

Chemical Engineering Department Development and History 1893-1991

by James B. Cordiner, Jesse Coates, 1991

It is fair to say that the development of chemical engineering at Louisiana State University began in 1893 with the arrival of Charles Edward Coates, a professor of chemistry and chemist on the staff of the Agricultural Experiment Station.

Coates' personal interest in sugar chemistry and sugar engineering was to dominate the focus of the department for the next third of a century, although the topics of chemistry were expanded to include theoretical, physical, electro, historical, and physiological chemistry. He served for over forty years as a professor of chemistry and Chairman of the Department of Chemistry.^[1] He also served concurrently with the Audubon Sugar School, as a professor until 1907 and as its dean from 1907 to 1931.

Coates was appointed dean of the newly-formed, multi-disciplinary "College of Pure and Applied Sciences" in 1931 and remained in that position until his retirement in 1937. The LSU Catalog for 1934-35^[2] shows that Division I contained the departments of chemistry, chemical engineering, and sugar engineering (Audubon Sugar School), while Division II consisted of sugar agriculture, agricultural chemistry, and biochemistry and Division III was physics and applied electronics.

The major thrust of this article is directed toward chemical engineering, including its development within the Audubon Sugar School, and the following section (largely abstracted from a 1917 publication by Charles E. Coates^[3]) is of special interest in that respect.

AUDUBON SUGAR SCHOOL, 1893-1917^[3]

(The following are quotes from "An Experiment in the Education of Chemical Engineers. The Twenty-Fifth Anniversary of the Audubon Sugar School, by Charles E. Coates.)

The part which the chemist has played in modern development we have known in a way for some years, but we are appreciating now as never before, the vital and imperative importance to our nation of a body of men who cannot only discover chemical principles but can also apply them industrially.

A little over a century ago, when sugar was first made from beets, the root was low in sucrose and the process gave a poor yield of an inferior grade of sugar with an almost valueless molasses. . . . the chemist and engineer, working together, slowly improved the processes until a good yield of sugar was turned out, practically pure, and both the molasses and all the other by-products became sources of profit and not of loss. In consequence the net cost of beet sugar fell year by year until it finally became a serious competitor of cane sugar and, finally, it was offered at prices closely approaching the cost of cane sugar production.

The sugar planters of Louisiana, ... seeing the increasing gravity of the situation . . . in the late [eighteen] eighties, called to Louisiana Dr. W. C. Stubbs and established. . . the Sugar Experiment Station at Kenner, Louisiana, which was subsequently moved to Audubon Park, on the outskirts of New Orleans. . . . But when the planters began to look for chemists and engineers, they were simply not to be obtained. . . . In 1890, therefore . . . it was decided to establish, in connection with Sugar Experiment Station, a school for the training of experts in sugar work, opened in 1891 as the Audubon Sugar School.... The school was successful from the outset and, in a couple of years, more students were applying for admission than could well be accommodated. In the meantime the Sugar Experiment Station was taken over by the State of Louisiana as part of the Louisiana State University. . . . In 1908 its numerical importance was such that it was reorganized as a college of the University.

From the first the writer [C. E. Coates] and his colleagues were given a free hand by President [Thomas D.] Boyd in formulating the course of study, and changes were made year by year as experience or circumstances dictated.... The purpose of the school when first organized was to offer to the citizens of Louisiana the opportunity to secure such training as would qualify them to enter most advantageously the sugar industry of the state.

The course as formulated in 1897, was four years in length. . . . It soon became clear, however, that a satisfactory foundation could not be given to high school graduates in four years, so, in 1899, the course was made five years in length. The first three years were spent on fundamentals— chemistry, physics, mathematics through calculus, economics, English, engineering sciences such as mechanics, and thermodynamics. These courses were comparable to those given in the chemical engineering departments of MIT, Illinois, and Cornell. Specialization in the sugar industry was reserved for the last two years. Courses in sugar house control, sugar house machinery, mechanical engineering, machine design, steam engineering and the like were offered. The salient feature of this instruction was that it was accomplished by a combination of classroom work and practical instruction in the Audubon Sugar Factory and, later, in various Louisiana sugar factories. So far as the writer knows, this was the first five years' course in chemical engineering ever offered in this country.

Was this chemical eEngineering? In the well-known textbook by Badger and McCabe,^[4] *Elements of Chemical Engineering*, examples of the type of work chemical engineers are concerned with are given. Listed there we find the flow of fluids, flow of heat, filtration, evaporation, crystallization, and extraction, among others, as chemical engineering operations. These are also key operations in the manufacturing of sugar. Moreover, some of the data taken in the Audubon Sugar Factory in the early days are still cited today in Perry's *Chemical Engineer's Handbook*.^[5] Were the students in the Audubon Sugar School being taught chemical engineering? The answer is clearly in the affirmative. The foregoing facts speak for themselves.

Whether the date be 1897 or 1908, it is certain that by 1908 chemical engineering was firmly established at the university, and that LSU was the birthplace of chemical engineering education in the south.

THE DEPARTMENT FROM 1897 TO 1908

Since the primary concern of this article is chemical engineering education at Louisiana State University, attention will be focused first on the year 1897 when the Audubon Sugar School became an official part of LSU. It was operated as a private corporation (with funds subscribed by the Louisiana Planters' Association) with a course originally of two years' duration. Additional details of its history were published in an article by E. A. Fieger.^[6] Excerpts from that article follow:

After a care/id consideration of the chemical developments which have occurred in Louisiana, it seemed appropriate to present the history of one of the first chemical industries of the state and to show how its introduction led to a series of developments which had far-reaching effects. This industry ... was born during a period of agricultural adversity. It developed and flourished, due to the application, diligence, and patience of a small group of men who probably unconsciously applied chemical principles to a crystallization process . . . and caused an awakening—and its salvation through the use of chemists and engineers. This is the story of the sugar cane industry.

If history is correct, the first sugar cane was introduced into Louisiana by the Jesuits in 1751, about thirty years after the founding of New Orleans.

Sugar engineering, as cited in the LSU Catalog for the year 1902, was one of eight regular courses of study leading to appropriate degrees. The course was designed to train experts in the sugar industry to fill good positions in the field. It included instruction in the agriculture, chemistry, and manufacture of sugar. The students had full courses in the lecture rooms and laboratories of LSU and then spent the grinding season of their junior and senior years in the field, the sugar house, and the laboratory of the Sugar Experiment Station (originally located at Audubon Park, New Orleans, but moved to Baton Rouge in 1897). The chemical engineering curriculum is first mentioned in the 1907 LSU Catalog.

THE DEPARTMENT FROM 1909 TO 1936

The roster of students in 1910^[2] includes several in the Audubon Sugar School and two sophomores in chemical engineering; that of 1912 lists possibly the first graduate student; and that of 1913 lists seven undergraduates.

Paul M. Horton is listed in the 1919 catalog as Assistant in Chemistry; in 1925 as Assistant Professor of Chemistry; in 1927 as Associate Professor of Chemistry; in 1935 as a Professor of Chemical Engineering (all within the Department of Chemistry). In 1936, chemistry and chemical engineering are listed as separate departments within the College of Pure and Applied Sciences (C. E. Coates, Dean). The first PhD was awarded in 1935.

A special posthumous tribute to Dean Coates was instituted in 1957 with the establishment of the Charles E. Coates Memorial Award for outstanding contributions to the professions of chemistry and chemical engineering, the corresponding professional society and the community. In

addition to his many other achievements, Dean Coates was a charter member of the Louisiana-Mississippi chapter of the AIChE and helped to organize the Louisiana section of the ACS.

THE DEPARTMENT FROM 1937 TO 1956

In 1937 the catalog shows chemical engineering as a separate department within the College of Engineering. Dr. Horton is listed as head, and Jesse Coates and Arthur Keller as assistant professors. Dr. Coates ran the department almost single handedly during the war years of 1942-45 since Dr. Horton was on leave working on a high-priority project and Dr. Keller was on leave for another assignment at LSU. Bernard Pressburg joined the faculty as Assistant Professor in 1941, but was on military leave from 1942 to 1945.

The catalogs for this period indicate that Horton, Coates, and Keller taught a tremendous number and variety of chemical engineering courses. In addition to the courses listed earlier, Horton conducted considerable research in the pulp and paper field.

THE DEPARTMENT FROM 1957 TO 1969

The years 1957 to 1963 saw substantial increases in the complexity of course offerings and in the number of faculty. Dale Von Rosenberg joined the faculty in 1957; James B. Cordiner and Frank R. Groves in 1958; and Adrian E. Johnson in 1960. Paul W. Murrill came to LSU as a graduate student in 1960, received his PhD degree, and eventually became department head in 1967. In 1969 he became Vice-Chancellor, and shortly thereafter Chancellor, of the Baton Rouge campus, but left in 1980 to become Executive Vice President of Ethyl Corporation, and then Chairman and Chief Executive Officer with Gulf State Utilities Company.

Several individuals were permitted early retirement from Exxon Corporation to come to LSU. They included Alexis Voorhies, who came in 1964, and Roger Richardson, who joined in 1965. Edward McLaughlin, from Imperial College of London University, was a visiting professor at LSU for the 1967-68 academic year, returned to London for two years, and then joined the LSU faculty permanently.

THE DEPARTMENT FROM 1970 TO 1991

In 1970 Joseph A. Polack was granted early retirement from Exxon Research and Development Laboratories to become a professor and head of the LSU department. He served in that capacity for the next six years.

In 1976, Polack became Interim Director of the Audubon Sugar Institute in addition to his duties as head of the chemical engineering department, but soon thereafter resigned as head to become the full time director of ASI, where he remained until his retirement in 1988.

Douglas P. Harrison served as department head for the next three years until he chose to return to the teaching ranks. Additional historical information for this period can be found in a 1979 issue of *Chemical Engineering Education*⁸¹

Harrison was followed by Edward McLaughlin, who served as department head until 1987 when he resigned to become Dean of the LSU College of Engineering. Faculty additions during this time included Donald C. Freshwater, Kerry M. Dooley, Michael Y. Frenklach, Gregory L. Griffin, Martin A. Hjortso, F. Carl Knopf, Geoffrey L. Price, Danny D. Reible, Richard G. Rice, Don L. Ristroph, Conrad B. Smith, and David M. Wetzel.

Arthur M. Sterling joined the faculty in 1975 and in 1987 consented to act as interim department head until a permanent head could be found. This was achieved in 1988 with the arrival of John R. Collier from Ohio University.

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