, 413, 418
Building, See Building Club, 205
Handbook, 445
Modern school of, 235
Chemotherapy, 340
Chen
K. K., 316
Wei, 520
Yun Ti, 317
Chernick, Cedric, 422
Chernin, Robert, 446, 450
Chess tournaments, 364
Chicago, University of, 198, 213, 285
Chisholm, Malcolm, 439, 513-516, 519, 529, 535, 548-549
Chittenden, R., 46
Chiu, Grace, 422
Chlorine treatment for the common cold, 186
Christens, J. M., 422
Christenson, C. L., 169
Christmas party, 488
Christoffersen, Ralph, 446
Christou, George, 513, 519, 529, 559
Chromatography, 548, 550
Chung, J. W., 423
Cincinnati
   ACS Section, 550
   Gazette, 53-55
   Milling Machine, 363, 412
   University of, 213
   Citrus fruit peel, 360
   Civil War, 25, 32
   Clare, Peter, 544
   Clark,
      Donald H., 479-481, 484
      George L., 426, 485, 569
      Orrin B., 64
      Rev. Thomas, 135
      Thomas D., 2-6, 15, 19, 22-23, 40-41, 45, 50, 52, 59, 64, 68-71, 101, 104, 152, 252-254, 284, 363, 485
   Clarke, John E., 201
   Clay
      Bro., 216
      Henry, 5
   Cleland
      Mrs. Elizabeth (Ralph), 199, 306
      Ralph E., 258, 268, 274, 322, 475, 486
   Clendenning, Grace, 198
   Clevenger, Z. G., 223
   Cline, Richard, 423
   Clinical Biological Chemistry, 393
   Cloud, H., 44
   Clouse, Arthur O., 457, 527, 533
   Coal Tar tree, 181
   Coggin, Deanna, 519
   Cohen, Alvin, 397
   Coke, 180
      Vending machine, 386
   Colby College, 169
   Cold room, 322
   Cole
      A. Elliston, 241
      Orah (Mrs. H. T. Briscoe), 169
   Coleman
      Bell Company, 174
      George H., 198
      William 544, 559-560
   College, 3, 7-12
      Board, 8
      Building, See Buildings of Wooster, 562
   President, 8
   Collins
      Jon L., 546
      Ralph L., 446, 473, 476-478, 484
   Colloid Chemistry, 143, 270, 287, 300, 391
   Colloquia and ACS speakers, Lists for 1946, 91, 398-403, 524
   Colonial tearoom, 276
   Colorado, University of, 339, 437
   Colton, Charles A., 583
   Columbia University, 127, 241, 264, 285, 402, 425, 427, 523
   Combined Degree Program, 517
   Commemorative ACS three-cent U.S. stamp, 435
   Commencement reported in IDS, 245
   Commerce and Finance, School of, 155
   Hall, 240
   Commercial Solvents Corporation, 208, 213, 274, 488
   Commission on Higher Education, 517
   Committees
      Administer research funds for ACS, 330
      Brazilian Project, 501
      Building, 474-485, 506
      Chemistry Addition, 501
      Chemical Physics, 517
      Colloquium, 397-399, 501
      Curriculum, 388, 393, 443-444, 501
      Electrical needs, 388
      Enrollment, 388, 501
      General Chemistry, 386-387, 393, 501
      Glassblowing shop, 410-412
      Graduate, 500
         Admission and assistantships, 387, 501
         Council, 145
         Testing and standards, 446-448, 501
      Honors Program and special student recognitions, 501
      Hospital expansion, 494
Laboratory space, 388
Library, 388, 417-418, 501
Master of Arts for Teachers program, 451, 501
Microanalytical services, 388, 414-415
Names of specific committees, 386-389
National Defense, 145
Policy, 499-500, 510
Post-war planning, 323-324
Professional Training of Chemists, 286, 290, 317, 320, 322, 386, 436, 439, 456
Radioactive materials, 407
Radiochemical Building, 407-409
Safety, 387, 404-405, 407, 501
Schedule, 145
Self-Survey, 252
Seminars, 387
Shops, 387, 410-414, 501
Sigma Xi nominations, 387
Space, 388, 404, 475-485
Space, services and facilities, 501
Space utilization and assignments, 404, 501
Stadium repair, 222-223
Stockroom cataloging, 388-389, 415-417
Student health, 140, 247
Summer symposium, 440-443
Technical services laboratories, 501
To prepare a general state education plan, 3
Undergraduate, 500
Written and spoken English, 145
Comprehensive written examinations, 299, 446-447
Computational chemistry, 533-536
Center, 535-537
Computer based system, 533-536
CDC 3400-3600, 535
Control Data Corporation 7600, 535
Facilities, 532-536
QCPE, 536
Science, 536-537
Time averaging, 535
VAX 11/780, 535
Comstock, 17
Conant, James B., 377
Concentration Groups, 232
Conductivity
Experiments, 45
In nonaqueous systems, 233
Conference on
Coordination Compounds, 442
Hyperconjugation, 442-443, 494
Medicinal Chemistry Program, ACS, 442
National
Organic Symposium, 443
Organic Sulfur Chemistry, 440-442
Congers, 67
Conley, Robert, 450
Conn
C. G., LTD, 356
H. L., 287
Consulting Fees, 223-224
Consumption, 40
Conti, Rocco, 212
Cook
A. Gilbert, 587
Donald J., 430, 452, 493, 568
Cookson, Thomas A., 373
Coon
Jesse B., 197, 202, 207
Julius M., 197, 202, 207
Cooper, Robert H Science Complex, 564
Cooperative Chemistry Education, 540-541
Coordination Compounds
Conference, 442
Coordinator for general chemistry, 319, 540
Cope,
Arthur C., 567
Scholar Award, 548
Copeland
James L., 450
Richard, 565
Copper
Plating, 183
Stripping, 356-357
Copying facilities, 226
Cordes, Eugene H., 436-437, 503-505, 508, 512, 554
Corey, Elias J., 523
Corn
Industries Research Foundation, 308
Fellowship, 419
Oil, 127
Corr, I. N., 57
Cosgrove, J. M., 204
Costs
Automatic balance, 77
1873 building, 42
1931 building, 244-245
1964 addition, 477-483
Center-of-Excellence Program, 526-527
Centrifuge machine, 46
Chemicals and equipment, 36-37
Centralblatt für Bakteriologie und Parasitologie, 96
Conferences, 440-443
Depression, effect on students, 195
Dunn's woods, 67
Financial report for 50, 51
Lab building, 15
Sold, 22
Library (after a fire), 66
Museums, 184-185
Original building, 15-16
Radiochemistry building, 407-410
Recruiting trip for H. Day, 266-267
Telescope, 36
Cottage Grove Apartments, 363
Cotton, William Jacobs, 567
Coulter, John M., 64, 73, 92
Council on Dental Therapeutics, 163, 469
Counts, Richard, 536
Courses
Listing, in 1930, 191-192
Numbering, 98, 191-192
Revision of the content, 300-301
Courson-Greeves Award, 544-546
Courthouse, 3, 85
Covenanter, 18
Cox
D. A., 80
Edward T., 39
Laurence, 544
Standiford, 489, 492
Craig, John, 366
Cram, D. L., 398
Crampton, Charles, 428
Crandall, Jack K., 439, 512-513
Crane
Keith D., 585
William, 366
Cravens, J. W., 16, 44, 145, 235
Crawford, William H., 264
Creager, Stephen, 513
CREST, 355, 462-471, 498
Criswell, Dewey, 201
Cromwell, Norman, 584
Crooks, William, 60
Crouthamel, C. E., 397
Crucible, 8, 129
Crystal structure, 485, 490
of molecules, 427
Crystallographer, 534
Culbertson, Julian L., 574
Cumulative examinations, 446-447, 500, 542
Curie, Madam, 359
Current, Jerry, 492
Currie
James N., 131, 136, 241-242
Robert W., 213
Curry, B. E., 113, 119, 121-122
Curtin, Michael, 519
Curtis, Lila C., 200
Curts, Betty, 231, 260, 273, 279
Cyclotron, 258, 294
Daggett, Robert F., 236-241
Daily
    and Daily, 89
Cardinal, 106
Daims Memorial Lecture, 550
D'Alelio, G. F., 580
Daleke, David, 513
Dalton
    John, 194
    and the Atomic Theory, 170
Daniels
    Farrington, 397
    Troy C., 210
Darwin, 73
Dasher, Paul J., 215
Data Processing and Information
    Northwest Campus, 522
Davidson,
    Ernest R., 446, 513-514, 519, 536-537, 548, 584
    Vaughn, 544
Davies, Earl H. C., 567
Davis,
    Chester, 279, 546
    Louis Sherman, 78, 93, 97-99, 102
    113, 116, 122-126, 129, 131, 135, 158-164
    Gold extractor, 125
    Oil burner, 124-125
    Mrs. Louis S., 159
Davison, B. S., 219
Dawson, Robert M., 201
Day
    Academic Year, Summer
    Scholarships, 546
    Lecture Hall, 523, 539
    Mrs. Harry G. (Marie), 330-331, 364
    D.C. and A.C. throughout the building, 388
Dean
    of the Faculties, 253, 276, 281, 291
    of Women, 116
Deckard, Cleophas, 414
Dedication of
    1931 Chemistry building, 189, 199, 240-245
    1988 Chemistry addition, 522, 556-559
Deer, Leon, 200
Degeilh, Robert, 558
Degnan, William M., 255, 267, 287, 314
Degree, Doctor
    of Medicine, 28
    Honorary, 514, 558
Dehydrogenase, 504
De la Mare, P. B. D., 443
Delphin, Walter, 544
DeLuca, Hector F., 523
Demonstration explosion, 471-473, 492
Dennis
    David W., 571
    Louis M., 241
    Rebecca, 14
    William C., 571
Dental
    Advisor, 253
    Biochemistry course, 275, 301
Caries, 163, 463
    Class, freshman, 275, 463
    Enamel, 463, 466
    Health, 160, 163, 463
    Students, 393, 463
    Therapeutics Council on, 163, 469
Dentifrices, 463-474
    Fluoridation, 463-471
    Research, 470-471
Dentistry, School of, 123, 162, 258, 264, 515, 540
Denver, University of, Chancellor, 209
Department picnic, 487, 489, 496
Departmental Secretary, 228-231
DePauw University, 288, 568-569
Depression, 195-196
deSouza, Romualdo, 513
Deters, John F., 587
Deupree, John F., 202, 415
DeVries, Nadine, 519
Dewar, M. J. S., 443
Dextrins, 308, 342
Dickey, Joanna M., 415, 459, 486, 497
Dickover, Ward M., 201
Dictaphone, 228
Diedrich, James, 366
Diehl, Harvey, 453
Dietetics, 31, 35, 158, 171, 176
Dilling, Wendell, 578
Dilts, Charles D., 572
Dimick, Keene P. Award in Chromatography, 548
Dingle, George W., 197, 202
Dinner, Alan, 544
Director of Business Affairs, 528
of Laboratories, 300, 382-384, 417, 499-500, 528
Dirigible, 187-188
Dirkse, Thedford P., 254
DiSalvo, Joseph, 504
Discher, Clarence A., 326, 342, 366
Disciplines of Chemistry, Major, 515
Dismore, Paden, 367
Dispute among faculty, 9-10
Distilled water, 246
Distinguished Lectures Programs, 524-525
Distinguished Prof. Emeritus of Chemistry, 378
Distinguished Academic Rank, 514
Dithiolium salts, 504
Doctoral
First earned degree, 152
First mentioned, 115
Graduate work, 115, 151-152, 157-158
Dodds, J., 12
S. C., 85
Doeden, Gerald, 564
Doerr, Richard, 366
Dolby, George, 204
Dolian, Frank E., 197, 213, 430, 460
Dolnik, Vladislav, 519
Dolomitic plasters, 217
Dorain, Paul, 450
Dorman, Linneaus, 446, 450, 495
Dorough, G. D. 398
Dorsett, John, 414, 528
Dow
Chemical, 208, 210, 215, 291, 366, 384, 419, 450, 491, 495, 539, 541, 555
Foundation, 539
Scholar, 544-545
Corning Corporation, 326
Award, 545
Dowd, William, 544
Downey, Charles G., 568
Doyal, Harvey A., 213
Doyle, George J. P., 422
Michael, 559
Draft boards, 307, 311
Draper, Olive May, 585
Draper's Physiology, 25
Druelinger, Melvin, 575
Drugs and the Mind, 549
Drunkometer, 365
DuBridge, Lee, 375
Dugan, LeRoy, 215
Dukes, Dean (Purdue), 231
Duncan, F. N., 120
Dunn
Benjamin, 69
McKee, 88
Dunn’s Woods, 69-70, 74
Duplicating, 530, 537
DuPont Company, 167, 212-215, 271, 326, 365, 375, 385, 438, 493
Associate Instructor Awards, 546
Distinguished Lecture Series, 524
Fellowship, 418-419, 450, 487, 489, 493
Dupree, John, 197, 202, 215
Dutremez, Sylvain, 519
DuVigneaud, Vincent, 445
Eagle-Picher Lead Company, 214
Eagleson
Preston E., 217
Wilson, 216-217
W. F., 177
Earle, Constance, 198
Earlham College, 104, 563, 570-572
East
Chicago Extension, 254
Texas State Teachers College, 339, 494
Eastern Indiana Normal University, 564
Eastman Company, 352, 450
Eaton, M. T., 170
Ebbing, Darrell, 450
Eberbach & Son, 384
Eckels, Frank (“Dad”), 196, 228-229, 259, 274, 278, 320-321, 337, 430, 489
Edison, Thomas A., 181, 360
Edmondson, Frank K., 362
Edsall, John T., 431
Education, School of, 21, 235
Educational Opportunity Fellowship, 544
Edwards
Benjamin, 450
Bros., 302
Egan, J. J., 422
Eggers and Higgins, 482
Ehrlich,
President Thomas, 220, 523, 558
Eichelberger, Marietta, 174
Eigenmann, Carl, 132, 135, 152, 170
Eisenschiml, Otto, 172
Eisenstein, O., 519
Eisler, S. L., 197
Elbinger, Rebecca Leash, 326
Electric
Car, 142
Furnaces, 179, 182, 227
Kites, 26
Light traffic signals, 142
Machine with battery, 8
Electricity, 26, 109
Electrochemical
Analysis, 105
Society, 146, 269, 272, 277, 305, 334
President of, 516
Honorary member, 272
Electrochemistry, 98, 104, 109, 113, 158, 178, 182, 192-193, 275, 286-287, 300, 513, 516
Electrodeposition, 146, 342
Electrolysis, 113, 137
Electrometallurgy, 158, 300
Electron Impact Spectroscopic Laboratory, 437
Electron microscope, 361, 382, 386, 498
Electronics, 321, 456
Electro-plating, 164, 167, 337, 356
Elie, Ernest L., 580
Eli Lilly Company, 184, 204, 216, 308, 313, 315, 367, 419, 425, 446, 489-490, 493, 497, 520, 541
Elliott,
Ebenezer, 1, 8, 10-14
The lobbyist, 11-12
F. R., 253
President (of Purdue), 582
Elsheimer, Neil, 486
Elving, P. J., 398
Embalming fluid, 35
Emerson, Dean (IU Medical School), 163
Emery, Alden H., 402, 472
Emory, William Oren, 589
Engineering, Civil, 9
England, Richard, 545
Engle, S. G., 119
English, 22-24
Department, 240, 261, 263, 277, 291, 295
Enrollments, 200, 259, 287, 539-541
Ensmann, Robert, 446, 530
Environmental Chemistry (SPEA), 513, 517-518
Ernest Guenther Award, 548
Ernst, Richard R., 523
Esarey
Ralph, 284
Robin, 202
Eschenbrenner, G. L., 366
Ethyl Corporation, 578
Gasoline, 188
Etner, Robert, 202
Evans
G. Harlowe, 585
Percy Norton, 112, 582
Evansville
College, 572
Medical College, 48
University of, 563, 572, 578
Evolution, 73
Ewing, George, 439, 512-513
Executive Committee, 254, 257, 291
Experimental animals, 311
Extension Centers, 144, 219, 254, 285
Indianapolis, 219, 254, 327
Exxon Corp., 549
Eyring, Henry, 453, 493
Facilities, 265-266, 454-455
and Services, Manual, 455
Faculties, 3, 4
Associate Dean, 521
Dean of the, 253, 263, 272, 281, 446, 490, 521
Faculty
Bridge parties, 364
Controversy, 9-10
Lectureships, named, 523-524
Lists of faculty
for 1827-85 (at intervals) 3-5, 22, 39, 64
Meetings, 384-386, 394, 407, 415, 433, 439, 445, 449, 458
Meharry Medical College, 218
Prairie View A&M College, 218
Research fellowship program, 438
Salaries for 1934-35, 229
Senate, 233
Women's Club, 276
Faraday
Michael, 396
Society, 496
Farris, Rev. James B., 5
Faulker, Larry, 524
Federal
Bureau of Investigation Technical Lab., 214
Research contracts, 328
Federation of Am. Soc. for Experimental Biology,
274-275, 425, 428, 490, 492, 497
Fees, 223-224, 229, 257, 294
Laboratory, 94
Remission of, 294
Fehlner, T. P., 580
Felger, Maurice M., 213, 219
Fellows, Ella, 38
Fellowships, 164-165, 268-269, 326, 487, 542-546
Felting, Kirsten (Mrs. Streib), 535
Female Seminary, 59
Fenn, Phyllis, 326
Fenske, Merrill, 569
Ferguson
Byron L., 562, 586-587
James W., 567
Philip, 366
Fersht, Alan R., 522
Fesler, J. W., 240
Field, Robert, 524
Fieser
A. S., 197
Louis F., 403, 496
Fighter airplane, 362
Fijardo Sugar Company, 138
Filing cabinets, wooden, 363
Filming of optical glass, 342-349
Finances (See Costs), 93, 237, 247
Financial
Aid for AIUC Newsletter, 459-460
Aid for blacks, 450
Limitations, 21, 93-94
Resources of T. Wylie family, 85-86
Situation, 81
Status, 1875, 50-51
Stringencies, 196
Support for graduate work, 164-165, 225
Fine gold, 181
Finholt, A. E., 397
Fink, D. F., 271
Fire, 21-24, 44, 66-67, 69, 100, 102, 118-119, 141, 483, 580
Extinguishers, 292
Hazards, 376, 406
First
Band, 11
Christian Church, 135
Female student, 23, 37
150 Years of Chemistry at Indiana University, 559
"University" Building, 22
Fischer
Emil, 201
Fisher
Dale, 431
Martin H., 178
Scientific Company, 406
Fittig, Rudolf, 49
Fitzpatrick, J. S., 289
Fleck, Thomas, 519
Fleener, Gary, 414
Fletcher, Worth, 166, 197, 205
Flory, Paul J., 577
Flu epidemic, 146-147
Fluoridation, 425, 463-471
Dentifrices, 355, 463-471, 491
Hydrocarbons, 582
Public water supplies, 463
Fluoride, 160, 348, 355, 463-471
Fluorine, 146, 183, 342, 348, 463-471, 516
Isolation of, 516
Foley, A. L., 142, 170, 188-189, 223
Follis, Richard, 307
Food and Drug Administration, 468, 574
Foods and dietetics, 98, 113
Ford Foundation Fellowship, 544
Fort Wayne
Extension, 219, 254
Female College, 585
Gazette, 55
Fosdick, L. S., 402
Foster
J. F., 582
W. A., 271
Foundation for Nutrition, 163
Foundry, 11
Fowler, Donald, 411, 528
Fox
E. L., 197
Lionel E., 117
Marye Anne, 524
Foye, W. O., 325, 367
Fraenkel, Rabbi Mark, 493
Frangipani Room, IMU, 543, 558
Franklin
J. A., 337, 353, 475, 477, 479, 484
and Marshall College, 562
Institute, 18
Fraser
Dean, 491
Jack, 520
Frederic Bachman Lieber Award, 497
Freeman, J. P., 580
Fresco, J. R., 496
Fresenius
Karl Remegius, 48, 54, 56
Laboratory, 92
"Qualitative Analysis," 54, 77
Friends
of Chemistry Fund, 431, 460, 538, 552
Society (Quakers), 104, 107, 570
Fribourg, University of, 341
Frohman, Anson, 197
Fromageot, Claude, 440
Froning
Henry B., 580
H. Robert, 367, 423
Frye, Robert, 201
Fuchs, Ralph F., 380
Fuertes, Lewis Agassiz, 171
Fulbright
Awards, 489, 495, 498, 504, 547
Lecturer, 504
Fuller, H. V., 587
Fulmer, Jervis M., 568
Funding, Governmental, 23, 39, 419
Funerals, 19, 84-85
Funston, J. Arthur, 570-572
Fuoss, Raymond M., 366, 397
Furman, N. H., 486

Gage, Bradley, 366
Gajewski, Joseph J., 512-513, 519
Galley, Paul J., 546
Galvanic battery, 8
Gamble, C. O., 131
Gamow, G., 496
Gang of Four, 316
Garfield, President, assassination, 216
Garner
  J. F., 112
  James Bert, 589
  Samuel, 64
Garrels, R. M., 397
Garst, Roger G., 340
Gary Extension Center, 219
Gas
  and Fuel Analysis, 113, 391
  Masks, 375, 421
Gasoline engines, lead-free, 188
Gassman, A., 269
Gatos, Harry C., 272, 338, 342, 522
Gavit, B. C., 169, 302-303
Geckler, R., 325
Gee, Kyle R., 546
Geiger, Beatrice, 296
Geissler's air pump, 77
General
  Assembly, 2, 3, 8, 11-12, 19, 39, 70, 88, 101, 152, 247, 475, 480, 555
  Chemistry, 123, 152, 232, 512-513, 519, 539-540
  Chemistry Division, 318-319
  Education Board Fellowship, 218
  Electric, 203, 363, 418
    Foundation, 542, 546
  Funds from the State, 39
  Motors, 541
Gentry, Lenore, 326
Geochemistry, 517-518
Geography, 3, 34-35
Geological collections, 29
Geology, 54, 189, 371-372, 512-513, 517-518
Georgiadis, Family, 547
  Gregory, 545
  Minos, 547
Gerkin, Ernest, 367
German
  Academy of Sciences, 378
  University of Prague, 376, 382
Germann, Albert F. O., 586
Gibbs, J. W., 47
  Willard Medal, 583
Gibson
  David M., 590
  House, 60
Gies, W. J., 127
Gigous, Harold, 204
Gilbert
  K. E., 519
  Ward O., 207
Gilbertson, Lyle I., 167, 272, 430, 460
Gill, Jack, 558
Gilliam, Frances, 249
Gillum, Professor (Indiana State), 575
Gilman, Henry, 283
Glassblowing, 278, 294-295, 410-412, 454, 481, 527-530
Glassware surplus, 363
Glick, Mark, 519
Globulin biosynthesis, 376
Gold, 18, 125, 137, 180
  Extraction of, 163
  Fine gold, 181
Goldbeck, John H., 586
Golf Association, 141
Gonso, Harry, 558
Gooch
  F. A., 47
  Crucible, 47
Goodrich, Mollie, 229-231
Gordon
  L. B., 397
Conference on Nucleic Acids, 550
Conference on Quantum Mechanics, 505
Gore, Robert C., 167, 212, 229, 572
Gosnell, Rex B., 578
Gosport, 4
Goulac, 360
Gourman Report, 290
Governmental grants, first, 304-305
Grace, W. R., and Company, 520
Grades, record books, 115-116
Graduate Advisor, 448, 499-500
Club, 277
Council, 166, 298
Curriculum, 390-391, 446-449, 502
Level Placement Examinations, 446-448
Office, 448, 529
Program, 299, 390-391, 532
Research, introductory, 448
School, 114, 151-152, 164, 305, 322-323, 446-449, 451-452
Brochure for chemistry, 418-419, 451, 458
Bulletin, 191-193, 300
Dean of, 508, 521
Ranking, 290, 506-508
Students, 210-216, 305-310
Enrollment, 506
Entrance examinations, 446-447
Recognitions, 544-546
Work, 164-165, 211, 300, 323, 390-391, 446-449, 541-542
Department’s role in regulating, 300
Graham
C. N. 138
Chemistry textbook, 19
Frank V., 564
Hotel, 197-198, 204, 271
Paul, 450
Grants from outside agencies, 164-165, 307-310, 439, 450
Grasselli Chemical Company, 164, 166
Fellowship, 211-215
Gray, Harold, 176
Greek, 3-4, 10, 24, 37, 98
Green
B., 223
David E., 491
Greencastle, 568
Greene, Elizabeth, 89, 320-321, 343, 431, 530, 538, 543, 552
Greenstein, Jesse P., 402, 425
Gregg, Charles L., 210
Greico, Paul A., 374, 513-515, 519, 528, 532, 535, 548, 552, 555-558
Griess, John, 367
Griffins’ blowpipe, 36
Griffitts, F. A., 214
Griffy
Creek, 221
Lake, 221
Grim, R. J. Scholarships, 545-546
Groggins, P. H., 402
Gronnert (Wabash historian), 588
Grose, Herschel, 430, 493
Ground broken for 1931 building, 238
Grubb, Betty, 529-531
Gucker
Eleonore (Mrs. Frank), 373, 558
Frank F., 373
Appointment, 374
Hall, 431, 523
Lectureship, 431, 523
Memorials, 431
Research Program at L.U., 420
Katharine, 373
Guest, W. J., 277
Guggenheim Foundation, 161
Fellow, 198, 438, 490, 493, 547
Guinier, Andre, 487
Gulf Coal Saver Company, 167
Gunsalus, Irwin, 400
Gurd,
Frank R. N., 512-513
Ruth, 513
Guthrie
Helium, 175, 187-188
Hemoglobin, 376
Hendricks,
  Thomas A., 44
  Sen. William, 6
Henke
  Clyde O., 107, 149, 154, 158, 182, 201, 224
  Kenneth O., 201
Henley, Mr., 353
Hennel, Cora B., 185
Henshaw, F. R., 162-163
Hepley, Glenn, 274, 278, 321, 337, 416, 433
Herbert Newby McCoy Award, 583
Hercules Powder, 210-211, 449
Hered, William, 285
Heymann, Hans, 440
Heyrovsky Micropolarograph, 269
Hibben, Henry B., 22
Hickinbottom, Professor, 445
Hicks,
  John W., 306
  R. Lowell, 567
Hidy, Phil H., 274, 307-308, 311
Hieftje, Gary, 512-514, 519, 527, 548
High, Edward G., 218, 274
High school
  Certification of commissioned, 42
  Teachers, 185
Higher Education Commission, 556
Hildebrand, Joel H., 487
Hill
  J. T., 422
  Nat U., 85
Hindenburg, 187-188
Hinesley, H. M., 201
Hiram Walker Company, 214
Hirschfeld, T., 520
History of Chemistry
  Course, 391
Hites, Ronald, 513
Hirtle, Lucinda, 558
Ho, Ping Lum, 317
Hochanadel, Clarence, 273
Hoeschele, J., 520
Hoffman,
  Darlean 524
  Horace, 64
  Roald, 522
Hogan
  James L., 166
  Vada, 533
Holcomb, Roger, 176
Holderman, Richard, 202
Holl, Carl W., 576
Holland
  J. E. P., 186
  W. E., 197
Hollingsworth, Mark, 513
Holman, H. P., 121
Holmes
  Harry N., 571
  Major, 122
Holmstedt, R. W., 170
Home Economics, Department of,
  102, 123, 176, 296, 521
Honorary doctoral degrees, 241-242,
  549, 558
Honors,
  Advisor, 444, 500
  Banquet, 444-446, 494, 497, 502,
    528-529, 543-547
  Program for degrees, 501
  Research, 444
Hoobler (Iota Sigma Pi), 199
Hoods, Fume, 247
Hooker Electrochemical Company,
  211
Hoosier Courts, 363-364
Hopkins, B. S., 183
Horack, Frank E., 169
Horton, William S., 320
Hospital Expansion, Committee for,
  494
Houghton-Mifflin Company, 270
Housing facilities, 363-364
Hovey, Edmund Otis, 587-588
Howard
  Edward, 364
  J. H., 386
  University, 581
Howell, Lloyd B., 589
Hruschka, Judy Driver, 578
Huber, W. H., 423
Huddle, W. J., 223
Hudson, Loyd, 552
Huffman, John, 446, 534-535
Hull, Clarence J., 575
Humbaugh, N. W., 201
Humbolt, Alexander von, Sr Scientist Award, 548
Humidity controls, 361, 484
Humiston, B., 146
Humphrey, Shirley Arnold, 529
Hunt
  Herschel, 177, 210
  Virgil, 197, 203, 215
Hunter
  H. W., 197
  Mary Elizabeth, 49
  Morton C., 49
Huntington College, 105, 286
Hurd, Dallas T., 366
Hurty, J. N. Laboratories, 107
Huse, Erle S., 573
Hutcherson, Grover C., 135, 194
Hydrogenation Laboratory, 409-410
Hygiene, 124
  Committee, 99
Hyperconjugation Conference, 442-443, 494

I Remember Him: A Biography of Frank Thomson
  Gucker, 432
Ided, Thomas M., 567
Illinois
  University of, 198, 210, 256, 259, 270, 283, 286, 290, 305, 308, 332, 382, 402, 405, 453, 485, 508, 524, 528, 556
  Wesleyan University, 573
Immunochemistry, 424, 427
Indian and Negro Music, 159
Indiana
  Academy of Science, 47, 88, 147, 217, 268, 326, 488-490, 493-494, 497, 549, 571, 577
  Speaker of the Year, 549
  Alumni Quarterly/Magazine, 44, 89, 107, 139, 143, 165, 209, 248, 280, 555
  and Purdue Universities joint meeting, 488
  Asbury University, 568
  Central College, 166
  Central University, 574
  Chemical Society, 488-489
  College, 6-12
  Dental College, 161
  Journal, 5, 77
  Medical College, 568
  Memorial Union, 344, 514
  Section of the ACS (Indianapolis), 175, 268-269, 400, 499
  State Fair, 179, 182-183, 486
  State Normal School, 575
  Eastern Division, 564
  State Teachers Association, 170, 185
  State Teachers College (State University), 575
  Union Club, 364
University
  Alumni Association, 218, 274, 486, 551
  Club, 234
  Extension Centers, 144, 214, 219-220, 254, 268, 284-285, 327, 521
  Foundation, 340, 343, 348-355, 466-470, 482, 514, 538, 552
  Agreement with, 466
  Name changed, 12
  News-letter, 240
  Quarterly, 165
Indianapolis
  Extension Center, 254, 268, 284
  University of, 574
Indium, 130
Industrial chemistry, 231, 300, 317, 382
  Professorship, 519-520
Infante, Anthony J., 565
Informational Services, 512
Infra-red light, 322, 455, 532
Inland Steel Company, 541
Inorganic Chemistry Symposium, 504, 552
Insect Phermones, 551
Institute for High School Teachers of Chemistry, 504
Instrumental methods of analysis, 289, 291, 324, 453, 515, 532
Interim president, 50
Interdepartmental Programs, 516-518
Intermediary metabolism, 340
International Harvester Co., 214
Iodoform, 113
Ionic beams research, 491
Iota Sigma Pi, 174-176, 198-203, 272, 326, 366
Iowa
  State University, 331, 437, 453, 493
  University of, 198, 258, 551
Irions, Don G., 131
ISCO Award in biochemical instrumentation, 548
Isobe, Fusanobe Paul, 106, 133-137, 173, 241-242, 245, 367
Istanbul, University of, 376, 489
“isotopes laboratory”, 408
Ittner, Robert, 294
Iwata, T., 519

Jadden, W. B., 131
Jagoe, Christopher, 519
James
  Floyd, 197, 207
  Joe, 366
  Janitor, 79
Japan, 133-137, 242, 245, 338, 367
Jaskunas, S. Richard, 513
Jasper, John, 519
Jemiolo, B., 519
Jenkins
  Fred, 201
  W. Terry, 512-513
Jennings, Gov., 2-3
Joens, Jeffrey, 545
Johns Hopkins University, 152, 172, 264, 275, 306, 568, 572, 584
Johnson
  Aaron, 167
  Charles H., 589
  Eric, 565
  G. Dana, 339, 404, 416, 433, 436
  Geneva, 531
  Jay Howard, 564
  Judy, 530
  Mary K., 544
  Norma, 298
  R. D., 397
Johnston, Victor, 519
Jones
  Chester, 201
  Donald, 476, 497
  James Homer, 285, 289, 320, 331, 342, 375
  Marc, 545
Jordan, David Starr, 30, 34, 36, 40, 62-64, 68, 74-77, 81, 90, 136, 337
  Fishes & specimens, 67
  Hall, 157, 361, 404
Josse, J., 496
Journal of the American Medical Association, 161
Journalism building, 235
Joyner, Ralph, 564
Ju, G. Z., 519
Julian, Percy L., 569
  Science and Mathematics Center, 569
Julius Rosenwald Fund, 217
Junior Division, 254

Kahlenberg, Lewis A., 106, 110-112
Kammerer, Paul, 171
Kanartec Coatings, Inc., 291
Kanning, Eugene W., 179, 193, 198-200, 210, 213, 229, 246, 259, 268-269, 284, 291, 313
Kansas State University, 339, 436
Karslake, William J., 567
Kartinos, Nicholas J., 305, 367
Keiss, Arthur E., 210
Keller
  Mollie Goodrich, 230, 279
Raymond, 198, 215, 230-231
Kelley, Barbara, 365
Kenig, Fabien, 519
Kent State College, 339
Kentucky State College, 485
Dept. of Chemistry, 218
Kessel, W. G., 576
Key, William, 366
Keys,
Ancil, 366
Chemical Stores, 416-417
Library, 458
Kharasch, Norman, 440
Kilpatrick, Alexander, 39
Kilsheimer, Sidney, 567
Kime, E. M., 296
Kinetic molecular theory, 45
King
Cecil V., 149, 272
D. M., 558
Florence B., 176, 210
Franklin S., 215
Kinsey
Alfred C., 148, 169, 268
Clara McMillan, 148, 191
Philip A., 572, 578
Kintner, Edward, 576
Kirkman, Wayne, 201
Kirkwood
Daniel, 22-27, 39-40, 50, 58, 67,
74, 76, 84-85
Hall, 227, 324, 336, 361, 404, 473
Kirner, W. R., 453
Kirsch, Joseph L., 567
Kiwani Club, 268, 277
Klemm, LeRoy H., 382, 385, 414,
429, 436, 486
Klinge, Paul, 492
Knapp's Chemistry, 19
Knego, John, 512
Knudsen, Oran M., 584
Kochi, Jay, 512-515, 518, 527, 535,
547
Kohlmeier, A. L., 170
Kohlrausch, 45
Kokomo Extension, 219
Kolachov, Paul J., 309
Konopinski, Emil J., 258
Konrad, W. P., 207
Koogle, Lowella, 433
Kotz, John C., 559
Krafft, F., 99
Krauskopf, F. C., 118, 119, 122
Kreighbaum, William E., 591
Kretzschmar, Carl, 298, 418
Krilium, 486
Kroc, Robert, 268
Kronenberger, Albrecht M., 298,
418, 487, 493
Krueger, Gordon, 585
Kruger, Terry, 566
Kuebler, John R., 131-132, 139, 201-
204, 270, 487, 567
Kunze, Kathryn, 519
Laboratory Building, 15-16, 22
Explosion, 492
Flooding, 484
Manual for ASTP, 302
Regulations, 55-56
Safety, 404-405
Motion pictures, 405-406
Pamphlet “Laboratory Safety”,
406
Lahm, George P., 545
Lahrmann, Dolores, 538
Lake
Lemon, 220-222
Monroe, 220, 222, 471
LaMer, V. K., 402, 425
Lander, J. J., 438, 495
Landis, Gerald K., 380
Landsberger, Frank, 512
Lane, H. W., 201
Lang, Patti, 566
Langer, Lawrence K., 258
Langhoff, Peter, 512-513, 527, 550
Langmuir, I., 203
Languages, foreign, 3, 9-10, 22-24
Languell, Lucile B., 280
Lanterman, Elma, 199
Lantz, Claude, 202
Largman, Ted, 431
Larrabee, William C., 568
Larson, Raymond G., 587
Lathe, 295, 379
Latin, 3-7, 24, 37, 86
Laubengayer, A. W., 397
Lauder, Mr., 140
Lauer, W. M., 443
Laurence Scientific School (Harvard U.), 2
Laurent’s polariscope, 77
Law Department, 3, 44, 98
Lawhead, Thomas, 412
Lawrence
Berkeley Laboratory (LBL), 535
College, 285
Livermore Laboratory, 520
Richard, 564
Lawton, William, 366
Lead, 109
In gasoline, 188
Oxides, 106
Plating baths, 360
Poisoning, 188
Sulphides, 217
Tetraethyl, 386
Leal, Joseph C., 308, 430, 460
Learning Resources Center, 539
Lecture Demonstrations, 396-397, 540
Explosion, 471-472
Hall, Harry G. Day, 523
Lectureships
E. Campagne, 523
M. Carmack, 523
H. Day, 523
F. Gucker, 431, 522-523
F. Maters, 522-523
Lee
Ira, 122, 139
Summer Scholarships, 545-546
Robert J., 270
Leer, Harry, 202
Legislature, 7, 23, 27, 44
Lehigh University, 139
Leighty, J. A., 425
Lengnick, Guenther, 489
Lehner, Victor, 137
Lens Coating, 342-355
Leonard,
George R., 127
G. W., 325
Springs Lake, 221
Lesh, Larry N., 565
Lessor, Edith Schroeder, 587
LeSuer, William M., 308, 315, 340, 367, 397, 430, 460, 538
Letter
Grades, 115
To the editor, 394-396
Levin, Ezra, 309
Lewin, Alfred, 513
Lewis
E. R., 588
E. S., 443
H. F., 398
Lord Jack, 525
Robert, 273
Lewisite, 186
Keys, 498
and Information Services, 526
Liebig, 46
Liebreicht, 48
Light scattering measurements, 421
Lightning, 26, 66
Lilly Undergraduate Summer Research Scholarship, 546
Limbach Company, 481
Lime, 146, 164-166, 180, 217
Association fellowship, 164-165
Plaster, 165
Slaked, 182
Limestone, 17-18, 146, 165, 181, 204
Calcination of, 468
Lin,
Feng, 519
H. M., 422
Jinping, 546
Lind, S. C., 288
Lindley
Ernest H., 101
Hall, 101, 171, 235, 296, 363
Lingle, Robert M., 149, 201, 430, 493
Lipari, Giovanni, 545
List
Alpha Chi Sigma, 1946, 1947, 366
Ball State Faculty, 566
Butler,
Courses, 566-567
Former faculty, 567
Graduate teaching assistants, 1940-41, 273
Guests at dedication, 243-244
Institutions in Indiana with accreditation, 563
Scientific Publications, Annual, 422
Speakers, Southern Ind. Sec. ACS 1948-50, 402-403
Lithospermum ruderale, 490
Liu, Chu-Tsin, 486
Livingston, L. F., 271
Lobkovsky, E., 519
Logan,
Harold W., 201
W. N., 223
London, University, 436
Long, Norman O., 572
Louden
John H., 85
Theodore J., 85
Lowden, J. L., 129
Lowengrub, Dean M., 558
Lowell, Mildred Hawksworth, 156, 249, 297, 333
Lubrizol Corp., 419, 449, 542, 545-546
Lucas, Eric, 519
Luckett, Denessa, 546
Luffer, Debra, 546
Lutz, Wilson B., 578
Lycopene, 218
Lyons
Jr., Robert E., 201, 205, 238
Mrs. Robert E., 199
Robert E., 17, 64, 67, 78-80, 83-84, 89-250, 257-259, 286, 296, 336, 371, 508, 589
Electric car accident, 142
Recovery of gold process, 137
Lysher, John, 414
M. D. Anderson Hospital, 301
Ma, Pang Fai, 565
M.A.T. degree, 451-454, 490
MacCutchen, Sam, 397
Machado, Francisco, 519
Machine shop, 294-295, 363, 379, 383, 412-414, 454, 528, 530
Machinist, 379, 383, 412-414, 530
List of, 414
Madden, Dick, 426
Madenwald, Frederic A., 107, 149, 154
Magee, John L., 398, 580
Magnavox Company, 214
Magner, Lowell Max, 342, 369
Magnesium
Fluoride, 342-356
Oxide, 109
“Magnetic Resonance Laboratories”, 456
Magnus, Philip, 513-514, 535
Maguire, Joseph, 579
Memorial Award, 546
Malaria, 305
Manchester College, 576-579
Manhattan Project, University of Chicago, 383
Mann, F. G., 440
Manpower problems, 310
Manual of Information for Prospective Students of Chemistry, 412
Manufacturing Chemists Association Award, 558
Marburg, University of, 93
Marchi, Louis E., 302, 339
Margerum, Dale, 583
Marmur, J., 496
Marquis, T., 446
Marsella, John, 545
Marsh, Max, 366, 519
Marshall
College, 339
Frances E. (Mrs. Eagleson), 217
Howard D., 306, 308
T. R., 422
Martin
Ernest L., 212, 326, 342, 357
F. D., 453
John N., 576
Linda, 346
Oliver Curtis, 120, 241-242
Richard, 414
Marvel, Carl, 283
Maryville College, 214
Mass Spectroscopy, 456, 529, 532
Massachusetts Institute of Technology, 338, 366, 382, 522
Master
of Arts for Teachers, 451, 490
Degree, 508, 517
of Science-Information Specialist, 526
Masters, John, 366
Mastin, Thomas W., 590
Mathematics, 3, 6-12, 22-24, 27, 39-40, 84, 393, 517
Lectureship, 522-523
Prof. and Mrs. Frank, 173, 200
Rentals, 364
Mathews
Helen, 492
J. H., 271
Mathias, S., 497
Matson, F. A., 397
Maurer, Richard L., 464
Maurice, Jewell, 298
Maxwell
David, 3, 16, 67
Howard, 85
James D, 21
May,
Frederica (Bonnie) Kirby (Mrs. C. E.), 127
Prof. and Mrs. Clarence E., 200
Mayfield
Evart E., 212
Paul, 201
Mayo, Dana W., 455, 458, 532
Mays, William, Award, 546
McBain, Evelyn L., 272
McBee, Earl T., 397, 487, 582
McCarthy, Walter, 366, 400
McClung, Leland S., 258, 265, 276, 346, 426
McCollum, Elmer V., 160, 171-172, 176, 264
McConnell, M., 520
McCord, Clara, 38
McCormick’s Creek State Park, 365
McCoy,
E. Marie, 531
Herbert N., 583
Herbert Newly Medal, 583
McCracken, Branch, 360
McDonald, J., 520
McDowell, John, 450
Mcfail, Loring, 201
McFarlin
H. J., 201
Harold G., 166, 197
McGlynn, Sister Amata, 210
McGrew, LeRoy A., 564
McHarness, Robert C., 213
McKenzie, J. H., 197
McKinney
Paul C., 590
Peter, 450
McKinnis, Thomas, 579
McMasters, Donald L., 512, 531, 591
McMillen, Clara B. (Mrs. Alfred Kinsey), 148
McFheeters, Joseph G., 85
McQuarrie, Donald A., 439, 512
Mead,
Marshall, 366
Johnson Company, 541
Fellowship, 544
Meader, J. W., 121
Meadowood Messenger, 469
Means, Karl Stone, 567
Mechanical instruments services shop, 530
Mechanics, 7, 24-25
Medcalf, Eugene, 197
“Medical Preparatory Course”, 96
Medical school, 517
Scientists Scholarship Fund, 545
Technology, 393
Medicinal chemistry, 291, 340, 424, 427, 442, 512
Meeting, 442
Medicine, 3, 93, 95, 114, 298
Meem, Lawrence, 273
Meharry Medical College, 218, 274
Meibohm, Alvin, 587
Meiser, John, 565
Mellanger, George, 410
Mellon, M. G., 236, 476, 583
Melvin Village, N.H., 377
Memorial
Hall Residence for Women, 179
Park Middle School, 565
Stadium, 232-233
Temporary “annex”, 364
Union Building, 179, 235, 400, 543
Men’s Faculty Club, 316
Mendelev, D. I., 46
Menis, Oscar, 427
Mental and moral sciences, 7
Mercaptans, 344
Merck & Co. (Merck, Sharp & Dohme Co.), 269, 438
Index Awards, 544-546
Mercurial pneumatic trough, 17
Mercurochrome, 128
Mercury, 137
Merriam, Helen, 309
Merrill, Winifred, 155
Mertz, Edwin, 366
Melson, M., 496
Metabolic antagonism, 340
Metallurgy and Assaying, 391
Metaphysics, 3
Metcalf, Clair, 406
Metzner, Wendell, 198, 204, 430, 460, 493
Meyer
L., 46
Walter L., 437, 456, 481, 495, 497, 500, 505, 512
Wendell W., 578
Meyers, Albert I., 523
Miami University, 20, 207
Michaelis, L., 397
Michigan, University of, 152, 285, 289, 291, 313, 382, 402, 405, 424, 437
Microanalytical chemistry, 155, 228, 414-415, 454-455, 459, 486-487
Microscopy, 194-195
Middleton, A. R., 582
Midwest Cooperating Sec. of the ACS, 400, 428
Mierson, Judge Robert W., 85
Miles, Wyndham, 249
Miller
Charles, student, 25
Clem O., 578
Edward G., 579
Fred M., 211
John William, 414, 531
Robert, 297
Roy G., 590
Milligan, Robert, 1, 20
Milligan, Robert, 566
Milliken
Robert A., 203, 375
University, 551
Milling machine, 363, 379
Million Dollar Memorial Drive, 179
Mimeograph machine, 553
Minerals, 51
    specimens, 29
    waters, 35, 51
Mineralogical Cabinet, 42
Minnesota, University of, 285-288, 305, 308, 382, 400
Minshall, D. W., 569
Minton, Rev., 35
Mirrors, 183
Missouri School of Mines, 105
Mitchell
    Allan C. G., 258, 268
    James L., 67-69
    Thomas D., 10
Mitochondria, 428
Mitsui Mining Company, 184
Moenkaus, William J., 170
Moissan, 146, 516
Molecular
    Biology center, 475-476
    Application for partial funding submitted in 1957, 475-476
    Size and structure, 45
Spectroscopy, 437
Structure Center, 442, 527, 533-535
    Director, 534
Monmouth College, 85
Monroe County, 2, 67
    Bank, 225
    Female Seminary, 59
Monroe, Pearle, 430, 460
Monsanto Chemical Co., 339, 450, 486, 520, 542
Montague, Jack, 564
Montgomery, Lawrence K. (Mike), 436-437, 503-505, 512-513
Montpellier, University, 493
Moore
    Charles, 545
    Helen N., 200
    Joseph, 517
    M. L., 398
    R. B., 112
    R. D., 173
    Richard Bishop, 567, 582
    Moorman, Earl F., 202-204, 214
Morgan,
    C., 520
    Hallie Isabel, 198
    Morrill Act of 1862, 581
Morrison
    John L., 23
    Joseph T., 567
    Sarah Parke, 37-38
Morton,
    Prof., 101
    Camp, 29, 32, 36
    Governor, 29
Mosbo, John, 565
Moser, Clarice, 529
Moss, Lemuel, 50, 68, 71
Motion pictures, film, 198, 202-203, 271, 405-406
Mottier, D. M., 170
Moulton
    Forest Ray, 171
    H. R., 348
Mountjoy, R. H., 488
Moxley, G. Barrett, 125
Moyle, C. L., 326
Mueller, Mrs. H. J., 376
Muhler, Joseph C., 355, 425, 463-471, 491, 498
Mulder, H. D., 325
Mulliken, R. S., 443
Muncie, 177
    National Institute, 564
    Normal Institute, 564
Mundy, B. W., 366
Mungall, William S., 559
Murr, Brown, 450
Muser, Mr. & Mrs. Curt, 558
Museum, 16, 32, 44, 54, 67, 147, 184
    William Hammond Mathers, 147, 338
Music
    Building, 235
School of, 155
Mustard gas, 186
Myers
B. D., 7, 99, 155, 170, 179, 229
Hall, 458

N-bromosuccinimide, 340
Nachstein, Henry, 273
Named Faculty Lectureships, 522-524
Nankai University, 315-317
Naphtha, 17-18

National
Academy of Sciences, 274, 376-378, 547
NASA Traineeship, 544
Bureau of Standards, 541, 584
Cancer Institute, 425, 548
Catalysts Award, 549
Chemical Exposition, 148
Defense effort, 284
Defense Research Committee, 344, 375, 379
Defense Research Council, 343-345
Health Research Institute, 234
Inorganic Chemistry Symposium, 504
Institutes of Health, 341, 381, 542, 556
   Fellowship, 418-419
Lime Association, 164-167
Medal of Science, 272
Nutrition Conference for Defense, 376
Organic Chemistry Symposium, 443, 504
Research Council, 305, 358-359, 374, 400, 562
Science Foundation, 380-381, 420, 452, 526, 542, 550
   Established, 380
   Faculty fellowship, 438
   Graduate fellowships, 544
   Institute for Teachers, 453
   Traineeships, 544
Youth Administration, 297

Natural
Phenomena, 27
Philosophy, 3, 17
   and Chemistry, 20

Products, 436
Science, 22, 30
Naval Ammunition Production
   Engineering Center, 528
Navy, 301, 456
   Research Laboratory, 344
Neal-Marshall Alumni Club, 217
   Memorial Award, 545-546
Necrology, 552
Nees, A. R., 106
Neese, Donald E., 203, 207
Nef, John U., 581
Neff
   Anne Eliza, 28
   Joseph, 28
Negro student in 1882, 59
Neher, Clarence M., 578
Neithamer, Richard, 450
Nelson, R. E., 582
Nemec, Joseph W., 305, 325
Ness, Frederic, 249
Neumann, F. W., 325
Nevill, C. Richard, 519

New
   College Building, 66-68
   Harmony, 27-35
   Jersey, 551
   Mexico, University of, 568
   Side Reformed Presbyterian
   Church, 18
   York Agricultural Experiment
   Station, 283
Newkirk, John G., 64
News
   Edition of Industrial and
   Engineering Chemist, 155, 165
   Letters, 429-430, 459-460, 520
Newman, M. S., 393
Newsom, Helen, 198
Newton, Alexandra, 511, 513, 552
Nice, Margaret, 198
Nicoll, Paul A., 362, 410
Nicotinic acid, 310
Nieuwland, Father Julius A., 579-580
Nitroparaffins, 582
Nix, Sydney, Jr., 366
Nixon, R. M. (not pres.-to-be), 345
NMR, 456-457, 527, 533
Nobel Prize, 583
Nobrega, Armi, 544
Noller, Harry F., 525
Non-academic staff, 278-279, 294, 321-322, 336-337, 527-532
Nordstrom, Robin, 530, 537
Normal school, 21
Norman, George, 204
North
American Review, 96
Carolina, University of, 290
Central Association of Colleges, 586
Northern Indiana Normal School and Business Institute, 585
Northwest Campus, 521-522
Acting Dean for Academic Affairs, 521
Territory, 28
North-Western Christian University, 566
Northwestern University, 259, 291, 305, 375, 379, 402, 420, 550
Notre Dame, University of, 151, 288, 383, 487, 550, 579-581
Novotny, Milos, 512-514, 519, 548, 550
Noyes
A. A., 375
Jr., W. Albert, 287, 403, 584
Sr., William A., 178, 584
Nuclear Magnetic Spectroscopy, 456, 496, 503, 528, 533-535
Nucleic acids, 46, 550
Nunamaker, Jeanette, 205
Nurre Mirror Plate Company, 183
Nutrition, 20, 176, 265
and health, 160
Foundation Fellowship, 419
Service, 174
Nutritional biochemistry, 265, 411
Research, Foundation for (Davis), 161-164
Nutt,

Cyrus, 45, 49
John J., 546
Nye, D. D., 241

Oak Ridge Laboratories, 301, 520, 565
O'Banion, Elmer E., 218
O'Bannon, Charles, 366
Oberlin College, 571
Oesterle, William F., 105, 114, 121
O'Harrow, John W., 125
Ohio,
Oil Company Fellowship, 419
State University, 301, 402, 576

Oil
Burner, 124-125, 163
Shale, 17-18
O'Konski, Chester T., 421, 431
Old Laboratory Building, 16
Olsen, Clemens, 197
Optical equipment, 342
Optics, 24-26
Optional studies, 24

Oral
Health, 265, 469
Hygiene, 425
Oregon, University of, 436
Organic Chemistry,
Cumulative Indices, 332

Physical, 513

Special section, 444
Symposium, 270, 312, 443
17th National, 443, 497, 504
Sulfur chemistry, 291, 340-341

Conference, 440-441
Synthesis, 283
Wheel, 426

Organometallic chemistry, 535
Orme-Johnson, William H., 524
Ortoleva, Peter, 513, 519
Osborn
Engineering Company, 223
Laurence L., 201
Wabash historian, 589
Osborne, Estelle, 422
Ossenberg, June, 117
Ostwald, W., 110
Otter, Richard R., 305-308, 325, 424
Outstanding
Staff Award, 528-530
Students, 148-149
Overman, O. Ralph, 122, 139
Owen
Brothers, 72, 523
Cabinet, 29, 32, 42, 55, 184
David Dale, 32, 36, 44
Hall, 36, 45, 67, 72, 235, 277, 523, 527, 534
Richard, 1, 22, 27-36, 48-49, 55, 88, 523
Robert, 28, 523
Robert Dale, 28, 36, 523
Oxygen, Liquid, 472

Packman, D., 414
Papish, J., 149, 356
Paratore, Paco, 544
Pardue, Harry, 583
Park,
Jae Chan, 519
Sungsoon, 519
Parker, Dr., 136
Earl, 273
Vincent E., 254
Parkin, Ivan, 519
Parks, Beaumont, 10, 12
Parmenter, Charles S., 439, 512-514, 548-549, 559
Partenheimer, William, 366
Pasteur, L., 46
Patents, 106-108, 114, 124-125, 137, 147, 149, 180, 183, 224, 343, 347-356, 466-469
Policies, 469
Pathology, 95, 130
Patrick, Robert, 420
Patterson
Austin M., 584
J. H., 106
Pattison, Scott, 566
Paudler, William, 450
Paul Ehrlich prize, 378, 495
Paul, Gitendra, 519
Pauling, Linus, 375, 377, 400-401, 559

Pawelec, Alice Brown, 107
Payne
Elmer C., 467
Fernandus, 170, 241, 264-265, 275, 284, 293, 296-301, 306, 318, 327-328, 331, 361
Pearl Harbor, bombing of, 277, 285
Pearson's Washington Merry Go Round, 314
Penetrometer, 421
Pennsylvania, State College, 213, 241, 268
University of, 85, 532
Pension Plan, 247-248
Pepper, Foster L., 167, 197
Perchlorates, 146
Perchloric acid, 337
Pering, Cornelius, 59
Periodic classification of the elements, 46
Perry, Oscar B., 241
PhD, first earned, 153
Peyton, Floyd A., 202, 208, 213
Pharmacy, 340
Petroleum, 188
Philippine Islands, 97
Phi Beta Kappa, 132, 269, 289, 443, 544
Lambda Upsilon, 176, 197-198, 269-271, 277, 315, 325, 365-366, 489, 492, 496
J. P., 367
Philpott, Delbert, 366
Phosphene, 187
Phosphorus, 160
Phosphorylase, 308
Photostat, first University, 226
Phrenology, 58
Physics, 7, 10, 48, 60, 76-77, 235, 258, 294, 517
Club, 170
Physiological chemistry, 46, 77, 127, 158, 274, 492
Physiology, 171, 264, 296, 410
Picatinny Arsenal, 218
Picnic, Departmental, 365, 486, 489
Piggot, C. S., 358
Pioch, Richard P., 467
Pittinger, N.O., 131
Pittsburgh,
   Analytical Chemistry Award, 548
   University, 217, 241, 339, 492
Place, Muriel, 211
Placement, 138-139, 208-216, 543
Examinations, 446-447
List of Graduates 138-139, 210-216
Plating and addition agents, 359-360
"PLATIN-NIG", 355-356
Platinum, 129, 137, 180-181, 227, 277
Plattner blowpipe analysis, 56
Plunkett, Roy J., 578
Pocker, Y., 496
Poindexer, Paris, 202
Polanyi, John C., 431
Policy committee, 499-500, 510
Polyhedron, 535
   Best Paper Award for 1987, 535
Polysaccharides, 307
Pople, John A., 431
Popoff, Frank, 558
Postdoctorals, 167-168, 518-519
Post-War Planning Committee, 323
Powell, J. E., 138
Prairie View State College, 218
Preer, John R., 274
Pregl, Fritz, 155
Preliminary examinations system, 446-447
Preparatory school, 22
President pro tem of IU, 22
President's Medal for Excellence, 523
Pressprich, K., 519
Prest-o-Lite Company, 107
Pribush, Robert A., 567
Price
   Charles C., 443, 487, 580
   Harold, 366
   William P., 215
Priest, R. M., 415
Priestley,
   Joseph, 25-26, 47
   Medal, 583
Princeton College (University), 85, 178, 236, 256, 289, 486
Private institutions (Indiana), Partial List of, 563
Procter and Gamble Company, 208, 211, 419, 466-469, 491, 542
Fellowship, 546
Patent Department, 468
Proehl, Elsa C., 308
Professional
   Guests, list at dedication, 242-244
   Training of chemists, 255
Professor of General Chemistry position, 319
Prohibition, its effect on department, 185-186
Proteins,
   And nucleic acids, 378
   Structure, 401
Public
   Health Service, 477
   Lands, 2
   and Environmental Affairs, 518
Publications, List of topics and faculty, 461-462
Pulido, A. A., 422
Purchasing Department, 260, 275, 321
Purdue
   John, 581
   University, 21, 31, 47, 53, 151, 173, 177, 210, 231, 237, 240, 259,
288, 405, 453, 475-476, 487, 556, 562-563, 573, 581-583
-Indiana game, 223
Pure Food and Drug Act, 574
Pursell, Chris J., 519
Putnam, F. W., 398
Pyle, James, 565
Pyrex glassware, 360, 415
Qualifying Examinations, 446
Quantum Chemistry Program
Exchange, 536-537
Quantum Mechanics, 512-513
Quill, Lawrence, 398
Quin, Lester, 201
Quinney, Paul R., 567
Quonset huts, 341, 534
RCA Scholarship, 445
Raab, Jacob, 492
Raczynski, Walter, 297
Radiation, 386, 496
Laboratory, 580
Radike, Arthur, 273, 466, 491
Radimer, Kenneth J., 382
Radioactive isotopes, 407-408
Radiochemistry, 155, 174, 398
Building, 404, 412
Ragatz, Oswald, 443
Raines, Eugene D., 217, 425, 485
Randall,
Senator's bill, 234
T. E., 477
Ransom, J. H., 47
Raper, Odell, 492
Rappites, 28
Rare gases, 173
Ratcliff, H., 113
Rawles
Hall, 156, 240
William A., 145
Ray
Gov. James B., 6
Kenneth W., 148, 166, 197
Richard, 366
RDX, 154, 304
Reavis, Ruby L., 298
Recktenwald, G. W., 430-431
Recitation and discussion sections, 394
Rector, Avis, 209, 310, 400
Reddick, H. G., 120
Redman, Laurence V., 241
Reed, Robert, 271
Reid
E. Emmet, 440
Jr., W. Bradley, 326, 341
Reilly,
James, 513, 519, 529, 559
Lectures, 550
Upjohn Award, 546
Reinhard, Jr., J. J., 289
Reininga, Lucille, 367
Remick, A. A., 397
Remsen, Ira, 77, 117, 152, 584
Rendell, John L., 308
Research
and Advanced Studies, 521
and Development, 521
Vice Chancellor for, 521
Career Award, 504
Computing Center, 491-492, 498, 535-536
Fellowships, 307, 418-420
at the U.S. Naval Research Lab, 438
Participation Program for College Teachers, 504
Residence Halls, Committee on, 253
Resignation and/or retirement, 247-248, 530-531
R. E. Lyons, 247-248, 250
Dinner for H. Day, 505
Frank Eckels, 337
Plan, 247-248
System, new, 247-248
Rettger, Leo F., 89, 97, 120, 241-242
Rhoads, Professor E., 30, 44, 53-55
Rhorer, Dr. Samuel K., 85
Rice
F. E., 122
Grantland, 207
Institute, 437
Stuart A., 431
University, 523
Rich, A., 496
Richards, Theodore W., 374, 420
Richardson, John, 512-513
Richmond Extension, 219
Ricketts, John A., 366, 568
Riebsomer, Jessie L., 568
Riegel, B., 397
Rinehart, Wilmer T., 206, 210-212, 430, 460
Roberts,
   Harold S., 320, 411
   J. D., 458
   Robert, 512, 527
Robertson,
   G. Ross, 476
   William, 201
Robinson,
   James M., 306, 308, 325
   Una, 199
Roe, J. N., 586
Roelofs, Wendell, 551, 558
Roessler-Hasslacher Chemical Company, 210, 213
Rogers,
   L. B., 397
   M. C., 415
Rohm and Haas, 332, 402
Roomes, Evert, 200
Rose, 56
    Chauncey, 588
    Donald G., 422
    Embree, 117
    Harry A., 567
    Hill cemetery, 14, 86
    Hulman Institute of Technology, 583-584
    Polytechnic Institute, 112, 574, 583-584
    William C., 365
Ross,
    Barbara, 546
    Louis A., 496
Rossini, Frederick D, 403, 580
Rotating Cathode, 113
Rothert, Frances C., 133, 143, 149
Rothrock
   David, 197, 202
   H. S., 197, 231, 431
Roush,
   Gar A., 113, 121, 127, 139, 269
   William, 513, 519, 559
Rowell, Robert L., 422, 431, 446
Roy-Chowdhury, P., 422
Royal
   Institution of London, 396
   Society (Great Britain) Fellow, 548
Royalty income, 469
Rudy, James H., Professorship, 514, 548
Ruhmkorff Coil, 36
Russell, Charles, 325, 341
Russo, Steven, 513, 559
Rutan, Phyllis, 326, 367, 397
Ryan, John W., 220, 316, 516, 537
Rybarczyk, James, 565
Ryker, A. H., 197
Rylander, Paul, 364, 367
Rymer, T. A., 143
Sabine patent, 352
Sabol, Albert, 366
St. Mary’s College, Notre Dame, 563
St. Xavier University, 215
Safety, 322, 338, 376, 387, 405-407, 472, 484, 539, 555
   Film ‘Plan to Live’, 405-406
   Glass, 271
   (Movie) in the Chemistry Laboratory, 405-406
   Shields, portable, 362
Salary, 4-5, 74, 78-82, 94, 100, 105, 128-129, 137, 141, 255, 260, 266, 292-294, 368-369, 449
Sanders,
   C., 295
   Lisa, 544
Sanitary Science, 84
Sao Paulo, University of, 492, 497
Sater, Charles, 414
Sattelberger, Alfred, 519, 535
Saunderson, Harriet Colburn, 72
Saveland, Alice, 107
Schaafsma, B. R., 325
Schaeffer, Riley, 374, 437, 439, 456, 493, 495-497, 504-512, 516, 526, 534
Schardinger dextrins, 342
Schlenk, F., 397
Schmelzle, A. F., 269
Award, 545
Schneller, Stuart, 446
Scholarships
for men only, 166-167
and Student Aid Committee, 254
Schooley, James, 486, 488
Schoor, Alvin J., 198, 204
Schreiber, Richard S., 590
Schrotenboer, Gordon H., 306, 325, 367
Schubert, W. M., 443
Schultz, O. F., 120
Schulz, Joseph R., 546
Schwan, Theodore C., 587
Schwartz, Albert, 202
Schwartzkopf, Joseph, Award, 545-546
Science
Building, 29-30, 40, 66, 184
(now Lindley Hall), 101, 227, 235, 263
Bureau Service, 188-189
Development Grant, 382
In a Liberal Education, 551
Program, 526-527
Scientific
Contributions, List of, 454, 553-554
“Scientific Course”, 39, 61
Courses in 1880, 61
Curriculum, 23-24
Data Systems Sigma 2, 535
Equipment, 17
Research and Development, Office of, 304, 344-349
Stores, 530-531
Computer-base System, 532-533
Scopvell, J. T., 575
Scott,
 Supreme Court Judge James, 6 I. W., 198
Scudder, Eugene, 149, 166, 201, 210
Seagram Company, 309, 314
Searle Scholar, 552
Secretarial services, 226-229, 267
Secretary, 99, 159, 227-228, 279-280, 529-531
-librarian, 230-231, 260
of Chemistry Faculty, 385
Seeber, E. D., 426
Seidel, Eugene, 384, 404-407, 411, 416, 433, 488
Seifert, Ralph, 383, 437, 444, 462, 472, 493, 501, 505, 512, 572
Seismograph, 34
Selective Service System, 311
Selenium, 146, 357-358
Self-Survey Committee, 252
Semester plan, change, 116
Semimicro qualitative analysis, 389, 393
Seminars, 275
Sernary, 3-6
Senate, 2, 11
Sendlinger, Shawn C., 519
Senior Girls Chemistry Club, 198
Serum globulin, 376
Settle, Howard, 202
Seward, Austin, 11
Sexton
Arthur R., 205, 215
Earl, 410-412, 421, 528, 531
Larry, 414, 530
Leonidas, 44
Seymour, Keith M., 412
Shadinger, Guy Howard, 567
Shale Oil, 17-18, 272
Shanks, John, 201
Sharp, Fred, 200
Sheehan, John C., 440
Shelley, Robert L., 201, 211, 564
Shepard’s “Elements of Chemistry”, 77
Sheperd, E. S., 121
Sheppard, J. W., 120
Sherman, H. C., 160
Sherockman, Andrew, 572
Sherwin
  Carl P., 139, 574
  Williams Paint Company, 167
Sherwood, T. K., 345
Shetterly, Fred, 119-122
Shideler, Norman, 201
Shils, M. E., 275
Shiner, Jr., V. Jack, 102, 373-374, 436-438, 442-444, 448, 452, 456, 481, 483, 489-505, 508-513, 519, 521, 526, 530, 550, 555
Shinn, Frederick, 103, 116, 119-121
Shirley
  Samuel C., 116, 201
  Canning Company, 195
Shirts, Neg, 202
Shive, William, 487
Sholtz, Allan R., 578
Short, Charles F., 202
Shriner
  Joan, 284, 333
  Rachel, 284, 326, 332
Shull, Harrison, 373, 437, 481-493, 497-501, 504-505, 508-512, 514, 516, 518, 521
  Honorary Symposium, 552
Shultz, Clifford G., 573
Sicks, John H., 201
Siddons, George F., 321, 360, 421
Siefker, Joseph R., 575, 591
Sigma Xi, 102, 132, 142, 147, 171-172, 175, 277, 325-326, 366, 380, 488, 490, 495
Silicone products, 326
Silliman
  Benjamin, 2, 24-25
  Journal, 25
  Textbook, 20
Silver, 181
Silverware, 181, 356
Simons, F. D., 120
Simpson, Matthew, 568
Sisler, Harry H., 453
Skidmore, Blanche, 307
Skolnik and Reese, 156, 249
Slaked Lime, 182
Sloan, Alfred, Foundation Fellowships, 496, 547
Sluss, James A., 450
Smalley, Richard E., 523
Smith
  Alexander, 589
  G. F., 314
  John H., 567
  L. Oliver, 587
  Lee T., 117, 149, 154, 201
  Lenore Gentry, 397
  S. Sterrett, 103
  U. H., 129
  Walter T., 325
Smith, Kline and French Company, 309
Smithson, Frederick C. M., 589
Smithwood Center, 363
Smokers, Alpha Chi Sigma sponsored, 202
Smoking, 406-407
Snively, Paul G., 166
Snopek, Jiri, 519
Snow, C. C., 198
Society of Friends, 570
Soddy, Frederick, 155
Sodium fluoride, 464-465
Solarium, IMU, 543
Solid state science, 338, 436
Sollman, Paul, 366
Solvents storage, 405, 481
Sommer, Nolan, 325, 430, 460, 489
Sonneborn,
  Award, 549
  Tracy M., 258, 265, 336
Sonnenthal, Eric L., 519
Sorin, Edward, 579
Sorrells, Morris, 492
Sousa, Lynn, 565
South Bend Extension, 219
Southeast (Jeffersonville) Extension, 219
Southern
  Indiana section of the ACS, 298-403, 425, 435, 471, 486-487, 498
  Methodist University, 332
Sowder
  Larry, 492
  Stanley, 176
Space
  Committee, 386, 403-404
  Problem, 87, 233-237, 266, 291, 297, 323
Spangler, William, 67
Spannuth, William, 67
Speaker of the Year, 549
Special section in general chemistry, 444
Spectral services laboratory, 455
Spectrophotometer, Beckman DU, 531
Spectroscopy, 45
Spencer, Grace G., 272
Spies Memorial Lecture Medal, 549
Sporleder, Ray, 534
Spraul
  J. R., 268
  Robert, 263
Spurgeon, Paul, 201
Sputnik, 453, 550-551
Stackhouse, George, 167, 213
Stadium, Tenth Street, 179, 223
  Repair Committee, 222-223
Staff
  Annual Award, 528-529
  List of non-academic in 1951, 433
  Member of the Year (University Wide), 530
Stahl, Elvis J., 220
Staley, A. E., Mfg. Co., 342
Standard
  Brands, Inc., fellowship, 365
  Oil
    Foundation Teaching Award, 549
    of New Jersey Development Co., 314
    Whiting, Indiana, 490
Stanford University, 62, 91, 270, 550
Stanley, Wendell M., 571
Stannous fluoride, 463-471
Stapleton, Patricia, 529, 552
“Starch Round Table”, 308
State
  Budget Committee, 237
  College Station, at Fargo, N.D., 153
  Fair, 180-181, 486
  Geologist, 27-28
  Road 37, 273-274
  University, 2
Stayner, R. Dale, 325, 366
Steam generator for distilled water, 81
Steele
  Howard, 201
  Margaret, 198, 213
Stefansson, V., 171
Steffen, L. Kraig, 519
Stellar constellations, 26
Stempel, Jr., Guido H., 177, 210
Stenftenagel, Judith A., 546
Stenographer, 226, 319
Sterling-Winthrop Res. Institute, 485
  Fellowship, 419
Stevenson
  Ernest F., 218
  Kenyon, 144
  William, 202, 211
Stewart
  Mr., 79
  James, 486
  Ralph, 197, 204
  Stickels, A. E., 131
  Stier, T. J. B., 309
Stillinger, Frank H., 523
Stitt, Fred, 256, 269, 276, 297
Stockhardt’s chemistry text, 24, 40
Stockroom, 93-94, 140, 228, 267, 275, 278, 404-405, 406-407, 415-417, 481
Helper(keeper), 93, 129, 259-261, 278, 292, 337, 530-531

Stone
J. B., 197
Professor (Hanover), 573
Winthrop Ellsworth, 582

Storage
Batteries, 106-109, 179-182, 224-227, 286, 300, 317
Vault for flammables, 405

Storch, B. H., 402
Storhoff, Bruce, 565
Storms, Lee B., 179, 343-349
Stout
Dean Selati, 232, 254-255, 263
Gerald, 421

Stover, Wendell, 197
Strain, Evelyn, 200, 214
Strasbourg, University of, 49
Strategic war materials, 284
Streator, James T., 578

Streib,
   Kirsten, 534-535
   William E., 417, 512, 528, 534-535

Strietelmeier, John, 586
Streichwieser, A., 443
Strickler, Alvin, 572

Strong
   Laurence E., 572
   Martha, 199
   Ralph K., 584

Stroup, Philip, 166, 178, 201

Stuart
   Elmer H., 138, 184
   Robert, 320
   Stubley, D., 422

Student
   Affiliates Chapter, American Chemical Society, 206, 267-270, 277
   Building, 132
   Complaints, 394-395
   Counseling, 254
   Friendship War Fund, 143

Government, 277
Guidance, 254, 272
   Counselor, 253
Health Committee, 145, 222, 247
Survey Committee (Chemistry), 263

Studley, Stephen, 529
Submarines, 187
Sugar Industry, 138
Summer Institutes for Teachers, 452-454, 542

Sunflower seed meal, 309
Superior students in general chemistry, 444

Supplies and expenses, 227-228, 261
Support staff, 225-226
Susan Butler Snow Award Com., 247
Suter, C. M., 397
Suttie, John, 523
Suttle, John (Jack) F., 321, 331
Swafford
   Donald, 414, 531
   Michael, 412

Swain
   Dr. Joseph, 83-85, 92-93, 99-102, 105-110
   Hall East, 240
Swan, John N., 241

Swarthmore College, 562
Sweeting, Orville J., 317, 320, 339
Swift, Jr., Elijah, 285, 289, 313
Synerholm, Martin E., 305, 313
Synthetic organic, 167, 516, 553, 582
Szabo, Attila, 512

Szent-Gyorgyi, A., 398

Talc Powder, 108-109
Tanford, Charles, 397
"Targeted" departments, 284
Taribara, T., 397

Taylor
   Bishop William, 585
   University, 585
Teachers' Insurance Annuity Plan, 247

Teaching
   Assistantships, 164
Associates Award, 504
Teletype, 149
Plating, 183
Titchie, Everett J., 585
Todus, 504
Lee J., 512-513, 529
Leslie J., 339, 366, 386-388
van Winkel, 356
Tokyo Nichi Nichi, 245
Titus, W. J., 223
Toner, Richard K., 204
Torr, Y. W., 362
Townsend, L., 519
Toxicology, 98, 113
Trace inorganic elements, 277, 307
Trancripts, copies, 226
Travel expenses, 266
Travis, F. H., Jr., 326
Treadway, Robert, 197, 202, 215
Trean, Joseph F., 202, 213
Trippet, Byron K., 590
Trix, H. Phelps, 306
Tryon, W. W., 213
Tryptophan, 128
Tswett, M. S., Medal for Chromatography, 548
Tuberculosis, 58, 81, 256, 315
Tucker, William B., 211
Tuma, J., 422
Turner's Chemistry, 16
Turner
Laura L., 38
J. P., 142
Typewriters, 99
Tyrosine, 340
Uhler, Frank G., 167, 213
Uhlig, H. H., 338
Ulysses G. Weatherly Award, 504, 549
Undergraduate
Advising & record keeping, 443-444, 499-500
Office, 543
Laboratory instruction, 539
Program 539-540, 554
in Chemistry brochure, 459
Recognitions, 544-546
Underground storage vault, 322, 405-406, 481
Underwood, Merrill, 574
United Presbyterian Church, 19, 33
United States
Bur. Agriculture & Industrial Chemistry, 402
Bur. of Mines, 402
Commerce Department 541
Drug Enforcement Agency, 541
Metals & Refining Company, 357
Naval Research Laboratory, 438
Universal Oil Company, 200, 215
University
Archives, 249, 505
Chemical Society, 131
Commons, 173
Division, 254
Fellowships, 164
Librarian, 458
Park, 63
Science Development Grant, 526-527
Senate, 233
Upjohn Company, 390, 546
Ure, Andrew, 28
Chemical Dictionary, 19
Urea, 2
Urey, H. C., 175
Urinary analysis, 77
U.S.R., 234
Utility Core Corridor, 476

Vagnier, Thomas L., 579
Valparaiso College/University, 153, 585-587
Van Arsdale, Prudence, 200
Van Atta, Robert, 565
Van de Hulst, H. C., 298
Vanderbilt, Byron M., 210, 244
VanderWerf, Calvin A., 453
Vanatta, Lynn, 544

Van Nuyys
Fresenius, 49
John D., 49
Morton Hunter, 49
Thomas C., 1, 30, 42-94, 156, 179, 244, 314, 461, 579-581
“Analysis of Urine”, 77
Ill health, 58
Leave for advanced work, 50
Portrait, 88
Van’t Hoff, J. H., 153
Vapor-phase,
Catalysis, 317
Oxidation, 106
Ventilation, 94-95, 247, 481
Venezuelan Fellowships, 545
Vernon, Helen, 198
Vice President-Bloomington, Acting, 521
Victory Tax, 306
Villanova College, 590
Vincennes University, 2, 23
VioBin Corporation, 309
Viola, Victor, 439, 513-514, 519, 529
Vischer, Paul S., 342-348, 355
Visiting Scientists in Chemistry Program, 494, 505, 550-551
Vitalism, 2
Vitamin, 171; 310
A, 160, 218
D, 160
K, 218
Vogel, Paul W., 326
Volcanic action, 26
Von Baeyer, A., 584
Voss, Jr., Bert J., 202, 213
Votaw
Maxwell, 201
Verling, 166, 197, 201, 466-467, 486
and Elizabeth Award, 546
Wabash College, 112, 288, 487, 587-591
Waddington, Charles, 458, 501
Wade, Frank B., 202-204
Wager, Wm. F., 573
Wagoner, Harvey E., 213
Wakim, K. G., 325
Walker
J. H., 149
Morton, 138
Wall, F. T., 496
Walling, C., 298
Walnut Street Presbyterian Church, 85
Manpower Commission, 324
Surplus Equipment and Supplies, 360-363
Waring Blender, 312
Warner, Julius (John) C., 107, 149, 153-154, 158, 182, 201, 209, 372, 430, 487-489
Water
Examination of, 566
Problems, 221-222
Still, 246
System, 222
Waterman Fund, 233
Waters, James, 528
Watson, Louis, 204, 214
Watt Dictionary of Chemistry, 56
WAVES, 301
Wawzonek, S., 332
Wazler, R. B., 581
Weaver, Alfred, 202-204
Weber
Esther, See Adams, Esther
J. E., 197
Weed, Samuel, 38
Weeg, L. E., 356
Weeks, Robert, 366
Weiland, Paul B., 143
Weimer
A, 313
Harry R., 577
Paul E., 578
Welcher, Frank, 202, 211, 213, 219, 327, 490, 567
Weller
Lowell E., 572
Stanley R., 578
Wells
Agnes E., 198
Richard, 431
Wendt, Gerald L., 173
Wenkert, Ernest, 437-439, 497, 504-505, 512, 514, 518, 550
Wentworth, Rupert A. D., 512-513, 529, 535, 539
Werkenthin, T. A., 585
Wesleyan College, 213
Wesselman, Harold J., 131
West, Judson, 204
Western
Military Institute Kentucky, 28
Regional Research Laboratories (USDA), 256
Westfall, Thomas, 202
Weston Fellowship, 167
Wheeler, Lawrence, 351-355
Whitacre, Francis, 177, 201, 210
White
Harold K., 450, 574
James D., 524
John, 112, 584
J.E., 422
Russell, 60
Whitmore, Frank C., 241, 268
Who’s Who in America, 169, 207, 211
Widlanski, Theodore, 513
Wiesbaden, Scientific Institute, 48
Wiesler, Donald P., 519
Wiggins, Gary, 525, 552
Wightman, R. Mark, 559
Wilcox
H. S., 467
R. C., 345-348
Wildermuth, Ora L., 267
Wiley, Harvey W., 47, 178, 573, 581
Wilgis, Ford Paul, 519
Willkie
Fred, 309
H. F., 138, 204, 314
Wendell, 144, 309
Wynn, 138
Wilkinson
P. D., 575
William, 273
Willard
Gibbs Medal, 583
H. H., 175, 289, 402, 424
Mary, 397
Willett, Helen (Holly), 530, 543, 552
Williams
David, 513, 519
Jane, 198, 213
Maurice, 384, 412-414, 421, 430, 433, 531
Wilson
Dale T., 204
E. Bright, 448
H. B., 121
Henry S., 217
J. T., 119
Joseph 450
L. D., 269
Wilton, Mr., 60
Wimmer, Ruth, 198, 205
Windsor, Prudence, 492
Winstein, S., 443
Winters, J. C., 402
Wisconsin, University of, 105, 122, 133, 137, 213, 242, 258, 271, 523
Wiseman, Park A., 564-565
Withnell, Ron, 529-531
Witmer, M. E., 415
Wittenbraker, 315
Woerner, Dale E., 573
Wolford, M. L., 402
Wolnak, Bernard, 430, 460
Wolynes, Peter, 558
Women, 42, 102-103, 131, 148, 166, 198-200, 205, 209, 213-214, 267, 511
Dean of, 511
Woodburn
James, 7-11, 21, 26, 34, 67, 72, 90
Walter, 85
Woodford, Arthur B., 64
Woodlawn Courts, 363
Woodward, R. B., 442
Wooster, College of, 562
Works of Reference, 19, 23
World War, 151, 205
I, 116, 139, 142, 463
Surplus, 360
Worley, S. W., 129
Wright,
Morris F., 571
Wendell W., 252
Quadrangle, 10
Wrubel,
Computing Center, 534
Marshall, 534
Wylie
Andrew, 6, 9-17, 71, 155, 577
Diary, 14-20, 23-26, 35, 48-50, 59-60, 66-67, 70-74, 216
Hall, 45, 67-72, 76, 87, 90, 118-119, 130, 140, 179, 194, 199, 201-203, 226-229, 275, 473, 503, 523
History, 12, 15-17, 26-33, 44, 63, 72
Home, 85
Louise, 38
Margaret, 38
Rebecca Dennis (Mrs. Theophilus), 14, 85
Richard, 14-15
Samuel Brown, 14, 49, 57-60, 71, 76
Theophilus, 1-5, 12-32, 35-44, 49-50, 58-60, 64-67, 70-74, 81, 84-89, 374, 457, 506, 523-525, 577, 588
Honorary degrees, 85
Resignation, 20
Wynne-Jones, W. F. K., 398
Wyoming, University of, 437
Xanthophyll, 218
Xerotoxin, 537
Xie, Tian-Min, 519
X-ray applications, 426
Crystallography, 442
Diffraction, 485, 532-533
Equipment, 322, 382
Structure facility, 532
Xue, Ziling Benjamin, 519

Yale University, 97, 214, 220, 236, 241-243, 255, 339, 376, 383, 489
Yang
Julie C., 317
Mo, 519
Shih-hsien, 316-317
Yvette, 519
Yates, Albert, 512, 527
Yellowwood State Forest, 365
Yennello, Sherry, 519, 546
YMCA, 135
Cabinet, 143
Yoder, Peter A., 78, 83, 93, 103, 120
Yoshisaka, Heikichi, 119
Young
Andrew H., 573
Harvey, 60, 216
Jack P., 565
James A., 213
John, 566-567
Margaret, 367
Vernon, 423
Youngen, E., 588

Zahm, John A., 579
Zamnik, F., 505
Zeiss, Harold, 520
Zimmerman
B.F., 120
Richard, 433
Zinc, 105, 265, 275, 306
Deficiency, 265, 275
Zoology, 25, 258
Department of, 258, 268, 296
Zucco, Martine, 519
Zwanziger, Joseph, 513
Zwolinsky, Bruno, 397