
Chapter 2

The Peffer Years

(1911-1934)

In the minutes of the meeting of the Board of Trustees¹ of June 14, 1911, the following entry can be found as item 18.

Four years ago a new course of study in Chemical Engineering was established. It has steadily made progress and the first class of 10 students has now been graduated. The enrollment in this department during the present year was 32 freshmen, 22 sophomores, 15 juniors and 10 seniors, or 79 in all.

Thus far the department has had no distinctive head. Having now become established along what seems to be the right lines, it is recommended that the department be designated as the School of Chemical Engineering, of coordinate rank with the other Schools of the University, and that there be appointed a Head for the School of similar rank and responsibility with the Heads of other Schools of the University.

For this position I recommend Mr. H.C. Pfeffer*, a graduate of Pennsylvania State College, and a man of rather unusual experience in the field of Chemical Engineering and who has agreed to accept the appointment at an annual salary of \$2250.

* The name of Harry C. Peffer was misspelled by the President!

18. Concerning School of Chemical Engineering: received, read and approved on Mr. Miller's motion.

To the Board of Trustees:

Four years ago a new course of study in Chemical Engineering was established. It has steadily made progress and the first class of ten students has now been graduated. The enrollment in this department during the present year was 32 Freshmen, 27 Sophomores, 15 Juniors and 10 Seniors, or 79 in all.

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Respectfully,

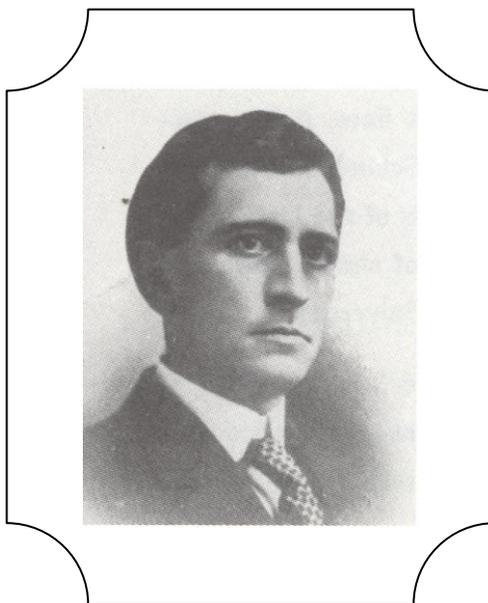
H. E. Stone (signed)

The excerpt of the minutes of the meeting of the Board of Trustees of June 14, 1911, that established the School of Chemical Engineering of Purdue University.

President Stone's recommendation was approved by the Board of Trustees and on June 14, 1911 the School of Chemical Engineering was a reality.

Name Changes of the School of Chemical Engineering

1906-1911	Chemical Engineering Curriculum
1911-1935	School of Chemical Engineering
1935-1951	School of Chemical and Metallurgical Engineering
1951-present	School of Chemical Engineering



Harry C. Peffer in 1911

Harry C. Peffer, the first faculty member and Head of Chemical Engineering, arrived at Purdue in October 1911 and had many problems to attend to and obstacles to overcome. He revised the plan of study adding chemical engineering courses (see Appendix D), but also adding more courses in chemistry, engineering, economics and German language. In 1918 he added physical chemistry to the plan of study. Stone was correct in his prediction. By 1915, just four years after Peffer's arrival, the School had 138 enrolled students, 57 of them freshmen.

Harry Creighton Peffer 1873-1934

Harry Creighton Peffer, the first professor and Head of Chemical Engineering at Purdue, was born in Tarentown, Pennsylvania in 1873. He received his B.S. and M.S. in Chemistry from the Pennsylvania State College in 1895 and 1908, respectively. He was employed by the Carnegie Steel Company, the Pennsylvania Salt Manufacturing Company, and the Aluminum Company of America (Alcoa) from 1900-1908. He was responsible for the construction of Alcoa's East St. Louis plant. He was also director of research and was responsible for much pioneering work on aluminum. In fact, before he joined Purdue he already had three important patents (US 826,351, US 938,270 and US 938,432). Ill health caused him to retire in 1908, but he continued as a consultant with Alcoa until 1915. He joined Purdue in 1911. During World War I he was organization manager of the U.S. explosive plant C in Nitro, West Virginia. In addition, for a period he served as Vice-President of the Ross Stone Company (now Rostone Corp.) of Lafayette.

Peffer directed the School for 23 years, longer than any other Head in the School's history. He dedicated much of his life to the development of the School, and many of the letters received from some of his former students during the preparation of the 75th anniversary version of this book show the students loved him. He died on July 17, 1934, collapsing in front of the Metallurgical Laboratory of the School at age 61.

Professor Peffer was one of the strongest figures of Purdue in the first quarter of this century and many anecdotes about him have been presented by Bray⁴ and Knoll¹⁸. He had a salty personality, a pungent wit and made rather aggressive remarks, especially at the University Executive Committee. These remarks were preserved on the campus as "Pefferisms." At a faculty meeting in the midst of a futile debate he remarked "A half dozen funerals on this campus would do a hell of a lot more good." He called an interrupter of faculty meetings "the most unnecessary noise on the campus." Once questioned by Purdue's purchasing agent H.C. Mahin as to what he was going to do with a camera he ordered through university channels he wrote to Mahin saying that it was none of his business what he did with the camera, but since Mahin wanted to know, he intended to take pictures with it. The letter arrived on President Edward C. Elliott's (1922-1945) desk and he called in Peffer to tell him that writing such a letter to an administrative officer was like sending it to the President. Peffer did not lose his composure but replied immediately that since he (Peffer) too was an administrative officer, Elliott would conclude that he (Elliott) had written a letter to himself!

Peffer struggled and suffered to have the School developed. For more than 12 years he had no private office but a roll-top desk in a partitioned area of the Education Building. He later moved to Purdue Hall and Heavilon Hall. He did not live to see his School move to its own building, the CMET Building, in 1939.

He wrote a number of publications and produced an additional five patents while at Purdue, mostly on structural materials resulting from his work with David E. Ross (see Chapter 8). He supervised the theses of five M.S. and 14 professional Ch.E. degree students. An unfortunate stigma on him was perpetuated for years because of his well-known feuds with Dean Potter. Potter, who outlived Peffer by many years, cast aspersions long after Peffer could respond. Based on the factual information, the two authors agree that Peffer was indeed a great educator and an outstanding administrator. His memory lives in a plaque, originally unveiled at Heavilon Hall on October 26, 1935, on the southwest entrance of the CMET building, and in a distinguished professorship bearing his name currently held by professor Doraiswami Ramkrishna.



This plaque, originally unveiled at Heavilon Hall on October 26, 1935, is now located at the southwest entrance of Forney Hall (the old CMET building).

Buildings for the School of Chemical Engineering

1911-1923	Education Building
1923-1930	Purdue Hall
1930-1940	Heavilon Hall
1940-1978	CMET Building
1978-2004	CMET and Potter Buildings
2004-present	Forney Hall of Chemical Engineering



Left: Harry C. Peffer in 1926. **Right:** Harry C. Peffer in 1934.

In 1913 the first graduate student enrolled in Chemical Engineering. The first advanced degree awarded by the School was a professional degree of Ch.E. awarded to Merle Robert Meacham (12/14/1887-8/3/1945) in 1918. He received a B.S. in Chemistry from Hiram College in 1911, and a B.S. in Chemical Engineering from Purdue in 1914. His professional Ch.E. degree thesis was on *Potentials of the System H_2 -Pt-0.1N(HCl + KCl)-Hg₂Cl₂-Hg* and it was conducted in the Chemistry Department. His research advisor was Nathaniel Edward Loomis, then instructor of chemistry. Subsequently Meacham received a Ph.D. from Syracuse University. He worked for Standard Oil Co. of New Jersey where he became manager of their Baltimore Refinery until his death in 1945. Although one more Ch.E. degree was awarded in 1921 and two in 1922, the First World War badly disrupted the School's nascent graduate program. It was not until 1921 that Ernest H. Hartwig (a 1919 B.S. graduate) received the first ever M.S. degree given by Chemical Engineering.

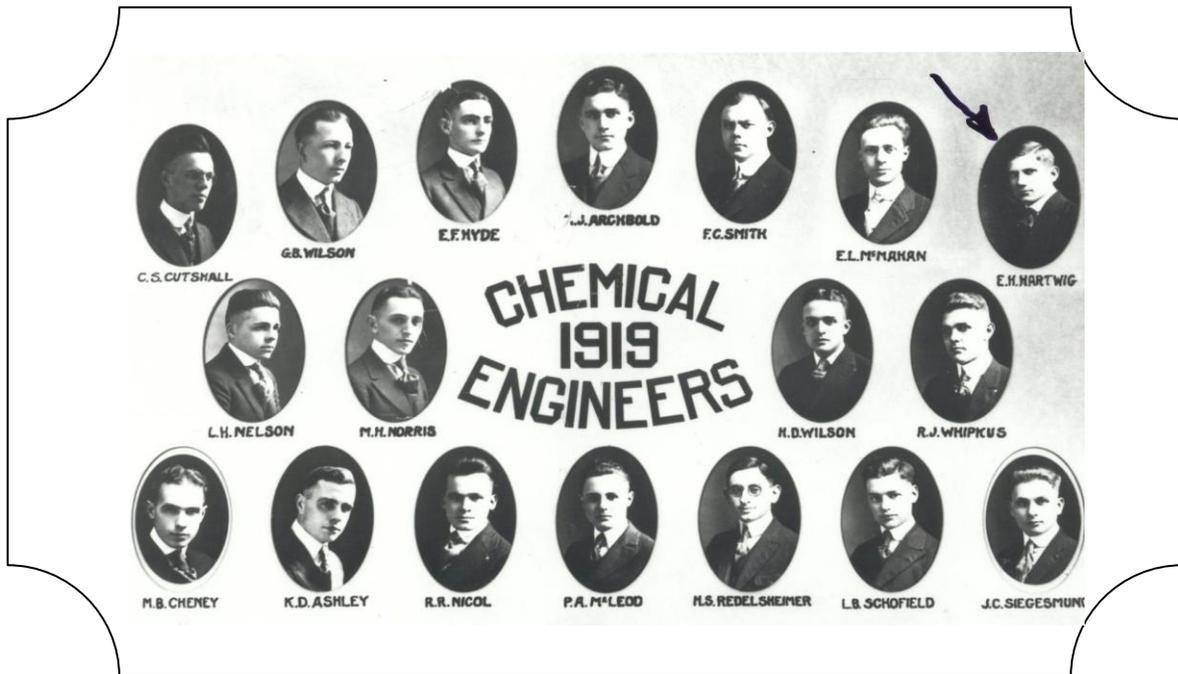
Ernest Herman Hartwig (1895-1992)

Ernest Herman Hartwig was one of the early graduates of our School, having received the 120th B.S. degree of the School in 1919. He is also the first student ever to receive a graduate chemical engineering degree at Purdue, having been awarded his M.S.Ch.E. in 1921. His M.S. thesis was entitled *Effect of Segregation of Impurities upon Carbon Distribution in Steel* and its experimental part was performed in the Chemistry Department under the direction of Professor Edward G. Mahin. In 1985 Hartwig recalled that he arrived at Purdue in September 1915 and had to pay a total of \$30, which was the full year in-state tuition (he was born in Wanatah, Indiana, in 1895). Using the consumer price indices of 1915 and December 2010, this tuition is equivalent to approximately \$650/year today. Quite a bargain!

Hartwig² had quite a few fond memories from his early years at Purdue "I recall a class in descriptive geometry, taught by Helen Golden, in the building commonly known as "Mike's Castle." Miss Golden was a sister of Michael Golden, for whom the building was nicknamed. She gave lectures in the assembly room, on the third floor. This was a fairly large room and the rows of seats were on a slightly sloping floor so that the rows of seats were on a slightly higher level than the seats in the row just ahead. I distinctly recall one incident. Miss Golden was at the blackboard demonstrating a problem. One day she was speaking, "draw a line from point A... Mr. Smith, will you please place your feet on the floor., to point B." The rows of seats were far enough apart that one could put his feet on the rear of the seat in front of him. Two or three inches of Smith's foot were visible from the blackboard. She saw it, and without interrupting her discourse on the problem, she addressed him."

Hartwig was also a member of the Purdue band. He writes: "But the real rivalry was always the game with Indiana University. Regardless of the outcome of all the other games on the schedule, the winner of this game, always the final game of the season, had a successful season. That condition may still exist." (Of course it does Mr. Hartwig, of course it does...)

After graduation in 1919 Hartwig was offered a position in the Chemistry Department under E.G. Mahin to supervise the laboratory course on quantitative analysis. He registered in the Graduate School and in 1921 he received his M.S. degree. He then became an instructor in the Chemical Engineering Department of the University of Wisconsin where he worked under the supervision of the legendary Otto L. Kowalke³. In 1923 he left Wisconsin (he supplied us with the salary figures at that time-\$1,100 (in 2010 ~\$14,100)for a 10 month appointment in academia, \$4,250 (~\$54,480 in 2010) for a 12-month appointment in industry) and joined Standard Oil Company of Indiana (later Amoco now part of BP) in Wood River, Illinois, from which he retired in 1960. He passed away in 1992.



The Class of 1919. Ernest H. Hartwig, the first M.S. degree recipient of the School, is first on the right on the top row.

PLAN OF STUDY

Name: *Ernest H. Hartwig* Degree desired: *M.S. ChE* Year: *1921*

Prerequisite Courses	Department	Course Number	Hours	When completed or to be completed	Instructor
Major Subject: <i>Metallography</i> consisting of the following courses:					
		<i>Metallography 18</i>	<i>3</i>	<i>5-9-21</i>	<i>Wahlin</i>
First Minor Subject: <i>Education</i> consisting of the following courses:					
		<i>Edun 1</i>	<i>6</i>	<i>1-31-20</i>	<i>Roberts</i>
		<i>8</i>		<i>6-5-20</i>	<i>"</i>
Second Minor Subject: <i>Phys. Chem</i> consisting of the following courses:					
		<i>Chem 15</i>	<i>6</i>	<i>1-31-21</i>	<i>Anderson</i>
		<i>16</i>		<i>6-1-21</i>	<i>"</i>

Special departmental requirements: *Effect of Segregation of Impurities Upon Carbon Distribution in Steel*

Thesis Option Non-Thesis Option Thesis Subject: *Carbon Distribution in Steel*

Approved: Advisory Committee

Anderson (Signature of Advisor)
Peffer (Signature of Professor in Charge of Dept.)
Wahlin (Signature of Head of the Department)
Roberts (Signature of Dean of the Graduate School)

EFFECT OF SEGREGATION OF IMPURITIES UPON CARBON
DISTRIBUTION IN STEEL

A Thesis
Submitted to the Faculty
of
Purdue University
by
Ernest Herman Hartwig
Candidate for the Degree
of
Master of Science
in
Chemical Engineering
June, 1921

Left: The plan of study for the M.S. degree of Ernest H. Hartwig
Right: The first page of the first M.S. thesis of the School

The training of chemical engineers was a subject of much debate in the second decade of the 20th century. A few months before Peffer joined Purdue, Milton C. Whitaker, a professor of Chemical Engineering at Columbia University and an important contributor to the ChE literature and societal causes expressed his views on the training of chemical engineers⁴ as follows: "The chemical engineer works in the organization, operation and management of existing or proposed processes with a view to building up a successful manufacturing industry. His fundamental training in chemistry, physics, mathematics, etc., must be thorough and must be combined with a natural engineering inclination and an acquired knowledge of engineering methods and appliances." He continued by giving a description of the types of courses that should be taught, which he classified as courses for "fundamental training" (chemistry, physics, mathematics), "associated training" (electrical, mechanical, civil and general engineering, and business economics) and "supplementary training" (laboratory and administration courses). Whitaker's views are presented here with some emphasis because he was a most influential educator and researcher, one of the earliest members of AIChE and its President in 1914. Whitaker—who had studied Chemistry (Ph.D. '02) with Franz Sachs. (a student of Siegmund Gabriel at the University of Heidelberg) and received the Perkins medal in 1923—was one of the earliest "true" chemical engineers, who believed in the rapid separation of "industrial chemistry" from "chemical engineering." His views affected his graduate students, including Eugene E. Leslie (Ph.D. '15, Columbia University) who taught at the University of Michigan. Leslie along with his students George G. Brown (Ph.D. '24) and Warren L. McCabe (Ph.D. '28) created an excellent Department of Chemical Engineering. Indeed, until about 1955 M.I.T. and the University of Michigan were considered the finest graduate ChE programs in the country.

The establishment of the American Institute of Chemical Engineers (AIChE) in 1908 gave shape to the dreams of the "converted chemists" who were calling themselves "chemical engineers"⁵, albeit with major obstacles²⁹. For example, Hugo Schweitzer⁶ declared in a 1904 ACS meeting: "I am absolutely against the introduction of chemical engineering in the education of chemists." [A sentiment some chemistry professors would agree with today.] In the same meeting, M.T. Bogert⁶, who joined Columbia in 1907 and became a colleague of Whitaker, agreed with Schweitzer saying that progress in "technical chemistry" was achieved in research laboratories by researchers without engineering training. In the same meeting Whitaker became the apologist of chemical engineering stating that a chemist was "generally not the man who is capable of transmitting from a laboratory to a factory the ideas which he has developed" because he was not educated "in the engineering branches." With such debates, when AIChE was formed in 1908 it had only 40 members (out of a possible 500 chemical engineers). The number rose to 214 in 1914 when Whitaker was President, but it was not until 1926 that AIChE truly became a representative society of chemical engineers²⁹.

Although Peffer was not in New York for the 1904 and 1908 meetings, his description^{7,8} of Chemical Engineering at Purdue in the Debris of 1915 and 1922 includes many of the same words that appeared earlier in Whitaker's article⁴. In 1915 it was mentioned⁷ that: "The work embraced by chemical engineering includes courses in Science; Civil, Mechanical and Electrical Engineering; and Chemistry... The training of the Chemical

Engineer fits him [sic] for such positions as chemist, engineer or manager in the industries which involve the application of chemical and engineering principles, as well as positions along strictly engineering lines which require a knowledge of chemistry to carry out most efficiently." In 1922 this text was somewhat revised⁸. "The foundation for this training is laid upon Chemistry, Mathematics and Physics." And Peffer concluded that the education given then "is a systematic serious effort on the part of its head*, to supply the need for men [sic] properly trained in chemistry and its relation to commerce and industry."

Thus, there is no doubt that Peffer, except for the exclusion of women, had the right vision for chemical engineering at Purdue, although it was a vision that gradually changed. Is Peffer entirely responsible for the directions chemical engineering was taking at Purdue in the 1920's? Probably not! He was trying to do whatever he could with the minimal facilities he had and the non-existent support he was getting from the University. For example, the reader must note that in the spring of 1923 Peffer was in charge of 176 students! One cannot avoid comparing this with some of the Departments that were competing for national recognition⁹ in chemical engineering. In 1923 M.I.T. had seven professors¹⁰ (W.K. Lewis, W.H. McAdams, C. S. Robinson, R.T. Haslam, W. Whitman, H.C. Weber and W.P. Ryan), the University of Michigan¹¹ six (A.E. White, W.L. Badger, C. Upthegrove, J.C. Brier, E.H. Leslie and G.G. Brown), the University of Wisconsin¹² four (C.F. Burgess, O.L. Kowalke, O.P. Watts and O.A. Hougen) and Purdue only one! If this was any consolation to Peffer, Purdue had the largest number of graduates with B.S. degrees. But it would take many years before it also had a respectable graduate program. (Competing with Schools that have significantly more resources is an old Purdue tradition that we are still waiting to give up; although the Forney building went a long way towards evening the playing field.)

In 1985 Prof. M.G. Mellon gave Prof. Peppas a vivid picture of Peffer's activities from 1911 until 1923. The entire School was Peffer's office in the Chemistry building (now the old Education building). The only "equipment" was a miniature Shriver filter press that he had on his desk. That press was in the School even during Shreve's days (around 1950) when Professor Mellon wanted to display it. Efforts to find it in 1985 in the attic of the CMET building were futile. Peffer's office was full of books and trade catalogs in a big stack on his right. His classes, usually 10 to 12 hours per week, were taught elsewhere. His private laboratory was in the basement of the Physics Building.

A highpoint in the history of the School and the life of Harry Peffer occurred in the summer of 1923. Fifty seven B.S. graduates (the largest number in this country) and one M.S. student had just finished their studies and the new enrollments were showing that the School was growing beyond any expectations. A total of 178 students had registered in chemical engineering. Peffer made his point to Dean Andrey Abraham Potter (1882-1979, dean from 1920 to 1953) and he finally succeeded in obtaining a series of concessions that would bring the status of the School to a more prominent position.

* The reader should note the all-exclusive statement about who was doing the work in those days!

In the fall of 1923, the School was moved to the south half of Purdue Hall. Equipment was finally purchased and a laboratory was started with the help of Dean A.A. Potter. And finally, a second faculty member was hired, a young M.I.T. graduate, John L. Bray, who became an Assistant Professor.

Major changes in the curriculum also were occurring so that in September 1923 a revised plan of study was proposed with courses in elements of chemical engineering, thermochemistry, metallurgy, mineralogy and general engineering (see Appendix E). After 1922, faculty members from other Departments had started helping Peffer in the educational process. Prof. M. Guy Mellon was teaching ChE 8, Technical Literature, and Perry L. Charles, an instructor in chemistry, was teaching ChE 7, Mineralogy. In September of 1922, the Catalyst Club was also founded.

Amidst all the difficulties of the early years and the large number of students that he had to advise or teach, Peffer found the time to do research. His first "publication" from his years at Purdue, indeed the first original research done in chemical engineering at Purdue University appeared in 1923 in the form of a U.S. Patent (No. 1,465,173 issued August 14, 1923) with H.C. Pierce on Electrodeposition of Co and Cr. Even after 1923, the funds available for research equipment were insufficient¹³. Thus, Peffer decided to concentrate on one specific area of research, one that was quite prominent in the structure of the early ChE program, metallurgy. Chapter 8 will show that for the next 30 years Purdue's School of Chemical Engineering remained a leading research institution in metallurgical engineering because of the contributions of Peffer and Bray.

In 1924, a new student society was started at Purdue, the AIChE Student Chapter. Originally a Chemical Engineering Society loosely associated with AIChE, it was the fifth Student Chapter of the Institute. It became a full chapter in 1929. Harry Peffer served as its advisor until 1934, although not a member of AIChE himself.

The academic year 1924-25 saw a major reorganization of the graduate program of the School. Until then, graduate studies consisted only of the preparation of a thesis much as in the German educational system. The first graduate course given was ChE 108, Advanced Metallurgy. The first ChE graduate course using the title Chemical Engineering - Advanced Chemical Engineering - was instituted in 1925 and taught by Peffer. This course was a rather primitive approach to unit operations, although by 1927 the famous book by Walker, Lewis and McAdams, *Principles of Chemical Engineering* was adopted as a text. Peffer made every effort to educate himself to the new ideas of chemical engineering. He only went to a few regional scientific meetings of ACS, but liked to travel to attend national meetings of educational nature. In the Archives of the School Prof. Peppas discovered all the handouts from "a summer course for ChE teachers" which was held at the University of Michigan in August 1931 and was attended by Peffer. (The Chemical Engineering Division of the American Society for Engineering Education continues to offer summer schools every five years.) The talks, with complete manuscripts, were by Lewis, Hougen, Brown, White and other giants of chemical

engineering. When Peffer returned, he sent the handouts to his other four colleagues and asked them to read them. To his surprise, below Peffer's perfectly typed memorandum, in 1985 Prof. Peppas found an untouched copy of the 300-page notes!

A survey of the employment of the 1911-1924 graduates taken in 1926 shows that out of 331 responding alumni 17.5% were employed as "chemists", 37.2% as "engineers," 7% as "metallurgists," 19.6% as "executives" (an impressive number indeed), 3.3% as "teachers," 3.3% as graduate students and the rest were in other functions. In fact, employment of ChE graduates was not a problem even during the depression years, as the 1932 *Debris* notes¹⁴: "Due to his [sic] broad and inclusive foundation in fundamental sciences, the chemical engineer has demonstrated himself to be the most versatile and adaptable member of the engineering profession. The increasing demand in this field is illustrated by the fact that during normal times the openings available for Purdue graduates in chemical engineering are several times the number of those graduating; during the depression period, over three-fourths of the graduates of this school had positions on graduation."

The School was now mature enough to proceed with the hiring of its third staff member, Professor Harold L. Maxwell, who joined the faculty in September 1926 as an Associate Professor. This was a much needed addition, not only because the enrollment had increased to 218 students and the teaching load was becoming difficult for Bray and Peffer, but also because Professor Maxwell brought to the School the prestige of a Ph.D. degree (Ph.D. Iowa State, 1924), much needed for a School that was organizing a graduate program. Indeed, Peffer never received a Ph.D. degree, a normal event in those days for a professor, and Bray received his from M.I.T. several years later, in 1930, while a full Professor. Maxwell stayed at Purdue until 1930.



Left: John L. Bray, the second Head of the School, in 1936.

Center: Harold L. Maxwell in 1927.

Right: Harold L. Maxwell in 1985.

**Harold Lee Maxwell
(1892-1988)**

Professor Harold Lee Maxwell was the third faculty member of the School of Chemical Engineering. He was born in Cottage Hill, Iowa, on February 3, 1892. He received his B.S. from Cornell College in Mt. Vernon, Iowa, in 1916 and his M.A. from the same school in 1917. His Ph.D. was from Iowa State University in 1924, working under the supervision of Anson Hayes. Upon his graduation he stayed at Iowa State as an instructor until 1926. He arrived at Purdue in August 1926 and was immediately involved in teaching an array of metallurgical and other courses. In 1930 he moved to E.I. duPont de Nemours, first, as a metallurgist in the ammonia department (1930-33) and then as chief metallurgist (1933-46). In 1946 he became supervisor of engineering consultants, and in 1952 technical advisor. He retired in 1957 and was a Visiting Professor at the University of Delaware from 1958-1959.

Professor Peppas met Professor Maxwell in August 1980 in the CMET building as he was visiting Lafayette for a few hours. His visit to Purdue in 1980 was a most sentimental occasion. He recalled that his office was in the second floor of Purdue Hall and he had been involved with several courses of the School.

Professor Maxwell made significant contributions to metallurgical and chemical engineering research and education. In four years he supervised two M.S. and one professional Ch.E. thesis. In 1928 he wrote the first publication of the school presented in a truly scientific Journal (see Chapter 8). A true pioneer in ChE, he taught, among others, the first graduate ChE course of the School, ChE 210, *Advanced Chemical Engineering*, where he introduced subjects such as distillation, liquid/vapor reactions, heat transfer and electrochemistry. Long before Clifton Lovell arrived at Purdue, Professor Maxwell offered the first ideas of modern chemical engineering to the students.

Professor Maxwell became actively involved in various research and engineering activities and enjoyed much respect in the profession. During the war he served in the Manhattan project with the Atomic Energy Commission (1943-46) and the Office of Science, Research and Technology (1944-46). He was very active in many societies, including AIChE, ACS, Society for Metals, Welding Society, Society for Experimental Stress Analysis, Association of Corrosion Engineers, Institute of Mining Metallurgical and Petroleum Engineers, British Iron and Steel Institute, and British Institute of Metals. In 1950-51 he served as Vice-President and in 1951-52 as President of the American Society for Testing Materials (ASTM). Among many recognitions, he received an honorary doctorate (D.Sc. '55) from his *alma mater*, Cornell College.

Bray and Maxwell had research interests in metallurgy. Thus, they sought to establish an independent graduate program in Metallurgical Engineering. It is not clear how students and professors decided how to classify the theses written during that period and it took significant search in old files and the registrar's office to discover that the first M.S. thesis in Metallurgical Engineering was written by Charles Gregory Dryer (M.S. '30) under the supervision of H.L. Maxwell. The subject was *A Metallographic Study of Failures in Boiler Plates*.

Two more additions to the academic staff of the School occurred in 1927 and 1928 with the arrival of Louis John Haga (1903-1987, S.E.M. '25 Michigan College of Mines (now Michigan Technological University), M.S. '28 Purdue University) as Instructor in Chemical Engineering, who taught Mineralogy and Metallography from 1927 to 1928, and Professor Robert B. Leckie (1888-1947), a graduate of the Royal Technical College, Glasgow, Scotland, (1907) who thus became the fourth faculty member of the School, as Professor of Gas Engineering. Before joining Purdue, Leckie had worked with Kingston

Gas & Electric Co. in New York and with Allied Chemical and Dye Corp. Thus, in May 1929 the School of Chemical Engineering had three Full (Bray, Peffer and Leckie) and one Associate Professor (Maxwell) with an enrollment of 272 students and a graduating class of 30. Professor Leckie made significant contributions in the area of gas engineering until May 1936 when he resigned due to a mental breakdown.

From 1928 to 1943 there was a need for instructors to assist Bray in the metallurgical laboratory and in other metallurgical courses. After the departure of Haga in 1928, James Thomas Gow (Met. Eng. '27, M.S. '28, both from the University of Minnesota) and Maurice Charles Fetzer (Met. Eng. '29 University of Minnesota) were hired for single academic years. The next two instructors in metallurgy stayed here for much longer time and contributed significantly to the School. Robert Harry Heyer (1907-ca 1992, B.M.E. '29, M.S. '30, both from the University of Minnesota) joined Purdue in 1930 and taught initially undergraduate courses in metallurgy and metallography, and after 1934 graduate courses in the same areas. He stayed here until 1937. Subsequently he was with American Rolling Mill Co. (1937-40), Battelle Memorial Institute (1940-41) and Armco Steel Corp. (1941-72). While at Purdue he received the 1937 Dudley Medal of ASTM. He authored the well-known textbook, *Engineering Physical Metallurgy*, London, 1940. The next instructor hired was Robert J. Raudebaugh, whose contributions will be discussed in the next Chapter.

In 1929 John L. Bray, who, according to Professor Mellon, in 1923 was making fun of Ph.D. degrees, took a sabbatical leave to return to M.I.T. to complete his Ph.D. thesis in Metallurgical Engineering. The need for a replacement was grave, and since a need existed in the areas of Geology and Mineralogy with courses required both by Civil and Chemical Engineering, Professor Frederick Leverne Serviss (1896-1955, E.M. '20, M.S. '22 Colorado School of Mines) was hired as an Associate Professor in 1929.

Herbert M. Weinraub (B.S. '30) recalled¹⁵ the last few years at Purdue Hall, which previously housed Mechanical Engineering, and was abandoned in 1930 for a move to Heavilon Hall. Professor Peffer was busy with courses, research and administration, and Leckie was establishing his program in Gas Engineering. Some technical problems had occurred in 1929 and no laboratories were operating except for the Metallurgical Laboratory located in M. Golden's space in Heavilon Hall.



Left: Frederick L. Serviss, who contributed to engineering geology, circa 1941.
Right: Robert B. Leckie, professor of Gas Engineering, circa 1931

In 1930 the School had rather strong programs ("options" as they were called) in Metallurgy, Gas Engineering and Geology. But the level of a major component of the curriculum, Organic Chemical Technology, was not to the satisfaction of the faculty members. Every good Chemical Engineering Department required a thorough analysis of the processes needed for production and treatment of organic chemicals. Harry Peffer and Richard B. Moore, Head of the Department of Chemistry and Dean of the School of Science, spent a major portion of 1929 and the Spring of 1930 trying to attract to the School an already successful industrial chemist who had his own private consulting practice—a 1907 A.B. graduate summa cum laude of Harvard University, who would become the most influential chemical engineer at Purdue, and one of the most important academic researchers and educators of the pre-and early post-World War II era—R. Norris "Benny" Shreve.



The faculty of Chemistry and Chemical Engineering in 1915. In the bottom row second from the left is Prof. James H. Ransom, who taught general chemistry to ChE's, third is Prof. Edward G. Mahin who taught organic chemistry and supervised the first M.S. thesis in Chemical Engineering, fourth is Prof. Harry C. Peffer, Head of the School of Chemical Engineering, and fifth is Prof. Percy N. Evans, Head of the Chemistry Department. In the top row, first from the right is Merle R. Meacham who received the first advanced degree in ChE (a professional Ch.E. degree) in 1916, and fourth from the right is Nathaniel E. Loomis, an instructor in chemistry, who supervised Meacham's thesis.

Shreve was finally convinced to join Purdue in the summer of 1930, at age 45, first as an Associate Professor and after 1931 as Full Professor. On March 11, 1931 he was writing¹⁶: "I do not know whether you by chance saw notices about my joining the faculty of Purdue University or not. The fact is that last summer I was *persuaded* [the italics are Shreve's] by this institution to start new work here in Organic Technology... The work turns out to be very interesting and particularly so to a man of my training, since this institution is preeminently an engineering one, laying stress upon industrial training, industrial research and industrial contacts." And to Vivian E. Hamilton with whom he had worked in 1928 on commercialization of the greensand beds of Texas he wrote¹⁷: "I think I wrote you that I was persuaded to join the faculty of Purdue University. This took place last September and so your friend is now a 'professor.' When I found that the University not only permitted but encouraged me to continue some of my consulting work their offer became attractive to me and it is working out very nicely." This was the concession Purdue had made to hire him, along with a vague promise for laboratory space and perhaps a new building in a few years. However, in his letters no mention was made of Chemical Engineering, only "Organic Technology."

Joseph Warren Campbell (B.S. '24, Pennsylvania State University, M.S. '25 Carnegie) also was added to the faculty in 1930 to contribute to the teaching of metallurgy. He had worked with Bethlehem Steel Co., American Steel and Wire Co., and Columbia Engineering Co., before joining Purdue. He stayed here only until December 1935, when he moved to Stanford University.

With Maxwell's departure, Shreve's arrival and Bray's return from M.I.T., the faculty had six professors, several instructors or part-time faculty (usually from other Schools) teaching peripheral courses and an impressive number of 441 enrolled students with 58 B.S. graduates and 7 M.S. graduates in May 1933. After 1932 the curriculum had been modernized with new courses in organic chemical technology, plant design, etc. and six options: General, Metallurgical, Gas, Military and Chemical Engineering, and Organic Technology.

At this point, some changes in education must be mentioned. An internal survey of the "requirements" of the chemical engineering curriculum in 1926 had shown that although Purdue was doing well in terms of courses in mathematics, physics, mechanics and "other engineering" with respect to the AIChE-recommended curriculum ("arbitrary" as the anonymous writer of the report was calling it), only 5.7% of the courses were truly ChE, with AIChE recommending 10.3%. It was therefore not surprising that AIChE did not include Purdue in a list¹⁸ of 14 Schools that could be "rated as giving satisfactory courses in chemical engineering. The committee desires it to be understood, however, that some schools may have been omitted which, with more complete knowledge of their work and conditions, might have been included." The last sentence was only a small consolation for the proud educators of the School. In the next seven years they worked hard to upgrade the program which was finally accredited in 1933. Chemical engineering at the University of Illinois-Urbana Champaign also was accredited in 1933. The Big Ten programs accredited before this were (in 1925 as part of the original 14) Michigan, Minnesota, Ohio State, and Wisconsin; and in 1926 the University of Iowa.

For many years Harry Peffer also was quite busy with University administration. He served on the Executive Committee of the University from 1926 until 1934. This Committee, equivalent to today's Senate but with much more power, then consisted of 20 faculty members, heads or deans and the President of the University. One of those deans was A.A. Potter, and it is no secret that the relations between Peffer and Potter were never better than lukewarm. It also was during this period that Professor Peffer became known for his "Pefferisms," aggressive expressions and aphorisms, which attacked bureaucracy and did not gain him many friends except among the students.

As Harry C. Peffer was entering his 61st year he could not but be proud of his accomplishments. He had come to Purdue in 1911 at the age of 38, to start a program alone, without laboratories or offices, without assistants or substantial funds, only with great enthusiasm and conviction that what he was doing would pay off. He was already the Head and the sole faculty member of the largest School of Chemical Engineering in the country in 1923 when a second faculty member was hired to help him. He had molded a chemical engineering curriculum that was perfect for students who would go to industry. He had seen 768 B.S. students graduate under his supervision, and he had started a graduate program that by 1934 had produced 24 M.S. and 26 professional Ch.E. and Met.E. degrees—an impressive number for the standards of that time—and in the next year would produce the first two Ph.D. degrees. He had moved from a partitioned area and no laboratories in the Education building to Heavilon Hall, now totally assigned to Chemical Engineering; and there were even discussions that a new building for chemical engineering might be built in the next five or six years.

For once in his life, this acerbic, strict and aggressive man, this excellent teacher and astute administrator, but poor diplomat, this gifted inventor who 23 years earlier had abandoned a brilliant industrial research career at Alcoa to move to academic poverty and bureaucracy could smile that he had succeeded, that he was Head of the largest chemical engineering school in the country, but also a School that, with a faculty of the stature of Bray, Leckie, Shreve and Serviss, was considered one of the five best in the country and the best in industrially-oriented research and education.

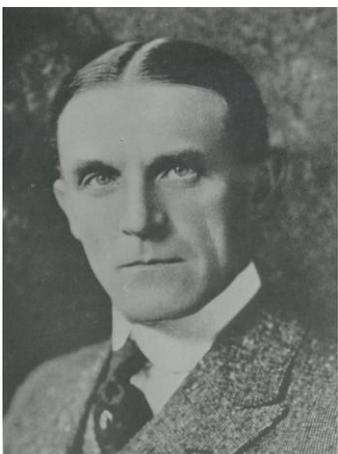
These must have been the thoughts and pride of Harry C. Peffer when on July 17, 1934 he collapsed and died in front of the Metallurgical Laboratory in Heavilon Hall. His former students remembered him for his contributions to the School and the University. For the younger generation, although he may have been forgotten, his contributions bear fruit every day. Considering the difficulties he faced and what he achieved, the first Head of the School may have been its greatest!

Student Life

In 1985, Prof. Peppas contacted some of the alumni of our School and asked them to provide him with their impressions from those days. Edmund S. Mills (B.S. '16), who was living in Ridgewood, NJ, recalled¹⁹ that ChE had no elective courses and that the writing of a senior thesis was compulsory. It was necessary for students to read, write and

understand the German language, and German publications dealing with chemistry were required reading. He remembered his graduation date: "Eighteen of us did receive our B.S. degrees in Fowler Hall in June 1916. No caps, nor gowns, just our most presentable suits! All of us were employed upon graduation, by company recruiters who visited the campus."

Leon H. Nelson (B.S. '19), who was living in Hilton, NY, in 1985, recalled²⁰ the ChE education during the World War I years. "Most of us were in the Student Army Training Corps living in barracks during the life of the Corps from September till December 1918. Of course we lost some members to the army during 1917-18 so we had 19 chemical engineers in our senior year." One of those students who did not return from the war was Stimpson W. Goddard who died in the battle of Argonne in 1918. Sixty-four years later, a good friend of his who remembered him well, Colonel Charles D. McAllister (B.S. '20 in Electrical Engineering) then of Orlando, Florida, offered a fellowship in his name. The Goddard fellowship established in 1983 was given to an outstanding graduate student of the School. The first recipient was Steven A. Clark (B.S. '79, M.S. '82, Ph.D. '85).



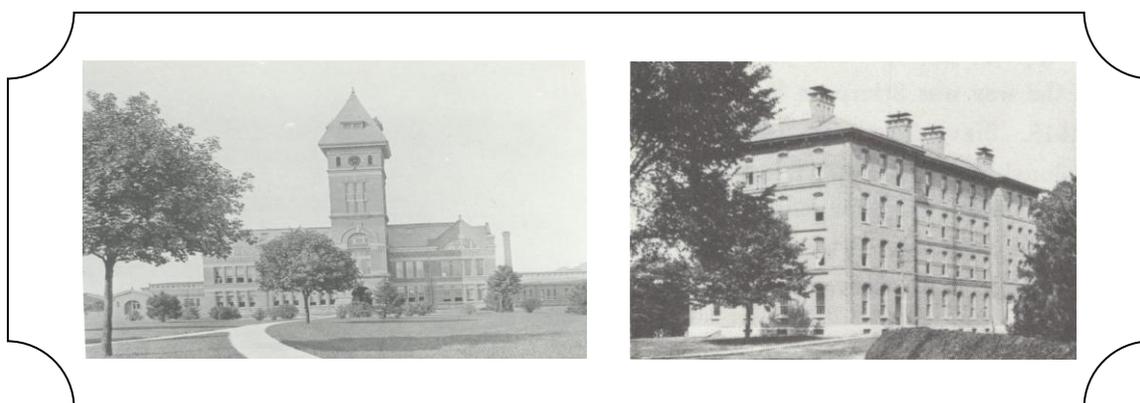
Left: President Edward C. Elliott circa 1926.
Right: Dean of Engineering Audrey A. Potter, who contributed significantly to the School's progress (1927 picture).

Chemical engineers seemed to be a rather elite group in those days. According to Nelson²⁰, seven of the 19 members of Tau Beta Pi were chemical engineers; there were at least 10 ChE members in Phi Lambda Upsilon. "Also, the university gave a school-wide IQ test in the spring of 1919 to the total enrollment of about 2800 (author's note: the correct number was 2605 according to Bray²¹). Our senior chemical engineers had the highest average IQ (of 135 as I remember it) of any single group in the school."

Indeed, very early in the School's history the ChE curriculum became quite demanding. This reputation started spreading all over the campus, to the delight and pride of "the Chemicals," as chemical engineers were called then. The *Debris* of 1927 stated²² "it is a popular belief, and without a doubt a truthful one, that the Chemical (sic) course is the toughest in the curriculum. At least the 'chemicals' manage to put in more hours per week in school than any of their classmates in the other engineering courses." And in the *Debris* of 1929 we find²³: "As members of the most difficult and consequently

the smallest school in the university, the chemical engineers have long considered themselves somewhat exclusive." Strangely enough, current students have similar feelings.

Ernest H. Hartwig (B.S. '19, M.S. '21) recalled² many classes being taught in Purdue Hall and in the laboratories of "Mike" Golden. Paul V. Brower (B.S. '21, then Ph.D. in Chemistry at the University of Chicago) claimed that chemical engineering as such was lacking from the courses the students were taking then. "Only the students from M.I.T. saw their notes published later by Walker, Lewis and McAdams in 1923." Indeed, Bruce W. Gonser (B.S. '23, Hon.D. '67) pointed out²⁴ that teaching was done "from Prof. Peffer's experience and use of industrial catalogs rather than textbooks..." But he stressed that "no doubt we had plenty of information on our studies of Chemical Engineering" and "in later industrial experience I never felt any scholastic handicap in not having had more formal chemical engineering training."



Left: Heavilon Hall was the third building of the School from 1930 to 1940.

Right: The Purdue Hall, where the School was housed from 1923 to 1930.

The student body's attitudes were rapidly changing probably as a result of the many changes in life after World War I. Edmund S. Mills (B.S. '16), our main source of student information from the pre-war years, gives a very vivid description of student life in those times¹⁹.

At the time I was a student at Purdue, a college education was not taken for granted! It was a privilege available to comparatively few. Such being the case, we respected all of the teaching staff with whom we had contact. That staff always was more than ready to assist any of us who might be having difficulty in "making the grade"... I think our respect for our teachers was indicated by our fairly formal code of dress. Jackets and neckties always! But in the senior year, it was allowable to be seen in senior "cords" having a few acid burns, purposely made or otherwise!

Because of the lack of facilities for Chemical Engineering (Peffer had only a small office in the Education Building) the students spent their extracurricular time in their fraternities or dormitories. A Chemical Engineering Society was formed in 1911 with Prof. Peffer as its advisor²⁵. It was progressively changed to an AIChE Student Chapter in 1929. The Catalyst Club was formed in 1922. The professional fraternity for chemical engineers was Phi Delta Chi, and many students were members of Tau Beta Pi and Phi Lambda Upsilon as well.

Phi Lambda Upsilon

The thirteenth chapter of the honorary chemical society Phi Lambda Upsilon, originally founded at the University of Illinois in 1899, was established at Purdue in 1917. Professor Peffer was its first advisor. This was the honorary chemical engineering society on campus for more than twenty five years. In the 1930's its members compiled a directory of all ChE graduates which is still available in the School's Archives. After Peffer, H.B. Hass of Chemistry, was its advisor from 1931 until 1934. Shreve was its advisor until 1943, when Omega Chi Epsilon was founded (see Chapter 4). However, a number of ChE students continued to be members of this society. For example, in the late 1970's eight chemical engineering students were members of Phi Lambda Upsilon.

Mills also gives us a most interesting description of campus life.

Absolutely no smoking on campus anywhere. No liquor for sale anywhere in West Lafayette, nor permitted in fraternities. No dormitories other than 'Ladies Hall.' No female students in any engineering courses. A 5¢ trolley ride took us to the iniquity of Lafayette, movies, the Lahr House and the Family Theater.

Phi Delta Chi

The nineteenth chapter of the honorary society Phi Delta Chi was established at Purdue in 1916. Initially it was both a social fraternity with a house on Littleton Avenue and an honorary society for chemical engineers and pharmacists. After 1926 there were no ChE members. However, in the 1980's a strong, but temporary, interaction developed again between Phi Delta Chi and the Catalyst Club.

Things would not be the same after the War. Gonser²⁶ recalled a characteristic incident which occurred in 1921 and shows that the attitudes of the students of that time to be closer to today's standards.

One weekend several of the upper-classmen of the Phi Delta Chi fraternity, then a professional fraternity of chemical engineering and pharmacy students, conceived the brilliant idea of leaving the basement

window in the chemistry building ajar after Saturday morning laboratory activities. Then, with feverish energy, they spent the weekend carefully disconnecting and switching the gas and water lines. Thus, on Monday morning when students started laboratory work they were amazed in attempting to light the Bunsen burners to find a jet of water extinguishing their matches. Of course, all chemical laboratory activities were called off for a couple of days until lines were properly reconnected again. It was a dangerous thing to do but a bit of fun while it lasted. What puzzled us was that it took professional plumbers a couple of days to make the change that took our senior students the equivalent of less than a day.

Chemical Department Professors Outwitted by New Type of Student

We reproduce here a humorous Purdue Exponent article of October 2, 1920. The title given here is the same as in the original article.

Perhaps you hadn't realized before just how popular Purdue is with those in quest of education. Students come here from everywhere, and now it seems that even a *portion of the animal kingdom* is anxious to gain admittance.

Mice have now attempted to invade the sanctum of Chemistry (*sic*), but Professor Peffer, who is in charge of the Chemistry (*sic*) department, instinctively hates the rodents, so that these ambitious folk had to seek other means of taking a college course in chemistry. Last summer they slipped one over on the entire department.

Professor Peffer had several samples of linseed oil in the laboratory, where the mice took a summer course in both organic and inorganic chemistry. Not to be outdone because of lack of assistance from members of the instructional corps the mice gnawed the corks out of the bottles of linseed oil, and by using their tails to extract the precious fluid from their containers they made a complete study of this subject of organic chemistry.

Of course students need chalk and mice are no exception. It happened that the Chemistry department had stored away enough of this white substance to last all this school year, but their ambitious mice used all of it in their work.

So you see that Purdue is after all a most popular school, catering to all classes if they really want to learn.

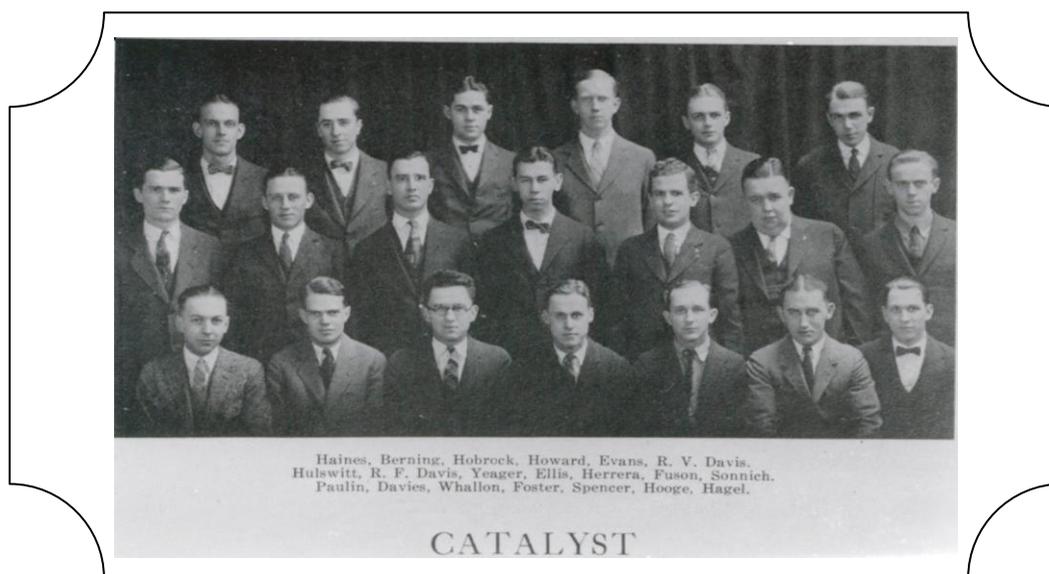
The Catalyst Club

The Catalyst Club was the oldest and most renowned of all the Chemical Engineering groups at Purdue University. It was formed in September 1922 as an honorary society in the School. As Bray states²¹ "at that time one of the instructors in another School refused to accept problems in which the metric system was used. To correct this 'injustice,' remove other sources of student irritation, and to help the School in general the group grew into a formal and very helpful society." Robert C. Becherer (B.S. '23, Hon.D. '55), one of the originators of the Catalyst Club, gives²⁷ a more accurate description. "We had a course in Thermodynamics added to our schedule in our Junior year and the instructor advised us at the beginning of the semester that the course would be based on answering 67 questions we would have during the semester. Knowing that the Mechanicals had a more complete course than we were getting, several of us decided to get together and find out if these questions were available in the various fraternities. We had a meeting at the Sigma Pi where we discussed the course. In addition to the review of the Thermo course, we became involved in discussing two groups in the Chemical Engineering School who, we concluded, were not properly recognized. Those were a group at the lower grade level who worked hard to keep up with others in the class whose grades came easier. Then at the opposite end of the grade level (there were those) who had perfect grades but were never recognized by Tau Beta Pi or Sigma Xi for various reasons. We therefore decided there was a place for a fellowship organization that could recognize these men for the good work they were doing. So, in fun we organized the Catalyst Club and followed the routine of pledge recognition and other details that were used by other Honorary Fraternities. The officers were given factious titles and the purpose of the organization was on the same vein. There were no pledge duties and the only activities were a party about twice a year." Its first meeting or "convention" was held on an island in the Wabash River in 1923. For years the pictures of its officers appeared in the Debris.

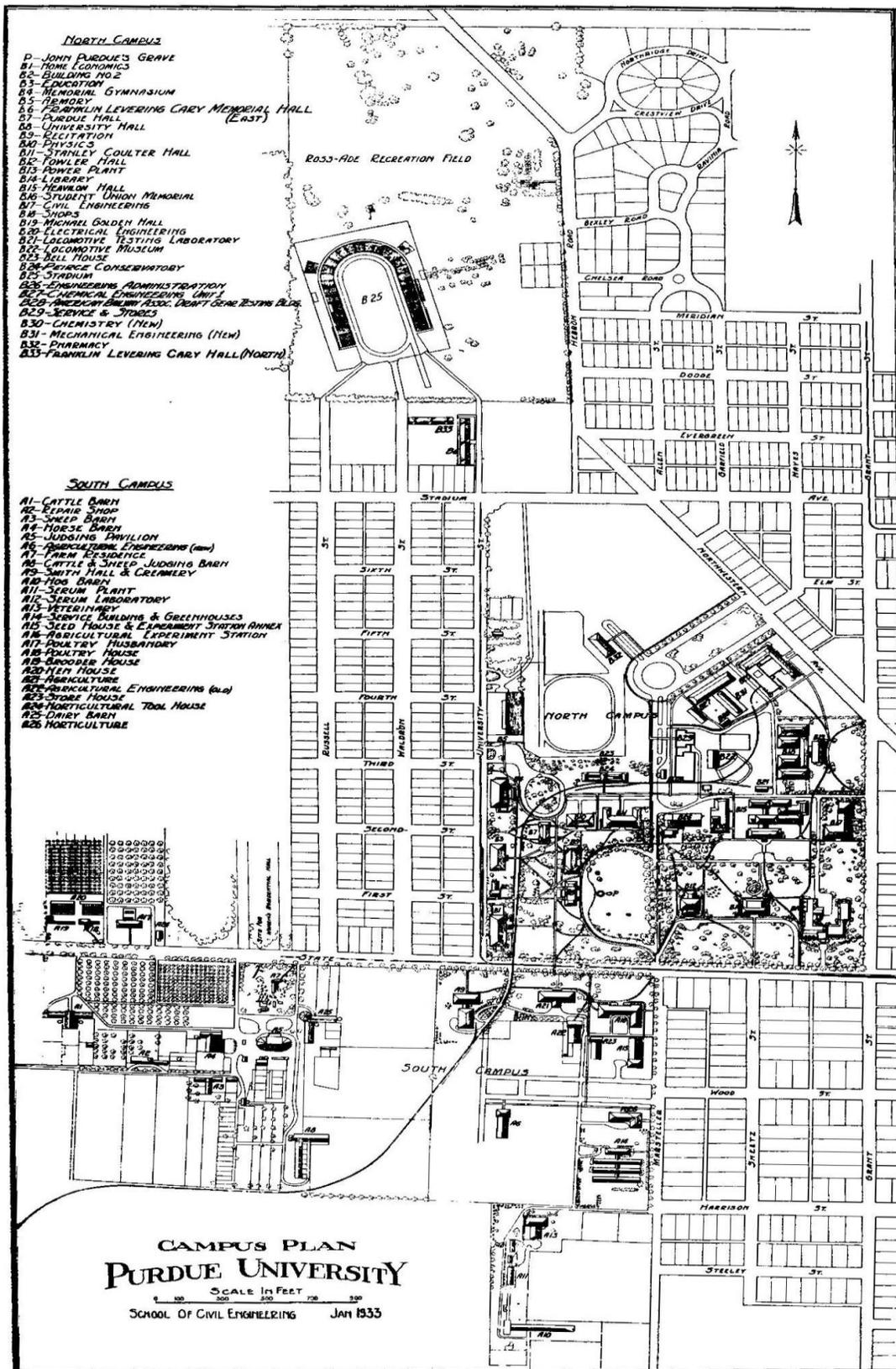
The 1925 goals of the Catalyst Club²⁸ would surprise the reader who remembers later events, especially in the 1950's to 1990's. "Meetings are held at frequent intervals during the school year. At this time papers and subjects of scientific and chemical interest are read and discussed with a view towards increasing the member's general knowledge of the subject. At the close of each school year a banquet is held at which all professors and instructors in the Chemistry Department (sic) and all seniors majoring in Chemistry (sic) are guests of honor. The official organ of Catalyst is the *Residue*, a monthly publication." For those still wondering, yes, the Catalyst Club was a ChE society from its inception. But this passage perhaps best exemplifies how the anonymous 1925 writer (and some of his classmates?) felt about Chemical Engineering.

The first advisor of the Catalyst Club was Harry C. Peffer (1923-1934) followed by Clifton L. Lovell (1934-1946) assisted by Frederick L. Serviss and George W. Sherman, Jr. At the time, Catalyst Club pledges could be identified by the Erlenmeyer flasks they were required to carry! During the advisorship of Sherman (1946-1954) a series of turbulent events occurred, some related to the famous cabin the club members owned on Wildcat Creek. John (Jack) E. Myers took charge in the 1950's. After 1966 and Myers' departure, Alden H. Emery, Jr. became the advisor. The Catalyst Club functioned as a social club, not as a University-sponsored society for a number of years. Up to the 1990's it ran as a social club with about six to ten meetings a year, as a place where faculty and students can meet and exchange ideas between a game of table-tennis and a round of "trivial pursuit."

Unfortunately, Purdue administrators concerns over liquor laws and potential law suits eventually brought an end of this noble institution during the 1990s. One aspect of the Catalyst Club that survives is the Razz Banquet (see Chapter 3).



The Catalyst Club members of 1925.



Campus map of 1933.

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