U. OF TORONTO'S DEPARTMENTS OF Chemical Engineering and Applied Chemistry

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In presenting this informal history of the department of chemical engineering and applied chemistry at the University of Toronto, I would like to have the reader imagine himself a gay, carefree engineering student at the University of Toronto at several time periods during the past eighty years . . .

Let us start in 1878

In that year the Dominion of Canada was only eleven years old, and Toronto had been incorporated as a city for only 40 years. The city was primarily a marketing center for a rich agricultural area and ended north of Bloor Street. Jarvis Street was *the* residential district. The construction of a city system of waterworks had only recently been authorized. Timothy Eaton had been in business for only ten years and Robert Simpson only half that time. Beer cost 15 cents a gallon.

Liberal arts colleges had been in existence in Toronto for many years, the University College building being some twenty years old. The first premier of Ontario, Sandford, had suggested that Toronto should have a college of technology and in 1871 had persuaded the legislature to vote $50,000 for one. However a new assembly under Alexander Mackenzie in the following year postponed this plan but did set up an evening school for teaching mechanics, drawing, and chemistry.

I mention this night school for laymen for two reasons. Two of its three teachers were J. Loudon and W. H. Ellis, both of whom were to play important roles in our later story. Also in the seventies there was considerable controversy regarding the propriety of a school teaching such practical subjects in association with liberal arts colleges already in existence; now, eighty years later, in a much more technical age, this controversy still rages.

In 1877, however, just before we see our first student in classes, the legislative assembly again gave its sanction to the establishment of a School of Practical Science and the familiar S.P.S. or "little red schoolhouse" was set up south of University College, and at a respectable distance from it.

The following year you are one of the first students in this new building, beginning a three-year certificate course. There are six professors on staff:

H. H. Croft, Professor of Chemistry
E. J. Chapman, Professor of Mineralogy & Geology
J. Loudon, Professor of Mathematics & Natural Philosophy
R. R. Wright, Professor of Biology
J. Galbraith, Professor of Engineering
W. H. Ellis, Assistant to the Professor of Chemistry.

Actually the first four of these divide their duties between S.P.S. and University College. In these early days Professor Galbraith is in charge of *all* engineering instruction but since there are only a few students there is the closest contact between him and those fortunate to be in his classes.

The courses offered at first are

The present professional staff in the department of chemical engineering at the University of Toronto are: standing, left to right—D. G. Andrews, W. F. Graydon, W. G. MacElhinney, R. E. Jervis, A. I. Johnson, R. W. Missen, and J. G. Breckenridge; seated—W. H. Burgess, W. H. Rapson, R. R. McLaughlin, S. Sandler and I. H. Spinner; absent—O. Trass.

civil, mechanical, and analytical and applied chemistry with only a very few students in the latter for many years. Soon after mining, electrical and architecture courses are established.

For many years all departments were housed in the one building. The basement floor was partly occupied by the coal cellar and the heating boiler but also had an experimental boiler, a machine shop, and the heavier testing machinery. The fire assay laboratory occupied the north-west corner. On the main floor were the library (where the students' engineering supply store is now), a blowpipe laboratory in the north-east corner, and several offices. The Professor of Chemistry occupied the office to the right on entering the north door.

On the second floor the quantitative and qualitative chemical laboratories were located on the north side of the building. The drafting rooms were as now.

The third floor was occupied by a museum in the north end and an assembly hall in the south.

The courses in chemistry listed in the calendars of the time were:

Elementary Chemistry

Applied Chemistry

The chemistry of combustion, fuels, furnaces, artificial lighting, explosives, photography, building materials, water, air, sewage, and chemical manufacture.

Laboratory work including technical analysis, the analysis of food, water and air, and toxicology.

Now if you were a student after the turn of the century

As we mentioned before there were only one or two students in analytical and applied chemistry before the turn of the century. Suppose you had been born 25 years later and you are an undegraduate taking this course starting in 1903. There have been some major changes in the constitution of S.P.S. in the period since its founding. In 1889 the professors who had been shared with University College were pretty well divorced from S.P.S. Galbraith had become Principal of the School and its first council had been set up. W. H. Ellis had become Professor of Applied Chemistry. In 1892 the B.A.Sc. degree was granted by the University; this required an additional year of study beyond the three years for the certificate.

In addition to Professor Ellis, A. P. Coleman was Professor of Assaying and Metallurgy and Professor Pike was also on the council. Among the early staff a man whose career we wish to follow is J. W. Bain. He had graduated from mining in 1896 and obtained his B.A.Sc. in 1897. The following year he had been appointed a Fellow in Mining Engineering and by 1902 was a lecturer.

As you start in 1903 E. G. R. Ardagh has just been appointed a teaching Fellow and M. C. Boswell a lecture assistant. For the session 1903-04 there were less than three hundred students in S.P.S. 95 first year, 106 second, 66 third and 22 in the B.A.Sc. year. In all of these years there are only 6 students in analytical and applied chemistry!

In spite of the rather small number of students, only two years later a separate department of chemical engineering was established – the first in any Canadian university. In the Calendars of the time we read that Department 5, Analytical and Applied Chemistry, was "designed to furnish instruction suitable for those students who intend to practice chemistry as a profession, either as analysts or as works chemists", while Department 6 was designed to fill the want of the "many industries where there is a demand for a man who combines the technical knowledge of the mechanical engineer with a knowledge of chemistry".

As a student starting in 1903 you would have moved to the new Chemistry and Mining Building which was opened in the session 1904-05. As so many of us probably remember the chemical laboratories were situated in the western end of this building on the first and second floors. Initially the assaying laboratories were in the basement along with the electrochemistry laboratories. Soon after, assay-

W. H. Ellis, founder, applied chemistry and chemical engineering department.

J. Watson Bain, head, department of chemical engineering, 1919-46.

R. R. McLaughlin, head, department of chemical engineering and dean, applied science and engineering.

ing was moved to the mill building.

In your graduating year the School of Practical Science became the Faculty of Applied Science and Engineering.

As a recent graduate before World War I you are probably following the course of the new faculty and specially of chemical engineering. In 1909 L. J. Rogers joined the staff as a Fellow in chemistry and began his long association with the department as a teacher of analytical chemistry and as a boiler of stomachs and other vital organs in connection with his work with city and provincial police departments. We meet other familiar names: C. R. Young is a lecturer in civil engineering, I. R. Pounder a Fellow in mathematics. By 1914 Ardagh and Boswell are both assistant professors and the triumvirate of Bain, Boswell and Ardagh who are to guide the department for so many years is well established. By this time there are about 40 students in all four years of the two departments, with rather more than half in chemical engineering.

In 1914 Galbraith, who had become dean of engineering in 1906, passed away after his long service in the school. He was succeeded during the war years by Ellis in spite of the latter's desire to retire. Dean Ellis retired in 1918 and died shortly after. He was succeeded by Brig. General Mitchell.

A student in the twenties

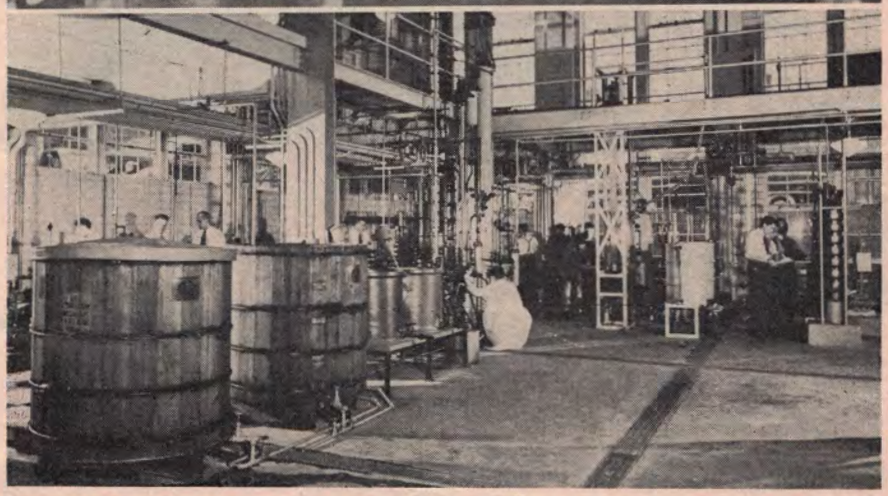
Suppose now you are a student in chemical engineering in the twenties. After 1921 you will find that course 5 has been discontinued, or rather absorbed in chemical engineering which becomes chemical engineering and applied chemistry. During the twenties and thirties the emphasis in the course was on applied chemistry and there was only a gradual change toward inclusion of unit operations and chemical engineering thermodynamics.

In the 20s we meet some new staff. R. R. McLaughlin received his B.A.Sc. in 1922 and early in his career as a graduate student, showed himself to be a man who would rise to great heights. This he demonstrated by walking agilely along the third floor window ledge of the Mining Building when once locked out of his laboratory. Next time you pass this building look up and ask if you would take the same chance.

E. A. Smith came in 1925 to do a master's thesis and remained on the staff. We may think that the students of today are sometimes, shall we say, impolite. One of the staff in this department was once hit on the back of the neck with a wet towel as he left a lecture to 3rd year miners. He promptly gave the course to "E.A." who reports that he had no trouble with the class but always walked out backward.

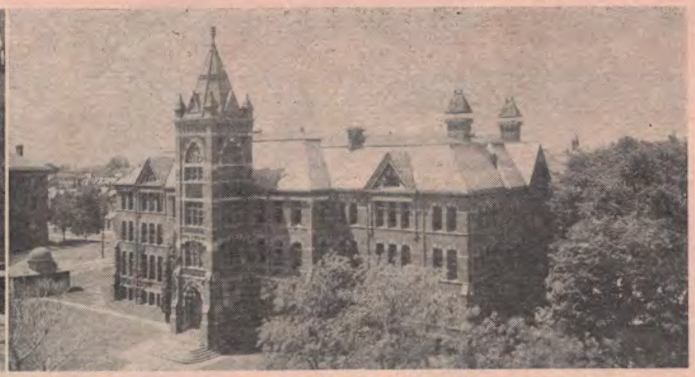
In the 30s we see more of the present staff appearing. R. R. McLaughlin became assistant professor in 1931 and W. C. Macdonald, J. G. Breckenridge, and W. H. Rapson were all demonstrators during these years. We might point out that between the wars, chemical engineering was consistently the largest of the engineering departments.

To end our period in the Mining Building we might move into the early 40s when Graydon and MacElhinney also appear as staff.



Top—A chemistry laboratory of the 1890's in the red brick engineering building. Centre—A chemistry laboratory in the Chemistry and Mining Building, taken about 1910. Professor Boswell is second from the left. Bottom—The present chemical engineering laboratory at the University of Toronto.

The Chemistry and Mining Building of the University of Toronto which was first opened for the session 1904-05.



The Engineering or "Skule" Building; the chemistry laboratories were located on the second floor at the right end of the building; this photograph was taken about 1910.

The Wallberg Memorial Building which houses chemical engineering department at the far end and the department of chemistry (near end).

The final student I would have you be starts his undergraduate work in 1946, perhaps as one of the thousands of servicemen on the campus, or rather on the Ajax extension of the campus. For these are the days when an engineering student must take the work of his first two years at the Shell filling plant at Ajax, 25 miles east of Toronto. Later on, back at the university, laboratories are run in shifts and lectures are often held in Convocation Hall.

This period sees the start of the very large expansion of the physical plant on the campus, an expansion which is still in progress. We are mainly interested in the erection of the Wallberg Building to house chemical engineering and chemistry – officially opened in 1949. This magnificent building, shared by chemistry and chemical engineering, was the result of a bequest to the University by Emil and Ida Marie Wallberg. The chemical engineering department occupies roughly three-fifths of the 150,000 square feet on four floors of this building. It is hoped that readers who have not visited these facilities will do so whenever it is convenient for them.

Professors Bain and Boswell retired in 1946 and R. R. McLaughlin became Head of the Department. This final era has seen an influx of many new staff (to a total of 13 at the writing of this article), many with some or all of their training in other schools. There have been many changes in the teaching with these new faces.

As a student finishing in 1950 you are more likely to have taken graduate work in chemical engineering. Since the twenties graduate study in the department has been a distinct feature. Until the late 40s the research was primarily in the field of organic chemistry. At the moment there are perhaps 4 or 5 times as many graduate students (a total of about 40) mainly engaged in physical chemistry and the unit operations.

The Industrial Chemistry Club

As a student at any time since 1909 you were automatically a member of the Industrial Chemistry (or more recently, the Chemical Engineering) Club. It was formed "to promote the study of industrial chemistry and chemical engineering." Illustrated lectures, preceded by an informal dinner and short musical program, with, no doubt, Toike Oike, were planned fortnightly, followed on the next day by excursions to local chemical concerns. Through the years this club has remained one of the most active in the Engineering Society, balancing the study program of the undergraduate with a social one that is most essential for a well rounded university training.

No story of the department would be complete without mentioning our oldest staff member, Art Hunt, the glassblowing philosopher. He shares the respect and affection that all of us feel for our former staff, a feeling which we can feel under the lines of this little verse.

"It's never too late to mend" (though
it may be too late for us)
Is the motto in room 47, as we
tramp up and down and cuss,
While Harold and Colin and Mac
and Ardagh and Smith and Bain
Await the start of the glass blower's
Art and the oxy-acetylene flame.
and the author of that – R.R., of course.★

NOTE TO PHYSICAL CHEMISTS

Plan now to attend the Symposium entitled "Mass Spectrometry in Chemistry", sponsored by the Physical Chemistry Subject Division of the C.I.C. H. G. Thode is chairman of this meeting which will be held at McMaster University, Hamilton, Ont. on August 30 and September 1, 1959.