CHEMISTRY AT RICE, 1912 to 1998

Edward S. Lewis, Rice University

Early period up to 1925. An Auspicious Opening

Twenty-one years after the charter of the William Rice Institute in 1891 the new institute admitted its first students in 1912.

The period up to 1925 not only included the start of all instruction including chemistry, but also World War I, which took faculty and students away for military service and governmental research. Before the war Rice Institute started with a celebration with visiting scholars from all over the world. This is commemorated in "The Book of the Opening (1)."

A number of departments started with a senior professor of international reputation, such as H. A. Wilson in physics, Julian Huxley in biology, and Griffith Evans in mathematics. This was not the case in chemistry. The faculty in chemistry started with W. F. Edwards, lecturer, in 1912, the year of the first classes at the Rice Institute. Edwards had a B.A. degree from the University of Michigan, and according to the catalog (2) he had been president of the University of Washington, an unconfirmed statement. He was joined briefly by several short-term appointments, and in 1916 by Harry Boyer Weiser, who had a Ph.D. from Cornell with Wilder Bancroft. With the exception of Weiser, the earliest appointments before 1920 lasted an average of 1.8 years. Weiser stayed for 32. Appendix 1 lists all chemistry faculty with approximate dates.

Mention must be made of one extremely short appointment, that of the organic chemist Frank C. Whitmore. He observed that the essential reference for this field, Beilstein's *Handbuch*, a multi-volume German compilation, was not in the library. Whitmore asked the president, E. O. Lovett, to purchase this for the library. Lovett refused on grounds of the great expense of this series; but after being told how essential it was for organic chemistry, he relented and offered to buy one volume. This ridiculous offer, equivalent to owning the A-C volume of an encyclopedia, insulted Whitmore, who then resigned immediately. He went to Pennsylvania State University, where he became established in a long career as one of the country's premier organic chemists. Notable was not only the loss for Rice of a potentially distinguished chemist, but also the practice of an assistant professor's going directly to the president with a request. Nowadays, the chain of command to access the president is much longer. The source of this story is vague. I have heard it from many sources both from Rice and Penn. State; an extremely short tenure is clear from the Rice catalog of that time. After 1920 many appointments lasted for years; some faculty of that period stayed on to retirement.

The earliest laboratories were located in the mechanical building, one of the original structures. A wooden annex was added somewhat later to accommodate some of the teaching and research needs. A catalog of this period describes the department as being "splendidly equipped" for modern research and teaching. A new chemistry building, started in 1923, was ready for occupancy in 1925. The cornerstone was laid by the distinguished chemist Edgar Fahs Smith, according to the 1923 yearbook (3).

A worldwide characteristic of the early period was an emphasis on analytical chemistry. The department had at least one and often two analytical chemists for many years. The early curriculum included general chemistry in the first year and analytical chemistry in the second year, and these two courses, with laboratories, were taken by all science-engineering students. Medical schools used the quantitative analysis and the organic course results as a screen for admission. Math 100, physics, English, and history were also taken in the first year, and science students took more mathematics, physics, and often a foreign language in the second year. With the exception of architecture students no one had a major until the junior year. Then the different majors had a variety of courses, but always five courses per year. All students, regardless of intended major, took the notorious Math 100 in the first year (and sometimes again and again). This rigorous program changed very little until the 1950s.

Mechanical Engineering Building, 1916, Rice Institute
courtesy of Rice Institute Library

In the junior and senior years chemistry majors took additional courses in organic, analytical, and physical chemistry, all with laboratories, as well as physics and mathematics. These, together with various humanity courses, completed the program to the bachelor's degree. All courses were one-year offerings in the early period; later one-semester courses were allowed. The first recipients of the bachelor's degree graduated in 1916. The yearbook shows that Mary Willard Fox received the B.A. with honors in chemistry in 1916. The first Ph.D. in chemistry was awarded to Jacob Sherrick in 1919.

Senior and graduate courses were listed. It is not obvious how many were actually offered, but a catalog of about 1916 mentioned the availability of courses in inorganic, organic, physical, electro-, sanitary, and agricultural chemistry, as well as a chemistry seminar.

Virtually the entire research effort in chemistry was that of Weiser; the first two Ph.D.s and four out of five later ones were his students. Thus, of the first 19 research papers published through 1920, 15 were Weiser's. The listing of research papers and Ph.D. students is derived from a complete, unpublished compilation of research papers and Ph.D. theses up to 1993 by the present author (4). These papers and theses covered a variety of subjects, mostly on inorganic precipitates and colloids; but there were also several on luminescence of inorganic solids.

Lovett Continues his Administration, 1925 to 1946

The year 1925 marked the opening of the new chemistry building, adding greatly to the space available for the department. This is the motive for dividing President Lovett's term into two parts. Some space was also allocated to architecture, chemical engineering and psychology, and library space for all four departments. The building was ornamented by a cement sculpture caricature of H. B. Weiser as a dragon clutching a student, presumably a freshman, with his claw. The building had an octagonal tower as a hood exhaust adorned with the symbol of an element of the first row of the periodic table on each of the eight sides.

From 1925 to 1946 there were only six additions to the faculty, and of these three preceded great depression of the early 1930s. Although the earliest faculty members had very short terms, those appointed after 1920 stayed on much longer, partly because of the deression. The faculty was nevertheless reasonably active in research, most contributing to the publications, even though Weiser still led in this count. Walter Kirner (an organic Ph.D. with Conant at Harvard) joined the faculty in 1925. Although a good chemist in his own right, he is remembered here as the mentor of George Holmes Richter, who earned his Ph.D. in 1929. Richter joined the faculty in 1931, after a post-doctoral year at Cornell (with Wilder at Weiser's suggestion) and in Germany, where he felt more at home among organic

chemists. Because he replaced Kirner, there was still only one organic chemist on the faculty of five members. They were Weiser, who remained until retirement in 1948; A. D. Garrison (retired in 1955); H. O. Nicholas (retired in 1957); Arthur Scott (a Harvard Ph.D. with T. W. Richards), who left for Reed College in 1936; and Richter (retired in 1974). Thus the thirties and early forties were a period of stability, but with a hint of stagnation. This was maintained until 1946 when a new president and new money for the institute started a post-World War II revival.

Research continued at a modest pace until World War II, with an average of over eight research papers and patents per year through 1943. Again Weiser contributed the most, but all the faculty published at least some in this period. There was about one Ph.D. per year from 1925 to 1944. In 1944 and 1945 there were no publications from the department, a reflection of the influence of unpublished war research, the absence of graduate students, and the increased teaching demands from special military training programs.

The Houston Administration, 1946 to 1959

President Lovett had offered to resign earlier but had been persuaded to stay on until a successor could be found. In 1946 William V. Houston was selected as the second president of the Institute. Houston was from Cal Tech, where he had a reputation as an excellent physicist. At the same time a new source of funds was acquired by the purchase of the Rincon oil field. This added considerably to the annual income of the Institute, and the stagnant period ended.

Over the next five years six new appointments in chemistry brought the total in 1961 to 10 faculty, now consisting of four organic, four physical, and two analytical chemists. Weiser had retired in 1947 and Richter had become chairman and dean. W. O. Milligan, who was appointed a post-doctoral fellow with Weiser after completing his Ph.D. (also with Weiser) in 1934, was appointed to the faculty in 1946. Milligan maintained a productive research program in quantitative studies of gas adsorption on solids and the use of X-rays to characterize and provide some structural information about his favorite substances, the hydrous oxides. Milligan became the Director of Research of the Robert A. Welch foundation, a title he kept in later appointments at Texas Christian University and then Baylor University.

Other departments of the Institute also became stronger in this period with new additions to the faculty. President Houston's efforts were helped by a completely new board of trustees under the chairmanship of George R. Brown. Brown's immense contributions to the entire institution are too large to describe here, but the name Brown is now found on three academic buildings, an undergraduate college, the school of engineering, and several teaching awards.

The leadership of President Houston and the foresight and ambition of Holmes Richter led to remarkable changes. In faculty recruitment Richter set a very high standard; most of his appointments had held nationally competitive post-doctoral fellowships. In this period only three of his eleven appointments lasted for less than five years. Later two (Turner and Curl) were elected to the National Academy of Sciences, and Curl received the Nobel Prize. The advances in research productivity grew from fewer than six papers per year through 1949 to more than 16 papers per year from 1950 through 1962. About four Ph.D.s per year were granted in this same period.

J. E. Kilpatrick joined the faculty in 1947; his research included the statistical mechanical consequences of some model systems, low-temperature calorimetry of organic substances, and contributions to the Rice computer, where he took advantage of his experience with the "Maniac" computer at Los Alamos. J. Waser, in single-crystal X-ray diffraction and E. S. Lewis in physical organic chemistry and reaction mechanisms, both arrived in 1948.

With the recruitment of R. B. Turner and M. G. Ettlinger in 1951 there was a major change in the managing of research. Turner brought in substantial external funds. Joined by a number of post-doctoral fellows, he brought the Rice department into intimate contact with the rest of the world of academic chemistry. Turner's research involved the heats of hydrogenation of unsaturated hydrocarbons, which he measured with his own hands because the precise experiments were very difficult. Turner also had a synthetic program that occupied most of his graduate students. The heats of hydrogenation work was widely appreciated and quoted; it had a world-wide impact on the treatment of the energetics of organic molecules. Turner became the first department member to be elected to the National Academy of Sciences.

After a few years Richter placed Turner in charge of graduate student recruiting, at which he was very successful. The number of highly qualified graduate students increased markedly. This was also the beginning

of a series of building changes, made possible because the other occupants since 1925 had found other space. The first air-conditioning appeared in the building, and it soon spread throughout the campus. The wide corridors were narrowed, some small classrooms being lost to research. Turner succeeded Richter as chairman in 1961, while Richter continued as dean.

The description of Richter as dean and chemistry recruiter omits some other features. He was an effective and popular teacher, especially of the first organic course. He was a source of many stories, which he would tell at lunch in a very low voice, forcing quiet from his listeners. He was insistent on attendance at examinations; once a student, having been denied a postponement, was delivered by ambulance, swathed in bandages, on a stretcher. Richter administered the examination without comment. Many Houston doctors still remember his organic course.

Groundbreaking ceremonies for Chemistry Building, Rice Institute, June 4, 1923
courtesy of Rice Institute Library
(LR) William M. Rice, Jr., Joseph L. Gillman, Jr., Edgar Fahs Smith, E. O. Lovett, William Ward Watkin, Dr. Weiser, Bishop Quinn

The establishment of the Welch Foundation for the support of research in chemistry in the early 1960s had a real impact. Most of the faculty received awards (at that time about $12,000 to $15,000 per year), which then could support several graduate students or postdoctoral fellows, as well as providing equipment and faculty summer stipends. This stimulated the search for other external research funds, which was mostly successful.

There were some notable additions to the faculty in the late fifties. One was Zevi W. Salsburg, a Ph.D. from Kirkwood at Yale, who became in a short period an international authority on statistical mechanics. Another was Robert F. Curl, a Ph.D. from Pitzer at Berkeley, who started doing microwave spectroscopy and continued into all branches of molecular spectroscopy, and who contributed greatly to the C60 problem, including participating in the discovery of that molecule and in an inspired assignment of its structure. R. L Sass (Ph.D. University of Southern California) started out as a crystallographer but recently has established an international reputation on atmospheric methane and global warming as a member of another department.

Concern in the later 1950s over computational facilities culminated in the construction of a modern vacuum tube digital computer at Rice. Professors Salsburg and Kilpatrick provided many ideas, and the actual construction was supervised by Prof. Martin Graham of electrical engineering, who contributed great technical skill. These efforts led to a physically large and powerful state-of-the-art computer with highly original features both in circuitry and in logic. Unfortunately, the development of the transistor made the Rice computer obsolete very shortly after its completion; but it was the start of a thrust in computational work that still continues.

Houston resigned for health reasons in the late 1950s, and an interim acting president, Cary Croneis, was in charge. A search at this time produced the name of Kenneth S. Pitzer, at the time professor of chemistry and dean of the College of Chemistry at the University of California at Berkeley. The department felt at home with this selection, in part because two of his Ph.D.s, Kilpatrick and Curl, were on the faculty, and the present author had known him while an undergraduate at Berkeley.

The Pitzer Administration, 1961-1968

When Pitzer arrived on campus he had an immediate impact on chemistry as well as the rest of the Institute. He backed a change in the charter to allow the admission of nonwhite students, to allow the charging of tuition, and to change the name to the "William Marsh Rice University." Tenure was introduced to stimulate the activity of junior faculty. In chemistry he recog-

nized a lack in inorganic chemistry, so he persuaded J. L. Margrave to come as a full professor. He also arranged to fill the newly created Robert A. Welch chair with J. L. Franklin.

John Margrave had already established a reputation at Wisconsin in high-temperature chemistry. He also began a study of the chemistry of elemental fluorine and learned how to control its great reactivity so that direct fluorination was possible. In the course of his Rice career Margrave has won practically every national award in inorganic and fluorine chemistry and was the second man elected from the chemistry faculty to the National Academy of Sciences.

Franklin came from The Humble Oil Company (now ExxonMobil), where he had been employed for many years after earning a Ph.D. at the University of Texas. He had become a world expert on the energetics of gas phase ions as revealed by mass spectrometry. As occupant of the Robert A. Welch chair, Franklin not only added to the department by his research and contacts with chemists outside of Rice, but he inspired an appreciation of fine food. He was a gourmet cook as many of us remember, and he knew and patronized the world's best restaurants.

The appointment in 1973 of G. J. Schroepfer, Jr. as professor of chemistry and chairman of the newly created biochemistry department solved an urgent problem of the biology-chemistry interface. Pitzer did not stay to make this appointment, but he had realized the need. The biochemistry department has thrived since, and is now about as large as chemistry.

Faculty salaries rose under Pitzer and became nationally competitive. The amount of externally funded research grew far more than it had been earlier, and research not only in chemistry but in other sciences did very well. In spite of this effort directed toward the sciences and to engineering, Pitzer was very well liked in the humanities and social sciences. He contributed much effort to these fields as well, and they also prospered.

In Pitzer's eight years at Rice the department produced 43 Ph.D.s, and well over 300 research publications. Much of this number could be attributed to the extraordinary productivity of the Margrave group, but all members of the faculty contributed. It was indeed a fruitful and exciting period.

Some appointments in this period were, in addition to Margrave and Franklin, P. R. Brooks (Ph.D. UC Berkeley, Herschbach) who designed and performed some very difficult experiments on the reactions of oriented molecules in the gas phase; and R. V. Stevens (Ph.D. Indiana, Wenkert) who initiated an ingenious synthetic program for complex natural products. Stevens was rapidly promoted to professor, but could not resist an offer from UCLA. Two physical chemists, Graham Glass, in combustion and gas kinetics, and Edward Hayes, a theoretician, were later promoted. Four others did not stay more than five years. When Pitzer resigned in 1968 there were about 14 members of the chemistry faculty.

Pitzer resigned to accept the presidency of Stanford. Because of student problems of a serious nature related to the Viet Nam war, Pitzer had a difficult and unpleasant time at Stanford and might have wished he had stayed at Rice. However, the Rice board was believed to feel that the university had taken on too much of a challenge and apparently was glad to see Pitzer go, an attitude not shared by the faculty.

The Hackerman Administration, 1970-1985

A two-year interim period under an acting president was unhappy for all. After much delay the board announced the selection of Norman Hackerman to assume the presidency. Hackerman, a physical chemist with a Ph.D. from Johns Hopkins, was at the time of this selection the president of the University of Texas at Austin. Hackerman was apparently charged with improving Rice's financial position. As a consequence there was a period of several years in which budgets were quite tight, but then advances continued.

The beginning of this period was a difficult time for the chemistry department. In the spring of 1970, Richard Turner died after a long illness. Then, less than a year later, Zevi Salsburg died suddenly in Los Angeles. Thus the loss of a premier organic chemist was followed by the loss of a very promising and distinguished physical chemist. The effect of these two premature deaths was difficult to overcome.

There were 18 new appointments in chemistry in this period; half remained on the faculty for an extended time. Those who earned tenure include, in chronological order, W. E. Billups and P. S. Engel in organic chemistry; L. J. Wilson in inorganic chemistry; R. E. Smalley in physical chemistry; T. Fukuyama and R. J. Parry in organic chemistry; R. B. Weisman and J. S. Hutchinson in physical chemistry; and K. H. Whitmire in inorganic chemistry. Whitmire came to Rice after a long sequence

of junior inorganic chemists who failed to achieve tenure, and later he became chairman of the department. In this same period Ernest Wenkert was brought in as professor and Michael Berry came to succeed Franklin as Welch professor; neither is still here.

Billups started a program of synthesis. He made a component of the boll weevil sex attractant, which had an impact on the cotton industry. The synthesis and reactions of some novel, very strained molecules including benzocyclopropene and methylenecyclopropene has kept his group occupied. He is now concerned with the organic chemistry of fullerenes. Engel initiated a study of organic photochemistry, which, together with studies of transient free radicals and their precursors the azo compounds, still continues.

Wenkert, an organic chemist most recently from Indiana with a Woodward Ph.D., was brought in as a possible replacement for Turner. Although this did not turn out to be the case, he did have a strong synthetic group, and got us well started in higher field NMR (high field was then 100Mhz), an area which he exploited in a number of publications. He was chairman of the department briefly before accepting a position at the University of California at San Diego.

During Wenkert's chairmanship the appointment of Fukuyama (a Kishi Ph.D. from Harvard) as assistant professor added immensely to the synthetic organic capability of the department. Fukuyama was a genius at very complex organic synthesis. He accomplished one major antibiotic synthesis after another, rapidly establishing an international reputation. Although he was rapidly promoted, he left in 1996 to accept a prestigious professorship at the University of Tokyo.

The appointment of Ronald Parry as associate professor (from Brandeis University) was the department's first in the biology-chemistry interface except for Schroepfer in biochemistry. His first work established the biosynthetic pathways of a number of natural products containing sulfur, and many other biosynthetic pathways have since been studied by using increasingly sophisticated techniques.

The acquisition of Rick Smalley was a great coup. He started doing innovative work on spectroscopy of substances in expanding helium jets at very low temperatures and continued this technique to make clusters of metals in the gas phase, and later clusters of carbon, leading to the discovery of the sixty carbon allotrope. He, along with Curl and Harry Kroto (visiting from Southampton), discovered this molecule, which they named Buckminsterfullerene, as soon as the structure was proposed. They accomplished the feat of assigning the "Buckyball" structure, based only on mass spectral evidence. It was generally felt that this would be worthy of the Nobel prize, which in fact was awarded to all three in 1996.

President Hackerman resigned in 1985 and was succeeded by George Rupp. Although he had been selected by a very capable search committee, there was considerable concern over this choice. Rupp was the first nonscientist president; having previously been dean of the Harvard Divinity School. This concern turned out to be groundless. Not only did the humanities do well, but it was a very good period for the sciences.

The Rupp Period, 1985-1993

George Rupp became president in 1985, an appointment lasting only eight years until he accepted the presidency of Columbia University. Rupp provided a strong sense of direction for every department including the sciences and was well recognized for his success. Among the arrivals in his period was a new dean of sciences, J. L. Kinsey from Massachusetts Institute of Technology. Kinsey had been a Rice undergraduate and earned a Ph.D. under Curl. He is an active department member as well as dean. M. A. Ciufolini was appointed in organic chemistry but left after several successful years to accept a position at the university of Lyon. Also in this period came the appointment of G. E. Scuseria, who has proven to be expert in using modern computational methods of quantum mechanics to calculate properties and stabilities of some fairly complicated molecules.

Several buildings were completed in Rupp's time, including George R. Brown Biosciences. This accommodated most of the organic chemical research as well as much biochemistry and bioengineering, vacating some of the 1925 chemistry building. Much of the physical chemistry research had already been transferred to the Space Science building, including the research groups of Curl, Kinsey, Smalley, and Weisman. All the teaching laboratories remained in the chemistry building along with some of the physical chemistry research and all the inorganic and some organic research, until the completion of the new Butcher Hall.

The Gillis Period, 1993-

Malcolm Gillis, an economist from Duke, is the current president. After a period of uncertainty, he is

now well accepted. He has planned a number of additions to the Rice campus, and has witnessed the completion of a building for nanotechnology, a new field arising at Rice from the fullerene work. This building, now called Butcher Hall, accommodates not only research in nanotechnology, but also most of the undergraduate chemistry laboratories and all the inorganic chemistry from the former chemistry building. There are also related areas of physics and engineering research in the building. The chemistry department office has been moved to the adjacent Space Science building, which also contains physical chemistry research and one teaching laboratory. Nothing is left of chemistry in the "old chemistry building," now called Keck Hall.

Several new department members have come in the Gillis period: Andy Barron, an inorganic chemist from England *via* Harvard, as professor; James Tour, also as professor, an organic chemist with interests in organic molecules as computer components; Vicky Colvin, in nanochemistry; Seiichi Matsuda and Scott Singleton, both in bio-organic chemistry; Victor Behar in organic synthesis; and Anatoly Kolomeisky, a theoretician, all as assistant professors.

Research Accomplishments

In the early years of the department H. B. Weiser was the principal contributor to research. He worked mostly on adsorption by precipitates, luminescence of inorganic materials and colloids.. Later, Arthur Scott worked on atomic weights, including that of carbon which was adopted until the mass spectrometric method became more widespread. A. D. Garrison was mostly interested in petroleum processing and production; he had close relations with the petroleum industry. There was not very much exciting research until after World War II, when a new group of faculty selected in part for research promise started their work.

Kilpatrick started a program of heat capacities of hydrocarbons at liquid hydrogen temperatures and above and thus allowed for the calculation of entropies. He also did some theoretical work. Later, Turner measured the heats of hydrogenation in solution of a wide variety of unsaturated hydrocarbons, both open chain and cyclic, to clarify the effect of structure on energies, including consideration of steric and conformational effects. This work had a wide impact on quantitative organic chemistry. The new appearance of nuclear magnetic resonance (NMR) spectroscopy included a memorable application by Ettlinger, who used it to establish the structure of Feist's acid (5), the first time NMR had been used to prove an organic structure. In a long series of papers the substituent effects on rates and equilibrium constants of diazonium ion reactions and the discovery of a hitherto unsuspected rearrangement were described.

However, no research at Rice has had the impact of the Buckminsterfullerene discovery. This new carbon allotrope and the related fullerenes have had a world wide impact. Thus, in a review published in 1993, edited by Billups and Ciufolini (6), the 13 authors cited 892 references, including duplication and also references with several papers cited. There has been no diminution in the rate of publication since then. Also about half of the current Rice chemistry faculty, as well as some in other departments, have published papers on the fullerenes. In 1995 *Science* selected Buckminsterfullerene as the molecule of the year. It was therefore no great surprise that Curl, Kroto, and Smalley were awarded the Nobel Prize in chemistry in 1996. This distinction is a first for Rice in any field.

The past years have seen an enormous increase in the accomplishments of the Institute become University, not the least of these those of the Chemistry Department. We look forward with confidence and enthusiasm to the future (7).

REFERENCES AND NOTES

1. "The Book of the Opening, Rice Institute, Houston, TX, 1914; an account of the distinguished visitors and the papers presented by some of them in celebration of the opening of the institute.
2. "General Announcements," a publication by the institute and later by Rice University containing course offerings and faculty lists. It was published annually except for a short period when it appeared in alternate years. It is called here the "Catalog."
3. The yearbook is an undergraduate student annual publication containing useful data of usually reliable nature. It has been called the *Campanile* for many years.
4. An unpublished compilation of departmental research publications and Ph.D.s and their thesis titles was assembled several years ago by the author. Based on faculty publication lists, *Chemical Abstracts*, and commencement programs, it was complete through 1993.
5. M. G. Ettlinger and F. Kennedy, "The Structure of Feist's Acid and Esters," *Chem. Ind. (London)*, **1956**, 166.
6. W. E. Billups and M. A. Ciufolini, Ed., *Buckminsterfullerenes*, VCH Publishers, Inc., New York, 1993.

7. Much of the matter in this article is based on the author's memory, whose time at Rice covers more than half of the life of the Institute and the University together. Two appendices follow, the first lists the entire faculty from the beginning of classes to the present, the second lists department chairs from the first faculty member known to have this title of unknown starting date to the present.

ABOUT THE AUTHOR

Edward S. Lewis, son of G. N. Lewis, received his undergraduate education at the University of California, Berkeley, and then earned his Ph.D. at Harvard under the supervision of Paul D. Bartlett. He joined the chemistry faculty at Rice in 1947, where he remained until his retirement in 1990. Professor Lewis spent a year at Oxford as a Guggenheim fellow in 1967-1968.

Appendix 1

FACULTY MEMBERS OF THE RICE CHEMISTRY DEPARTMENT[1]

NAME	DATES
W. F. Edwards	1912-1914
A. R. Hitch	1915-1917
W. J. van Sicklen	1915-1916
H. B. Weiser	1916-1948
G. L. Wendt	1917-1918
J. L. Sherrick	1918-1920
C. H. Classen	1918-1919
F. C. Whitmore	1919-1919
H. D. Draper	1919-1920
H. O. Nicholas	1921-1971
W. M. Craig	1923-1926
A. J. Hartsook[2]	1923-1926
A. D. Garrison[3]	1925-1953
W. R. Kirner	1925-1930
A. F. Scott	1926-1937
G. H. Richter	1931-1974
F. H. Hurley, Jr.	1937-1942
W. O. Milligan	1946-1964
J. T. Smith	1946-1951
J. E. Kilpatrick	1947-1985
E. S. Lewis	1948-1990
J. Waser	1948-1958
R. B. Turner	1951-1971
M. G. Ettlinger	1951-1964
G. R. Bird	1954-1959
Z. W. Salsburg	1956-1970
T. E. Brackett	1958-1963
R. F. Curl	1958-
R. L. Sass	1958-[4]
K. S. Pitzer	1961-1968
J. L. Margrave	1963-
J. L. Franklin	1964-1975
P. R. Brooks	1965-
R. M. Magid	1965-1970
T.S. Cantrell	1966-1970
R. V. Stevens	1967-1973
G. P. Glass	1968-
E. F. Hayes	1968-1978, 1987-1992[5]
O. Gansow	1969-1973
P. Haug	1969-1971
N. Hackerman	1970-1989
W. E. Billups	1970-
P. S. Engel	1970-
F. D. Rossini	1971-1975
J. J. Havel	1972-1975
F. T. Wall	1972-1979
E. Wenkert	1973-1980
L. J. Wilson	1973-
G. J. Schroepfer	1972-1996[6]
R. E. Smalley	1976-
T. Fukuyama	1988-1996
S. Mukamel	1978-1981
R. J. Parry	1978-
B. A. Sosinsky	1978-1982
M. J. Berry	1981-1992
D. M. Stanbury	1981-1986
R. B. Weisman	1981-
J. S. Hutchinson	1983-
K. H. Whitmire	1981-
M. A. Ciufolini	1985-1998
M. P. D'Evelyn	1987-1993
K. Burgess	1986-1992
J. L. Kinsey	1987-
S.-J. Hwu	1988-1993
G. E. Scuseria	1989-
A. R. Barron	1995-
S. P. T. Matsuda	1995-
V. L. Colvin	1996-
S. Singleton	1996-
V. Behar	1998-
A. B. Kolomeisky	2000-
N. J. Halas	2000-[7]

[1]Until 1940 the initial appointment was with the title "instructor;" after this instructor was used for very short-term appointments, and those are not included in this list. Visiting professors are also not included. [2] In 1926, Hartsook left to join the new Chemical Engineering Department. [3] Garrison was intermittently in Chemical Engineering. [4] Sass became more active in the Department of Ecology and Evolutionary Biology. [5] Hayes left in 1978 and returned in 1987 as professor of chemistry and vice president. [6] Schroepfer was primarily in Biochemistry. [7] Halas is primarily in the Department of Electrical and Computer Engineering.

Appendix 2

CHEMISTRY DEPARTMENT CHAIRS

H. B. Weiser	-1947[1]
G. H. Richter	1947-1961
R. B. Turner	1961-1964
E. S. Lewis	1965-1968
J. L. Margrave	1968-1973
J. L. Franklin	1973-1978
E. Wenkert	1978-1980
E. S. Lewis	1980-1985
W. E. Billups	1985-1990
R F. Curl	1990-1995
G. P. Glass	1995-2000
K. H. Whitmire	2000-

[1] The institute did not use the title "chairman" in the early years. The professor was the department head since there was then only one professor per department. It is not clear whether Weiser was department head at his initial appointment in 1916.

COMING EVENTS

October 3-5, 2002 — "Industrial-Academic Relationships in the Chemical and Molecular Sciences"
Chemical Heritage Foundation
315 Chestnut Street
Philadelphia, PA 19106
Contact Todd Waters, Tel: 215-925-2222
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May 3, 2003 — Kanawha Valley Chemical Heritage Symposium
Charleston Marriott
Charleston, WV/USA
Contact: Lee Maddex(lmaddex@wvu.edu) or
Michael Workman (mworkma2@wvu.edu)