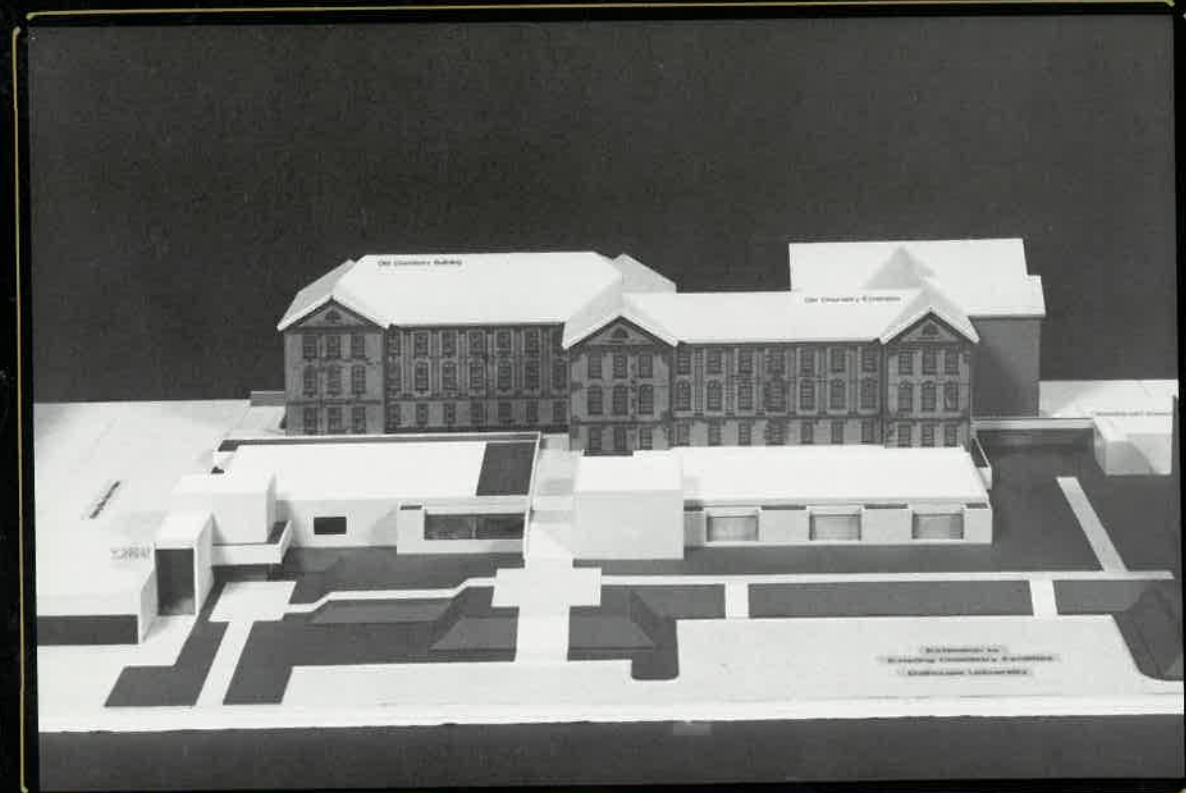




Old Dalhousie College  
Circa 1820

## Chemistry at Dalhousie



Model of Extension to Chemistry Building  
Circa 1986

by Walter J. Chute

**Chemistry at Dalhousie**

by

**Walter J. Chute**

**PROFESSOR EMERITUS  
DEPARTMENT OF CHEMISTRY  
DALHOUSIE UNIVERSITY**

Foreward

This is not a history, a chronicle perhaps, but more of a catalogue of people and events associated with Chemistry at Dalhousie. It would seem that the Department evolved as everything else in these Maritime provinces. The first professor of Chemistry, a Scot, came from overseas. He was followed by a succession of sons of Nova Scotia or New Brunswick, with one exception, a New Englander who through some form of reciprocity headed the Department when most Nova Scotians were going to the Boston States. Only in the most recent decades has Chemistry at Dalhousie taken on international stature.

The earlier edition of this work was designed to answer the occasional query about, 'who what and when'. That it occasionally served such purpose is the excuse for this up-dating.

It is obvious that the number of people who have worked at Chemistry in Dalhousie during the past quarter century greatly exceeds the total of those who were involved in the first century. Possibly from the vantage point of another hundred years a history can be written.

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IN THE BEGINNING  
GEORGE LAWSON - First Professor of Chemistry  
(1863-1895)

Dalhousie College was proposed by the ninth Earl of Dalhousie in a letter dated December 14th, 1817, which suggested that funds to the value of 9,750 to be used for the "founding of a college or academy on the same plan and principle as that of Edinburgh", "open to all occupations and sects of religion, restricted to such branches only as are applicable to our present state, and having the power to expand with the growth and improvement of our society". The college was to provide "for the education of youth in the higher branches of sciences and literature".

In January 1821 an "Act to incorporate the Governors of Dalhousie College at Halifax" became law. A college building had been commenced on the present site of City Hall in 1819, the cornerstone was laid on the 22nd May in 1820.

Years were to elapse before Dalhousie could offer the education in the "higher branches of science". A brochure from the University of Edinburgh dated 1817 lists Playfair as Professor of Natural Philosophy, Jamieson as Professor of Natural History and Dr. Hope as Professor of Chemistry and Chemical Pharmacy. It may be significant that Hope was on the staff of the Medical School. But Dalhousie could not make a beginning in either science or literature. Denominational rivalry and lack of funds were significant but no one strongly willed that the institution should make a beginning. In 1838 lectures started with the Rev. Thomas McCulloch, D.D., formerly Principal of Pictou Academy, as President. Early, tentative, lists show positions for five professors, including one in Chemistry and Natural History. Exigencies removed chemistry and the closest offering was from one of the three original professors, with

6.

Rev. James MacIntosh giving mathematics and natural philosophy. Dr. McCulloch had respect for science as a discipline. His own interests lay in Natural History and he campaigned for a museum to illustrate the biology and geology of the region. There is evidence of a later date that a "cabinet of philosophical apparatus" had come to Dalhousie from Pictou Academy. Certainly the Academy at Pictou and the Pictou Literary and Scientific Society had between them, in 1834-55, apparatus to provide demonstration lectures on the alkalis, alkaline earths, gases and the oxyhydrogen blowpipe, the argand lamp and a variety of demonstrations based upon a "galvanic apparatus" and an air pump. However, in both 1839 and 1840 the President and Professors of Dalhousie College joined in "respectfully reminding the Governors" that "wherever Natural Philosophy is advantageously taught its doctrines are illustrated by experiments which can be performed only by means of apparatus. In this Dalhousie College is yet vastly deficient".

In 1842 Professor MacIntosh reported to the Board of Governors that his second class "were in the present instructed in the Higher branches of Mathematics, Natural Philosophy and also Chemistry, a Science I consider necessary to include in a Course of Lectures on Physical Science". These were "illustrated by experiments so far as the limited apparatus of the College and that belonging to the Mechanics' Institute would admit". The text in Chemistry was that of Dr. Reid of Edinburgh, while he also used Playfair's Outlines for Natural Philosophy. Edinburgh's influence was being felt. It is needless to say that MacIntosh's lectures did not produce specialist graduates in chemistry. The College building had no particular facility for chemistry unless it was the vats that frothed in the part of the basement rented by a brewer. There is no account of a Joule or a Pasteur inspired by the conjunction.

7.

In September, 1843 Dr. McCulloch died. It was a bad year for Dalhousie. The new staff member in modern languages "cut his own throat on the beach of the North West Arm just four days before the opening of college". MacIntosh departed in the summer of 1844 for Scotland and while Thomas McCulloch, the son of the late President, took up MacIntosh's classes, the college closed in 1845.

From 1849 to 1859 the college funds were used to support a high school. In one year, (1856-7) a collegiate class was formed but did not continue.

In 1863 the College was reorganized under an Act which established a new Board of Governors. Sir William Young, who was Chairman of the Board for more than forty years, continued an enthusiasm for the growth and success of the College. The benefactions of Young, and later Munro and McLeod, placed the work of the College on a secure foundation.

Teaching began again in November of 1863 with six professors and sixty students. The Rev. James Ross, D.D., was President.

#### George Lawson - First Professor of Chemistry

Among the six staff members was the first professor of chemistry. An advertisement had appeared on August 6, 1863 in Toronto papers and those of St. John and the P.E.I. 'Islander' to the effect that the Board of Governors of Dalhousie College, "will receive applications until Tuesday, 15th of September next from those desirous of being appointed to the Professorships of Classics and Chemistry at Dalhousie College. Salaries for each professor to be 300 currency with fees." Eleven applications were received for the chair in chemistry. The Board may have had a difficult choice. One of the applicants was Dr. Abraham Gesner who was well known in the province for his studies and publications on the geology and mineralogy of Nova Scotia. He had also performed research of lasting value on the distillation of coal and petroleum.

A second man was willing to undertake chemistry but also geology, both theoretical and practical and mineralogy; he was willing to take charge of the Classical Department and, if desirable, would undertake a chair in Languages and Literature. Despite the opportunities available, the Board, on the nomination of Mr. J. W. Ritchie, seconded by Dr. (Sir) Charles Tupper, chose unanimously to appoint George Lawson, Ph.D., LL.D. The offer was conveyed to Dr. Lawson who was then on the staff of Queen's University, Kingston. He accepted on the 19th of October and promised to take up duties in Halifax about the middle of November!

Lawson was then 36 years of age. He was to discharge the duties of the Professorship of Chemistry at Dalhousie for thirty-two years. Lawson was born in Fifeshire, Scotland, on October 12, 1827. He had studied at Edinburgh and held posts there as demonstrator and lecturer in botany and natural science. His Ph.D. was obtained from Giessen. In 1858 he had come to Queen's as professor of Chemistry and Natural History. While at Queen's he started the Botanical Society of Canada. McGill University had "spontaneously conferred upon" him the degree of L.L.D. His reason for leaving Queen's are indicated in his application; "were it not that the affairs of the University of Queen's College have recently taken a turn which may produce much discomfort to Professors who are fonder of scientific and literary research than of angry discussions", he would not have removed.

It is a debatable point whether Lawson was the first professor of Chemistry, without entanglement with natural science, to be appointed in Canada. Lawson's appointment pre-dated the David J. Greenshields Professorship of Chemistry at McGill (1883). Henry H. Croft had, however, been installed in Toronto in 1843. His wizard's kitchen laboratory was occupied in 1859. Whether he taught chemistry alone is of little moment since Lawson, though appointed to

teach Chemistry, soon began lectures in botany which he continued throughout his years at Dalhousie and, at times, he offered a class in mineralogy.

The Faculty of Medicine at Dalhousie was organized in 1868 and merged into the Halifax Medical College in 1875. It is interesting to note that Dr. Charles Tupper, who was active in the organizing of the Medical Faculty, should be one of Lawson's sponsors. The calendar of 1868-9 shows Lawson to be lecturer in chemistry to the Faculty of Medicine. He was to continue as the only non-medical teaching staff. President Ross held ex-officio membership in the Faculty.

It has been said that Lawson was, for a period of time, Dean of the Medical School. Such designation is dubious. Medical education in Halifax commenced with a Faculty of Medicine of Dalhousie College in 1868. In 1874-95 this became, through incorporation, the Halifax School of Medicine which for some time was affiliated with the short lived University of Halifax. Lawson continued as the extra-mural professor of chemistry. At times, others taught the classes in practical chemistry and botany. The Halifax School of Medicine issued its own calendars and for years listed A. P. Reid and others as Dean.

Whether in anticipation of the return of medical education to Dalhousie in 1911, the Dalhousie Calendar re-introduced a Faculty of Medicine listing in 1885-86. Lawson was the only Dalhousie staff member but at times some of the Halifax School of Medicine, medical instructors were mentioned. The Dalhousie Faculty of Medicine gave George Lawson as professor in 1894-96 but also listed him as Dean. This continued until 1896-97 when Lawson had died. Throughout these years the Halifax School of Medicine Calendar provided Dr. George L. Sinclair and later Dr. John F. Black as Dean. Lawson's listing as Dean under Dalhousie's Faculty of Medicine is an anomaly. Perhaps he performed some liaison function between his teaching and the School of Medicine. The

minutes of the Board of Governors at Dalhousie do not mention Lawson's elevation to Dean.

Lawson took up his duties in the college building on the Grand Parade. He offered elementary chemistry, based upon a text by Macadam, to the third year students and a fourth year class based upon Fowne's Chemistry with Fresenius' Qualitative and Quantitative Analysis. He also offered mineralogy and geology based upon Nichol's or Dana's Mineralogy and Dawson's Acadian Geology. He regularly gave chemistry in a winter term extending from October 23 to April 22 and mineralogy in a summer session from April 27 to June 24. Both of the junior and senior classes had 8-14 students. In 1868-69 Medicine provided 14 additional students.

In 1868-69 a Mr. Grant offered a prize of \$20.00 to the student from the years 1867-69 for the best essay on "The Origin, Development and Comparative Merits of Modern Chemical Theories with Special Reference to the Educational value of Chemistry as an Unapplied Science". The prize was won by Herbert A. Bayne. Bayne graduated B.A. in 1868. He received an M.A. in 1872 and later the Ph.D, though the university which awarded it cannot be ascertained. Bayne returned to Dalhousie in 1877-79 to assist Lawson. He was the only assistant Lawson had in his long career. Bayne left to become Professor of Chemistry at the Royal Military College, Kingston, where he gave exemplary service. He died in 1886, "allegedly of overwork".

As the years passed there were gradual changes in the class offerings. The second class retained part of the qualitative inorganic analysis but took on organic chemistry. A third class in Practical and Analytical Chemistry appeared. The medical chemistry included chemical toxicology.

Tradition was being established. A section of the Chemistry 110 class of 1985 still occupies the time-table slot used by Lawson. So, too, the

organic classes of the second year.

The calendar of 1871-72 advised of the formation of Honours courses for the B.A. Chemistry was not among the offerings. A B.A. with Honours in Mathematics and Physics was awarded in 1873.

A Bachelor of Science course appeared about this time. Its requirements beyond specialization in Physics, Mathematics and Chemistry seemed to rest upon the avoidance of matriculation in Greek. Few were enrolled for the course and reference to the offering disappeared for some years.

It is apparent that only a fraction of the students taking classes in chemistry had laboratory experience. The general B.A. student avoided the laboratory for many years. Appeals were regularly made to the board of governors for funds to improve the laboratory facility. Lawson had \$100 in 1876 and \$60.00 in 1886 to provide chemicals and equipment. Students were expected to supply many of their own materials which included test tubes, salts of silver, gold and platinum. Years later the students were expected to provide their own alcohol and ether. In 1878-79, however, an "extended course in science instruction" was established at Dalhousie College. The governors, with Sir William Young leading the list, collected \$2,500 to purchase new apparatus. It was selected, "chiefly in Paris and Berlin" by Dr. J. J. Mackenzie, professor elect in Natural Philosophy (Physics). The new equipment was sorely needed. Lawson and Mackenzie had just taken stock of the cabinet of "philosophical apparatus" that had come from Pictou Academy. Although the Presbyterians were still expecting a credit of \$99.28 per year as interest on the value of this equipment, MacKenzie reported to the Governors that it "could not sell for \$20.00".

The "extended course in science instruction" was provided by Lawson, who was listed as professor of inorganic chemistry and biological Science; together



with Herbert A. Bayne, M.A., Ph.D., an old student of Lawson's, now appearing as professor of organic chemistry and chemical analysis. Mathematics was taught by Principal Ross and Professor Macdonald. J. J. MacKenzie, M.A., Ph.D., was professor of experimental and mathematical physics. A further addition was made with the Rev. D. Honeyman, D.C.L., as professor of geology, paleontology and mineralogy. Laboratories were fitted up for physics, inorganic and organic chemistry and natural science.

Difficulties arose again. Dr. MacKenzie died in 1879 at the age of 33. Bayne remained at Dalhousie for only two years. But succour was at hand. The Munro benefactions had commenced. Dr. J. G. MacGregor, M.A., D.Sc., F.R.S.E., was appointed Munro Professor of Physics.

With the departure of Bayne, Lawson had to re-trench in class offerings. He gave theoretical inorganic lectures to 2nd year Arts and first year Science. Organic chemistry was available to second year Science. Those in medical chemistry received both inorganic and organic chemistry. Some of these lectures were shared with Arts and Science. Practical chemistry included qualitative and quantitative analysis. The student numbers were not large. The first class in chemistry had in 1882-3 a total of 21. The organic chemistry had 3. The chemical laboratory attracted 5. Lawson also taught botany to 2 students.

An honours course in Physics and Chemistry first appeared in 1881-82.

In 1883 Lawson had become the first MacLeod professor of Chemistry. He was one of the original Fellows of the Royal Society of Canada and the President of the Geological and Biological Section in 1883.

The year 1881 saw the admission of women students to the college. As time passed more names of women appeared in the lists of the first chemistry class. In the class of 1885-86, Belle C. Crowe was a member along with twenty-four others. It does not seem she took a second class. When Miss Crowe died in 1925

she bequeathed \$10,000 to the University in support of a Fellowship in inorganic chemistry.

The college had grown slowly. In 1886-7 there were only 128 students in Arts and Science. But new space and facilities were needed for the future. In 1887 the cornerstone of the Forrest Building was laid by Sir William Young who contributed generously to the construction. Classes began in the building in 1888.

According to the instructions to the architect the Chemistry Department was to have a laboratory on the second floor of about 1200 sq. ft. with a classroom adjacent of about 750 sq. ft. There were also two small rooms of 150 sq. ft. each. Provision was made for a fume closet though, oddly, the fittings were to be of zinc. Water and drain lines were lead. The laboratory was lit by gas and provision was made for gas lines to burners. Some years later the entire building was wired (1898) for electric lighting at a quoted price of \$265.00! Apparently the architect followed the directions, since from this time "the Chemistry Laboratory is very large and airy and is so arranged that every student has a separate set of reagents and as much desk and table room as he can possibly use. There is a separate Balance Room and "Stink Closet". The same laboratory is reported over successive years to house from 64 to 80, and eventually 100 students. A quantitative laboratory for 16 students was provided at a later date. The calendar of 1891-92 advertised the beginning of a Faculty of Pure and Applied Science. This heralded the teaching of engineering classes. A Master of Science course was offered on terms which were close to those of the M.A. A special course in physics and physical chemistry appeared in 1893. It was based upon Ostwald's Outline of General Chemistry. Since Dr. MacGregor of Physics was publishing a series of papers on conductivities of aqueous solutions, one could speculate that he was involved in this class.

14.

Professor Lawson died November 10th, 1895. He had taught chemistry and botany at Dalhousie for thirty-two years. He had been curator of the museum and secretary of Senate. His activities had extended beyond the college. For a few years after 1877 he had been President of a Technological Institute which offered lecture courses applicable to various mechanical, agricultural, mining and chemical industries. Sir William Young was its patron. From 1864-85 he was secretary to the Board of Agriculture in the province and edited its publication. From 1885 he was Secretary of Agriculture for the province of Nova Scotia. For some time he conducted a model farm at Sackville, N.S. Lawson initiated chemistry at Dalhousie. In probability he was at heart a botanist. In his life span he published 93 articles on botany, 4 on zoology, 5 on chemistry and 5 on miscellaneous subjects.

An extensive and well documented biography of George Lawson as a botanist appears in 'L'Oublie de l'Histoire de la Science Canadienne - George Lawson, 1827-1895 by Jacques Rousseau, M.S.R.C., et. William G. Dore in Pioneers of Canadian Science, A Symposium presented to the Royal Society of Canada in 1964. (University of Toronto Press (1966)). While illuminating Lawson's work with botany, it provides little further insight into his teaching of Chemistry.



George Lawson  
1863-1895  
First Professor  
of Chemistry



Ebenezer MacKay  
1896-1920  
Second Professor  
of Chemistry

## EBENEZER MACKAY - The Second Professor

(1896-1920)

W. J. Karlake, Ph.D. (J.H.U.) was appointed lecturer in chemistry to complete the 1895-96 term. During the year Ebenezer MacKay, B.A. (Dalhousie 1886), Ph.D. (Johns Hopkins) was appointed MacLeod Professor of Chemistry and Mineralogy. The class offerings did not change materially. Remsen's "Introduction to the Study of Chemistry" and the same author's "Compounds of Carbon" became the texts. Advanced classes were offered in Methods of Quantitative Analysis and History of Chemical Theory. The quantitative analyses could be selective so as to specialize in assaying, analyses of foods, and poisons, or of soils, or potable waters, or gases.

The year 1898 saw the award of the first M.Sc. to Ebenezer H. Archibald. Archibald had done research on conductivity with MacGregor in Physics. He was the third student to be awarded an 1851 Exhibition scholarship. He proceeded to Harvard under Richards where he proved to be a better chemist than a theoretical physicist. He published on the determination of the atomic weight of caesium. Later with Douglas McIntosh who was the second 1851 scholar, he made up the initial chemistry department of the University of British Columbia. He was head of that Department from 1920-27.

The award of 1851 scholarships to Dalhousie students was of considerable importance. As MacGregor wrote in 1898, "before the nomination of a candidate for the scholarship was entrusted to the Senate of this College, it very rarely happened that a student gave any large amount of time to research, and the publication by a student of experimental results was unknown". Although the first scholars under the 1851 tended to do their major work with Physics, many turned to chemical physics or physical chemistry in their subsequent studies. The number included Archibald, D. McIntosh, W. H. Ross, G. M. J. MacKay and H.

Jermain Creighton.

Lack of equipment and supplies was a perennial. In 1898 MacKay reported on the lack of apparatus and reference books. "When MacKay arrived at Dalhousie to take charge of Chemistry he was greatly dismayed to find the complete stocks of apparatus could be listed on a single, small sheet of paper". He needed at least \$1,450, "to bring the present equipment up to a satisfactory standard ... to carry out the ordinary college work". He, himself subscribed to the *Zeitschrift fur Physikalische Chemie* and the *Berichte*. His journals are foundations for the current holdings of the chemistry library.

Although an Honours course in Physics and Chemistry had existed for a considerable number of years, the first graduate from the course appears to have been Elizabeth H. Stewart of the class of 1900. L. M. Alexander was the second in 1901.

The total enrollment in the Faculty of Pure and Applied Science had reached only 36 in 1902, but the numbers in chemistry classes had increased. Arts students had a requirement for one class in either Physics or Chemistry. For the year 1905-06, MacKay offered Chemistry 1 which had 31 in Arts and Science, 8 in Engineering and 10 in Medicine. Chemistry 2, which was the organic chemistry at the second year level, had only 2 students, but Chemistry 3 which had much of the content of Chemistry 2 for medical students, numbered 8. Chemistry 4, a second class for engineering students had 4 members. The advanced classes were: Chemistry 5 on Historical Chemistry and Special Topics; Chemistry 6 on Practical Inorganic. In the 1907-08 term this became Physical Chemistry of solutions, thermochemistry, electrochemistry and chemical dynamics, Chemistry 7 on Practical Organic; Chemistry 8 which was an original research project or more advanced work from Chemistry 6 or 7.

In 1906 the pure science part of the Faculty of Pure and Applied Science

reverted to the Faculty of Arts and Science. This change was, no doubt, connected with the expectation that the Nova Scotia Technical College would take over the education of engineers in September, 1909.

The first class in chemistry had now expanded to overflow the chemistry classroom. The Arts and Science registration was 253. Since 1906, candidates for Masters degrees had served as demonstrators. In 1907-08 G. M. J. MacKay, M.A., Dalhousie, had served as an instructor. He departed to take up a position in industry. C. B. Nickerson, B.A., A.M. (1907) Clarke University, was then appointed instructor to undertake duties in September, 1908. Nickerson had been a research assistant in analytical chemistry at M.I.T.

In the academic year 1908-09 the chemistry laboratory did service for 102 students. Laboratory fees provided \$520.00 while breakage charges amounted to \$536.46. Expenditures on apparatus and chemicals were \$975.64. A new balance cost \$175.13.

An anecdote from the memory of James (Jimmie) Sykes, a long time general factotum at Dalhousie, (Sykes managed the boiler room, grounds and much else at Dalhousie for many years), illustrated life in the Forrest Building while MacKay and President, (Lord John), Forrest shared that space.

This episode in the life of 'the little college' took place in the late fall of the year that C. B. Nickerson and the, to be, Honourable C. D. Howe, both Americans, joined the staff. The two men met in the hall of the Forrest Building to discuss their current feelings about Dalhousie. Both were approaching the day of no meals. It happened that 'Lord John' came along and enquired about their well being. Rather gently they suggested they would be happier if they were paid. President Forrest reached into his right back pocket to withdraw a roll of bills but rapidly replaced it saying "That's the Law budget". From his left front pockets emerged the Arts and Science budget and

the two were paid their due. Nickerson remained to become Head of the Chemistry Department. C. D. Howe departed to larger challenges and, long after, the Chancellorship of the University.

The year 1911 saw the retirement of President Forrest and the installation of A. Stanley Mackenzie as President. In the same year the Nova Scotia College of Pharmacy was begun. In 1917, with the cooperation of the New Brunswick Pharmaceutical Society the name was changed to the Maritime College of Pharmacy. Classes were given to pharmacy students by Arts and Science staff. A class in pharmaceutical chemistry was listed. It provided, in one year, aspects of general and organic chemistry.

The term of 1911-12 saw H. Jermain M. Creighton return to Dalhousie. He had completed the M.A. in Chemistry in 1907 and proceeded in 1908 to Birmingham under Professor Findlay on an 1851 scholarship. He obtained the M.S. from Birmingham in 1909, went to Heidelberg for 1909-10, and completed work for the Dr. Sc. at Zurich in 1911. In the term of 1911-12 he "gave his valuable service gratis during the year as Lecturer in Physical Chemistry. His course was highly successful". There were four students in his class. In 1912 he went to Swarthmore College, Pa. Here he remained to become professor in 1928. He retired in 1952. Dr. Creighton made many significant contributions to electrochemistry. He was given the L.L.D. by Dalhousie in 1948 and the Sc.D. from Swarthmore in 1957. Dr. Creighton spent much of his retirement at Glen Margaret, Halifax Co., though income from his patents and electrochemical processes, notably the electrochemical reduction of glucose to sorbitol, enabled him to be a world traveller in winter months. He was a regular visitor at the Chemistry Department. Here he donated valuable files of journals on electrochemical subjects. He died April 4th, 1975.

Dalhousie was now ready for expansion to the Studley campus. The

cornerstone of the Science Building was laid on August 15, 1912. Construction was slowed by the war. The summer of 1915 was taken up with the move of science laboratories. In the words of President MacKenzie, "The new Science Building is designed to be ultimately a chemical laboratory only, but for a number of years it will be divided between the departments of Chemistry and Physics. For a short time it will house also the Departments of Geology and Engineering". These few years were to continue through the nineteen-forties and fifties.

The original space allotment for Chemistry contained two lecture rooms seating 175 and 60 students respectively. There was a general laboratory for 120 students. A laboratory for qualitative analysis was suited to 60. There were specialized laboratories for organic, quantitative analytical and physical chemistry. Additional space provided the Professor's study, two private laboratories, two rooms for research, balance rooms, a departmental library, H<sub>2</sub>S room and photographic darkroom.

The 1915-16 calendar offered a B.Sc. with Honours in Chemistry. Previous honours degrees had been given with Honours in Chemistry and Physics.

Although science departments had new and enlarged work space the numbers of students were in sharp decline. Many men were in the services and women were in the majority in the lecture halls.

The explosion of December 6th, 1917, wrecked havoc about the university. Practically all the glass, except a few panes on the South side of the buildings, was broken. Though classes were in session only one student lost an eye and very few were severely cut. Students and staff went to work boarding up windows to keep out snow and to preserve the heating system and plumbing. All windows were closed by December 11th. Little damage was done to apparatus but some books suffered. The Carnegie Corporation advised that they would "consider it a privilege to pay for all damage to all buildings". It was months before

all sashes were replaced but the university was able to open again on January 3rd.

The year 1918-19 saw the return of the veterans. Student numbers nearly doubled.

On January 6, 1920, Professor Ebenezer MacKay died of pneumonia. C. B. Nickerson became associate professor and acting head of the Department. He was aided in the completion of the term by Mr. H. B. Vickery, B.Sc., of the Truro Normal College and Mr. G. F. Murphy, B. Eng. (1908) of the Nova Scotia Technical College.

Eben MacKay had been born in Plainfield, Pictou County in 1864. He was educated at Pictou Academy and Dalhousie where he obtained the B.A. with First Class Honours in Experimental Physics and Chemistry and a gold medal. He was principal of the New Glasgow High School before proceeding to Johns Hopkins where he received the Ph.D. in 1896. He also spent some time in the graduate school at Harvard. He was appointed to the Chair of Chemistry at Dalhousie in 1896. The Dalhousie Gazette of March 24, 1920 is entirely a memorial to Dr. MacKay.

As President MacKenzie stated: Do MacKay was "a man of inflexible discipline but unswerving justice".

Archibald MacMechan dedicated, "The Life of a Little College" to "Doctor Eben MacKay". MacMechan says "Still one hint I will hazard. Had Bunyan known you, he could have added some finer touches to his portrait of Faithful".

For the year 1920-21, Mr. R. C. Easson, M.A. (Queens) was added as a lecturer. Ebenezer Walter Todd was appointed demonstrator. Todd had arrived in Halifax during 1919. Apparently he and his sister, Mabel Vernon Todd, were proteges of H. L. Stewart, Professor of Philosophy. All three had connections with Belfast. Todd took up classes in Physics, Geology and Mathematics which, with matriculation and class credits from Queens College, Belfast, resulted in a

Dalhousie B.A. granted October 14, 1920. Todd had but one class in chemistry. Later he was enrolled as proceeding to a master's degree in chemistry but does not appear to have completed. Todd became instructor in chemistry, a post he held for nearly twenty years. Legend granted him peculiarities but following his death in 1944 the Dalhousie Gazette of February 25, 1944 said "whose philosophy of life and spirit endeared him to all who knew him". His sister, Miss Mabel V. Todd, at her death bequeathed the sum of \$4,500 to support the E. Walter Todd Scholarship in Chemistry. The terms of the bequest required that the recipient of the scholarship "be given a suitably bound and inscribed volume". The volume has been a current edition of the "Handbook of Chemistry and Physics" with a special bookplate.

In the next year W. A. Peck, B.A. (Colgate) replaced R. C. Easson. In 1923, H. S. King, A.B. (Harvard) was appointed Assistant Professor and took the place of Peck. King obtained the Ph.D. from Harvard in 1928. He was to teach organic chemistry at Dalhousie for nearly twenty years.

DOUGLAS MCINTOSH - The Third Professor  
and first Research Professor (1923-30)

In May 1923, A. Douglas McIntosh, B.A. (1896), B.Sc. (Dalhousie), A.M. (Cornell), M.Sc. and D.Sc. (McGill) was appointed Research Professor and Head of Department. It was said that McIntosh was Ebenezer MacKay's greatest discovery when he taught school in New Glasgow.

Dr. McIntosh had been a demonstrator at McGill in 1900 and within eight years was the MacDonald professor in Physical Chemistry. He resigned in 1915 to become the first head of the Department of Chemistry at the University of British Columbia. Here his colleague was E. H. Archibald, M.Sc. (Dalhousie), Ph.D. (Harvard). It does not seem that the fledgeling department at U.B.C. gave McIntosh much satisfaction, for as he wrote to President MacKenzie, "I am so disgusted with the past few years that I will go into grave digging or other honest employment rather than a university". Dr. McIntosh had taken up industrial research in the United States and resisted blandishments from MacKenzie for several years. It seems probably that McIntosh was induced to come to Dalhousie through a promise to some members of the Board of Governors from the president of the British Empire Steel Corporation, sited at Sydney, N.S., of \$250,000 for the support of research in Chemistry and Geology. Dr. McIntosh was also much interested in proposals of the day which would have united the several small colleges in the Maritimes into one major University. Dr. McIntosh was induced to take up appointment at Dalhousie as a Research Professor. B.E.S.C.O. fell upon hard times, (when was this not true of the Sydney steel plant). It seems probably that the Corporation did supply monies to support salary for Dr. McIntosh in some years but the amalgamation of the colleges did not come about.

The Chemistry Department now consisted of Dr. McIntosh, Professor C. B.

Nickerson, who was raised to professorial rank; H. S. King and E. W. Todd. The Department would not increase in numbers until after the arrival of the veterans of 1946.

In 1923-24 the classes offered were: Chemistry 1A, General Chemistry; Chemistry 1C, Pharmaceutical Chemistry; Chemistry 2, Advanced Inorganic Chemistry and Qualitative Analysis; Chemistry 3A, similar to 2 for medical and dental students; Chemistry 4, Organic Chemistry; Chemistry 5, History of Chemical Theory; Chemistry 6, Physical Chemistry; Chemistry 7, Quantitative Analysis and Inorganic Preparations; Chemistry 8, Organic Preparations and Analyses; Chemistry 9, Food Analyses; Chemistry 10, Research. This was a class format which was to continue, with minor change, for twenty years.

In 1925-26 H. R. Chipman, B.A. (Dalhousie) 1921, M.A. (Harvard), Ph.D. (McGill) was appointed Teaching Fellow in Chemistry without salary. He joined Dr. McIntosh in a research programme. Later Dr. Chipman was to teach chemistry in the High Schools of Halifax from whence many well-prepared students came to Dalhousie.

In November 1925, Miss Belle C. Crowe of the first-year chemistry class of 1885-6 died. She bequeathed the sum of \$10,000 to come to Dalhousie at the death of her sister, in support of a fellowship in inorganic chemistry. It was not possible to use the income for its original purpose for some years. A decision was reached to apply the money to the support of two scholarships, normally at the third and fourth years of the Honours course.

The 1927-28 calendar no longer showed particular chemistry classes within the Medical Faculty lists. From this time forward, pre-medical and pre-dental students were part of Arts and Science classes. In 1928-29 the staff members of the Chemistry Department were no longer included in the Faculty of Medicine lists.

A course in Fisheries was established in 1928-29. J. H. Mennie; M.A.

(British Columbia); Ph.D. (McGill) of the Fisheries Experimental Station, Halifax, was appointed Associate Professor of Chemistry (Fisheries). Mennie resigned after one year to take a staff appointment at McGill. Although Dr. D. LeB. Cooper, B.Sc. (1926) M.Sc. (1928) (Dalhousie); Ph.D. (McGill) was appointed Lecturer in Chemistry (Fisheries) in 1932, the Chemistry Department had little direct involvement in the programme. A loose connection existed between the Department and the Fisheries Experimental Station for more than a decade by which post-graduate students conducted research for the M.Sc. in Chemistry under the direction of staff at the Fisheries Station.

In 1930 President A. S. MacKenzie resigned. On August 1st, 1931, President Carleton W. Stanley took office.

Professor Douglas McIntosh resigned in 1930 to become director of research at Shawinigan Chemicals. He died November 24, 1952. He bequeathed the sum of \$2,000 to Dalhousie in support of the library holdings in Chemistry. Professor McIntosh's son Robert L. McIntosh took up study at Dalhousie to obtain his B.A. in 1935 and the M.Sc. in Chemistry in 1936. He secured the Ph.D. from McGill in 1939. After working for the National Research Council of Canada for some years he was professor of chemistry at Toronto. In 1961 he became Professor and Chairman of the Chemistry Department at Queens. Latterly he was Dean of the Graduate Faculty. It is believed Dr. R. L. McIntosh has retired and is living in Kingston. Dalhousie had paid its debt for taking Professor Lawson in 1863.

The year 1931 saw the one serious accident in the history of the Chemistry Department. Hugh Graeme Fraser, a student of Honours Chemistry, in his final year, was burned so seriously that he died. Tradition which has been augmented by the account of J. F. Horward, B.Sc. Honours Chemistry (Dalhousie 1932), M.Sc., Ph.D. (McGill), F.C.I.C. in Flashbacks, "Memories of Dalhousie in the 1920's and 1930's", Chemistry in Canada, June 1983, reveals that Fraser was engaged in

warming a Winchester bottle containing pinacol dissolved in benzene. Warming was done with a bare, smoky, Bunsen flame. There was a sharp crack and a sheet of flame. Fraser's clothing was on fire. He ran about, fanning the flames. Horwood and others caught Fraser and put out the fire with their labcoats. He was so severely and extensively burned that he succumbed to septicaemia. His classmates of 1931 endowed the Hugh Graeme Fraser Memorial Prize in Advanced Chemistry. It was first awarded to W. B. Beazely in 1933

In the same series of Flashback Memories, Dr. Horwood pays tribute to Dr. Douglas McIntosh, "One of Canada's most distinguished chemists" who was Head of the Department in Horwood's years as a student. It is such a tribute as any professor of chemistry could envy.

Dr. McIntosh published a substantial series of papers in Chemical journals during his years at Dalhousie.

The Dalhousie Chemistry Club was formed in the session of 1928-29. Dr. D. McIntosh was Honorary President, but all officers were students. Eventually, the Chemistry Club became the Dalhousie Student Chapter of the Chemical Institute of Canada.

The lists of names of officers in the Chemistry Club prompts mention that the number of students with a major emphasis on chemistry in their undergraduate programs had been growing since the coming of Creighton and McIntosh. Relatively few of these undertook the Honours in Chemistry course. Rather more elected to try for the degree of Bachelor with Distinction. Distinction required a higher standard in eight classes and often special projects in the second term of a class. It became commonplace for students to pursue the M.Sc. in Chemistry at Dalhousie or postgraduate study elsewhere following a degree with Distinction. About this time a number of graduates began to secure National Research Council scholarships for further study.



C. B. NICKERSON - The Fourth Professor  
 Acting Head of Department (1920-1923)  
 Head of Department (1930-1940)

Professor C. B. Nickerson, B.A., A.M. (Clarke University) had arrived at the Forrest Building in 1908. His first appointment was as instructor in chemistry. He became assistant professor in 1920, associate professor in 1921, professor in May, 1923, McLeod Professor and Head of the Department of Chemistry in September 1930. He had been Secretary of Senate since 1927.

President MacKenzie prevailed upon him to take up the Deanship of Arts and Science in June 1936. Nickerson seemed somewhat reluctant. Carl Coffin, (see later) referred to him as the 'rural dean' since he regularly left Halifax at the end of term for his summer place in Booth Bay, Maine.

Life was not eventful in chemistry at Dalhousie in Nickerson's day. He published one paper on qualitative inorganic analysis during his 32 years. He died suddenly on December 30, 1940.

Apparently Professor Nickerson had charm and a capacity for friendship. A resolution passed by the Executive of the Board reads:

"His death is a great shock to this University and he will be mourned by a great many friends in Halifax. Dean Nickerson had a great deal of humor and a notable capacity for friendship. His most striking characteristic was his loyalty to Dalhousie University and devotion to all its interests. His death is a great shock to his friends and colleagues, among whom were many members of the Board of Governors".



Douglas McIntosh  
 Head of Department  
 1923-1930  
 First Research Professor



Carleton B. Nickerson  
 Head of Department  
 1930-1940



Carl C. Coffin  
 Head of Department  
 1942-1954  
 Second Research Professor

CARL C. COFFIN - The Fifth Professor  
and a Second Professor of Chemical Research  
Head of Department (1942-1954)

When McIntosh departed in 1930, Carl C. Coffin was appointed lecturer with responsibility for physical chemistry. Upon him descended the mantles of McIntosh and Creighton for chemical research at Dalhousie.

Carl Coffin was a son of the manse. He attended Prince of Wales College and entered Dalhousie University with the first Sir William Young Entrance Scholarship. His last years as an undergraduate coincided with Professor McIntosh. He obtained the B.A. with distinction in 1924, and after two years spent in the research laboratories of Shawinigan Chemicals Ltd. went on to McGill for graduate work. At McGill he held National Research Council Scholarships throughout his course and took his Ph.D. in 1929 under the direction of Professor Otto Maass. The period at McGill was a particularly happy one. Like Maass, Coffin was primarily an experimentalist, and one of great originality and ingenuity. He had a particular flair for doing things with high accuracy in the simplest possible way and with a minimum of equipment.

After McGill, he spent a year at Utrecht with Ernst Cohen on a travelling scholarship. Coffin became an Associate Professor in 1931-32. In 1935 he was elected a member of the Royal Society of Canada at the unusually early age of 32.

At the death of Professor Nickerson in 1940, Dr. Coffin was made acting head of the Department. He became MacLeod Professor and Head of Department from September 1, 1942.

Dr. D. LeB. Cooper, who had held an honorary appointment as Lecturer in Chemistry (Fisheries) was made an associate professor on the full time staff. Dr. H. S. King, Associate Professor, departed from Dalhousie in the summer of 1942 on leave of absence. He had maintained his American citizenship throughout

his nineteen years at Dalhousie and now returned to the United States to take up duties with the War Department. He remained with the Chemical Corps of the U.S. Department of the Army until his retirement in 1959. While at Dalhousie Dr. King published at least sixteen papers in scientific journals. He was President of the Nova Scotian Institute of Science 1939-41. A number of his publications appear in the Proceedings of that society but others are to be found in technical journals.

In the absence of Dr. King, Chemistry 4, the second year organic chemistry class, was taught by professor E. G. Young of the Department of Biochemistry of the Medical Faculty in the term of 1942-43. Dr. Young had come to Dalhousie as the first professor of Biochemistry in 1923. Since the mid nineteen-twenties the medical class in biochemistry had been acceptable, under certain circumstances, as an elective credit in Arts and Science.

On September 1, 1943, W. J. Chute, B.Sc. (Honours Chemistry) (Acadia) (1939) M.A., Ph.D. (Toronto) (1943) was appointed associate professor to teach organic chemistry classes which had been given by Dr. King. Dr. Chute had been the recipient of National Research Council Studentship and Fellowships while at Toronto. He had taken part in the war time research projects then active at Toronto under the supervision of Professor George F Wright. During 1943 Dr. Coffin was given the recently created Harry Shirreff Professorship of Chemical Research. Dr. Cooper resigned to take up appointment with the Division of Fisheries, Department of Industry, of Nova Scotia. Later he became Head of the Department of Chemistry at Memorial University, Newfoundland, and continued work in Fisheries in St. John's until his retirement and death.

Dr. Cooper was replaced by Dr. M. R. Foran, B.Sc., M.Sc., (Sask.), Ph.D. (McGill) 1944, as associate professor. Dr. Foran had previous teaching experience in Saskatchewan and post-graduate work in analytical chemistry at the

University of Minnesota. Dr. Foran remained at Dalhousie until 1948 when he moved to the Nova Scotia Technical College as the first professor of Chemical Engineering, and later as Director of the School of Graduate Studies. Since his retirement from the Technical College, and to the present date, he has continued teaching in engineering fields at the Nova Scotia Institute of Technology, Halifax.

Dr. Coffin took an active part in the amalgamation of the Canadian Chemical Association, the Canadian Institute of Chemistry and the Society of Chemical Industry which produced the Chemical Institute of Canada in 1944. Dr. Coffin was a member of the interim board of directors of the C.I.C.

The 1945-46 term saw the beginning of the return of veterans from the second world war. It was soon to become a flood which enlarged chemistry classes by a factor of three or four. Many of the veterans chose pre-professional or scientific areas of study. For several years chemistry had the largest enrollment among the Arts and Science Departments. A special class in Chemistry 1 was begun in January of 1946.

Space was at a premium. The Engineering Department and Geology removed from the Science Building in the summer of 1945 to temporary quarters at the corner of Oxford Street. The building now remained to Chemistry and Physics. Chemistry gained about 6000 sq. ft., largely in the attic level. Alterations were made in the original laboratories. This was the beginning of the expansion of Chemistry to take up a building which had originally been planned for it. The expansion was to continue until every lavatory and broom closet was used for chemical purposes.

Dr. A. E. Kerr took over the Presidency of the University from Dr. Stanley in September of 1945.

In the 1945-46 term Mr. S. Schrage, B.Sc. (1944), M.Sc. (1946) was

appointed instructor in chemistry. He continued as a lecturer until 1948. Subsequently he obtained the Ph.D. from McGill and has been professor of chemistry at the University of Illinois since. Mr. B. L. Funt, B.Sc. (1944), M.Sc. (1946) also joined the Department as a lecturer in 1946-7. He completed the Ph.D. from McGill and later joined the Chemistry Department at the University of Manitoba where he was professor from 1959 and Dean of Graduate Studies from 1964. He is currently with Simon Fraser University, Burnaby, B. C.

Two other men helped during the peak pressure of the veterans. Dr. F. L. M. Pattison Ph.D. (Cantab.) removed to the University of Western Ontario where he was Head of Department for some years. He studied Medicine and took up a post with the Grenfell Mission in Newfoundland. He is currently living in London, Ontario.

Mr. Peter Yates, B.A. (London) completed a M.Sc. at Dalhousie before continuing to Yale for the Ph.D., to Harvard on fellowship and staff, and as professor of organic chemistry at Toronto.

Dr. C. A. Reilly, B.Sc. (1939), M.Sc. (1940), Ph.D. Chemical Physics (Harvard) 1950, was appointed assistant professor in 1948. He remained until 1951 when he departed to take up a research appointment with Shell Development Co. in Emeryville, California.

Throughout these rather hectic years the Department, particularly the group of students working with Dr. Coffin, maintained a considerable output of research. Dr. Coffin was among the Canadian pioneers in the application of radio-active tracers to chemical problems. Unfortunately, Dr. Coffin's sight was seriously affected in 1948. Dr. Chute was made professor and Director of Chemical Laboratories.

Dr. W. R. Trost, B.Sc., Alberta (1944), Ph.D., McGill (1947) was also appointed assistant professor in 1948. Dr. Trost had just returned from a Royal

Society of Canada Fellowship at Oxford. Trost became associate in 1955, professor in 1960. He was Dean of the Faculty of Graduate Studies from 1961 until 1966 when he resigned to become Academic Vice-President at the University of Calgary. Dr. Trost initiated research in areas of solid state chemistry and geochemistry. He is presently living in Victoria, B. C.

The year 1949 saw the establishment of the Faculty of Graduate Studies at Dalhousie. The faculty was to provide the framework for very considerable advances in research and post-graduate study in chemistry.

Dr. J. R. Dingle, B.Sc. (1941), M.Sc. (1943), Ph.D. (Toronto) from the staff of the Fisheries Experimental Station was a special lecturer in chemistry, attached through the Faculty of Graduate Studies, in 1949-50.

The 1950-51 term saw the appointment of Dr. P. M. Laughton, B.A. (Toronto) (1945); M.Sc. Dalhousie (1947) with W. J. Chute; Ph.D. Wisconsin (1950) as the first post-doctoral fellow at Dalhousie under the National Research Council. Dr. Laughton joined the staff of Carleton University the next year where he became professor of Chemistry.

Dr. D. E. Ryan, B.Sc. (U.N.B.) (1944), M.A. (Toronto) (1946), Illinois Institute of Technology (1948-49), Ph.D. (Imperial College, London) (1951); D.Sc. (Imperial College, London) (1965) came to Dalhousie in 1951 as assistant professor. He had previous teaching experience at U.N.B. Dr. Ryan was to carry out research in analytical chemistry which would give Dalhousie pre-eminence in this field.

Professor Coffin died January 12, 1954. Dr. E. W. R. Steacie, President of the National Research Council wrote, "He built up over the years a notable school of physical chemistry at Dalhousie. His students were always his friends, and from him they obtained a training and an outlook which they never lost. Few university professors have turned out as many students who

distinguished themselves in later life." Professor Coffin's daughter Natasha had graduated B.Sc. with first class honours in chemistry and the Governor-General's Medal in 1953. She completed work for the Ph.D. in radio-chemistry at McGill with Dr. Leo Yaffe. In later years as Dr. Natasha Hollbach, she has taught Chemistry at universities and colleges within Ottawa.

W. J. CHUTE - The Sixth Professor

(1954-1969)

W. J. Chute became Head of Department and Shirreff Professor in 1954. He was to be the last Head of Department. In 1969 Arts and Science departments were organized with Chairmen appointed for definite terms. Growth of the University required chairmen with administrative skills and diplomacy.

The classes which Dr. Coffin had taught were continued in 1954 and 1954-55 by Dr. S. G. Whitway, B.Sc., M.Sc. (1949), Ph.D. (McGill) and Dr. W. D. Jamieson, B.Sc., M.Sc. (1951), Ph.D. (Cantab.) who had been Dr. Coffin's students, and who were research officers of the Atlantic Regional Laboratories of the N.R.C.

Dr. A. N. O'Neill, M.A. (U.B.C.), Ph.D. (Ohio State), a research officer at the Maritime Regional Laboratories of the N.R.C., was a special lecturer in carbohydrate chemistry in the Faculty of Graduate Studies for several years after 1953 and until his untimely death.

The year 1955 saw the appointment of H. B. Dunford, B.Sc., M.Sc. (Alberta) (1952); Ph.D. (McGill) (1954) as assistant professor. Dr. Dunford had been on a post-doctoral fellowship at McMaster in 1954-55. He took up the classes which had been taught by Dr. Coffin. Dr. Dunford remained for only two years. His alma mater called him back. He is now professor of Chemistry at Alberta.

Dr. J. N. Greenblatt, B.Sc., M.Sc. (1944); Ph.D. (McGill) of the Naval Research Establishment, Dartmouth, was attached to the Department as a special lecturer in 1957.

The year 1957-58 saw Dr. W. R. Trost absent on a sabbatical. His classes were taken up by Dr. R. V. Webber, B.Sc. (1948), M.Sc. (Biochemistry) 1950; Ph.D. (Physical Chemistry) (Wisconsin) (1954). Dr. Webber was appointed as assistant professor. He had been a postdoctoral fellow at the N.R.C., Ottawa and

a von Humboldt fellow at Freiburg and Mainz in 1956-57. Dr. Webber remained at Dalhousie until 1962 when he joined Sir George Williams University and later the Defence Research Board of Canada.

To replace Dr. Dunford, Dr. O. H. Wheeler, B.Sc. (London); Ph.D. (Imperial College, London) (1953) joined the Department in 1957. Dr. Wheeler had gained post-doctoral experience at Purdue and the National University of Mexico. He departed after one year for the warmer climes of the University of Puerto Rico.

In 1958, Professor G. A. Dauphinee, B.Sc., M.Sc. (1953) returned to Dalhousie from post-graduate study at the University of Toronto. Professor Dauphinee had teaching experience and was a most helpful addition to the staff of the first-year class, both while Dr. Trost was absent on sabbatical and when he gave up the bulk of his teaching duties on becoming Dean of the Graduate Faculty. Professor Dauphinee subsequently became Assistant Professor and, in 1971, Associate Professor.

Dr. K. E. Hayes, B.Sc. (University of London); Ph.D. (University of Oregon) (1952) was appointed Assistant Professor in 1958. Dr. Hayes had undertaken post-doctoral research with Sir Hugh Taylor at Princeton and had been a research officer at the National Research Council. Dr. Hayes was to take up the physical chemistry classes which had been supplied by a succession of instructors since the death of Dr. Coffin. He was soon to surround himself with an active group of research students. He became Associate Professor, and Professor in 1971.

The academic year 1959-60 saw Dr. D. E. Ryan on sabbatical leave under an N.R.C. travelling fellowship. His classes were taken up by Dr. G. E. Cheney, B.Sc. (1952), M.Sc. (1954), Ph.D. (Pittsburgh). On Dr. Ryan's return, Dr. Cheney joined the Chemistry Department at Acadia University where he remained until his regrettably early death in 1970.

The year 1960 saw a major change in the Chemistry Department's emphasis on

research and post-graduate study. The Department obtained the right to offer the Ph.D. in Chemistry. Professors D. E. Ryan and W. R. Trost were most active in the promotion of this advance in the work of the Chemistry Department. A Ph.D. in biological sciences had been instituted in 1955. That course was a conjoint offering from the Biology Department and a number of pre-clinical departments of the Medical School. Chemistry and Physics were the first two, individual, departments to offer the degree. A degree in Oceanography dates from the same year. The Ph.D. degree made it possible to undertake, with students, projects of greater depth and complexity. Since the Ph.D. was being offered in a growing list of Canadian Universities it was essential that the Department should become competitive in attracting graduate students and research grant funding for students and equipment.

The year 1960 saw the transfer of the Department of Physics from the Science Building to the new Sir James Dunn Science Building. The whole of the old science building fell to Chemistry. Thus the prediction of President MacKenzie forty-five years earlier had come to pass. The areas vacated by Physics were extensively remodeled to give additional space to undergraduate and research laboratories. The joint library of Chemistry and Physics was separated with the Chemistry holdings remaining in the Department.

Dr. W. E. Jones, B.Sc., Honours Chemistry (1958), M.Sc. (1959) (Mt. A.); Ph.D. (McGill) (1963) was appointed Assistant Professor for 1962-63; Associate in 1968, Professor 1973. Dr. Jones initiated research with active hydrogen and nitrogen through spectroscopy having spent some summers working with Dr. G. Herzberg at the Division of Pure Physics, N.R.C., Ottawa, and while on sabbatical leave in 1968-69 in Stockholm.

Since 1963, several research officers from the Atlantic Regional Laboratories of the National Research Council had held appointment to the

Chemistry Department in the Faculty of Graduate Studies. These men have provided course work and have directed research students. C. R. Masson, Ph.D. (Aberdeen) has held an appointment as Professor, A. G. McInnes, Ph.D. (Ottawa) and R. A. Heacock, Ph.D., D.Sc. (London) have been Associate Professors. M. Falk, D.Sc. (Laval) has been a Research Associate. Dr. A. Taylor of the Atlantic Regional Laboratory and Dr. R. G. Ackman, B.A. (Toronto), M.Sc. (Dalhousie) (1952), Ph.D. (London) of the Fisheries Experimental Station were also Research Associates.

The Dalhousie Institute of Oceanography had been organized in 1959 with Professor F. R. Hayes of the Biology Department as the first Director. Cooperation was expected from the Departments of Biology, Chemistry, Geology and Physics. Dr. A. A. Mills, B.Sc., Ph.D. (Nottingham) was appointed Assistant Professor of Chemistry (Oceanography) in 1959. Dr. Mills was to remain in the Chemistry Department for four years, and then returned to Britain.

Dr. P. L. Splitstone, B.Sc., Ph.D. (Ohio State) joined the Department in 1960 as an Assistant Professor. After three years he resigned to take up college work in his native state.

Dr. K. T. Leffek, B.Sc. (1956), Ph.D. (University College, London) (1959) came to the Department as Assistant Professor in 1961. He had been engaged with post-doctoral research at the National Research Council from 1959-61. Dr. Leffek was the first physical-organic chemist to become a member of the staff. He organized a research group in this field. In 1967 Dr. Leffek became an Associate Professor, Professor in 1972, and in the year 1967-68 was on sabbatical as a Leverhulme Visiting Fellow at the University of Kent at Canterbury.

President A. E. Kerr retired in 1963. Dr. Henry D. Hicks became President and Vice-Chancellor.

An expansion of the number of full-time staff began in 1963 with the appointment of T. P. Forrest, B.Sc. (Mt. A.) M.Sc. (Dalhousie) (1959), Ph.D. (U.N.B.) (1962), as Assistant Professor. Dr. Forrest had returned from a year of post-doctoral experience with Professor Barton of Imperial College, London. He continued research in the natural products field and enlarged the class offerings in organic chemistry. Dr. Forrest was made Associate Professor in 1969, professor in 1975. He was on sabbatical leave in England during 1969-70, and again in France during 1984-85.

In 1964, O. Knop, B.Sc. (Masaryk), D.Sc. (Laval) 1957 joined the Department as Associate Professor. Dr. Knop had experience gained in a number of laboratories and had been Associate Professor in industrial chemistry at the Nova Scotia Technical College. He was able to initiate a group active in studies of solid state inorganic chemistry through application of X-ray diffraction and other techniques. Dr. Knop became Professor in 1970. He was absent on sabbatical leave in the second half of 1970-71.

P. J. Wangersky, Sc.B. (Brown), Ph.D. (Yale), also came to the Department as Associate Professor in Chemistry (Oceanography). Dr. Wangersky took up the chemical oceanography post which had been vacated by A. A. Mills. He had been a member of the Oceanographic Institute at Yale before coming to Dalhousie. He soon attracted a considerable number of post-graduate students and because of space lack in the Chemistry Building moved to laboratories in the expanded Atlantic Regional Laboratories, N.R.C. A later move was made to the Oceanographic Wing at the Life Sciences Building. Dr. Wangersky was on sabbatical leave in Spain.

The first Ph.D. in Chemistry at Dalhousie was awarded in 1964 to St. John H. Blakeley, M.Sc. (Imperial College, London), who had pursued research with Professor Ryan.

The summer of 1964 saw the commencement of an extension of the old science building (Chemistry Building) to connect this with the MacDonald Library. The new section was taken up early in the 1965-66 term. Chemistry was to gain two undergraduate laboratories in this extension and a number of staff offices. The expansion of laboratory space was not as significant as it might have been since laboratory space was lost from two floors, and areas from the first floor, to gain connection with the extension. The losses counterbalanced a half of the gain. Chemistry has continued to take over office space in the extension. The Faculty of Graduate Studies office became Chemistry Departmental Offices in January 1971. Further space was gained when the University Engineer's Offices were vacated in the summer of 1971. Later the Bookstore in the basement fell to Chemistry.

The 1965-66 term saw the addition of two new Assistant Professors. M. E. Peach, B.Sc. Ph.D. (Cantab.) returned to England after one year at Dalhousie but came back to Canada to join the Chemistry Department at Acadia University. D. H. Davies, B.Sc. (Carleton), Ph.D. (Bristol) (1964) had been at Carleton as a post-doctoral fellow. He remained with the Chemistry Department four years and then joined the Chemistry Department at St. Mary's University, Halifax.

Two more staff were added in 1966-67. D. L. Hooper, B.Sc., Ph.D. (U.N.B.) 1964, came to Dalhousie as an Assistant Professor following two years of post-doctoral experience at the University of East Anglia. Dr. Hooper was experienced in nuclear magnetic resonance spectroscopy, and since his arrival coincided with the Department obtaining its first nmr spectrometer, he has made particular contributions to this field of research. Dr. R. W. Frei, Dipl. Chem. (Berne), Ph.D. (Hawaii) had been a post-doctoral fellow in the Department during 1965-66. His field was analytical chemistry and his presence added strength to the already important analytical division. Dr. Frei became an Associate Professor

in 1970.

The calendar of 1966-67 saw the first major revision of class offerings in Chemistry to occur in many years. A new Honours program was instituted, which in common with the requirements for all Departments, required three Chemistry classes in each of the three later years of a four year program. Entrance was obtained from Senior Matriculation. First year continued as General Chemistry though at this time there were four lecture sections of the regular class as well as a special class for Dental Hygiene. The second year offered classes in Inorganic Chemistry, Physical Chemistry and Organic Chemistry. Two classes in organic chemistry were available, one for students in pre-professional courses, the other for those who would undertake further classes in the discipline. The third year offerings were a continuation of organic and of physical chemistry with a class in analytical chemistry. The fourth year offered choice among quantum chemistry, instrumental analysis and advanced work in either organic or physical chemistry. An offering in undergraduate research disappeared, for a few years, but was soon reinstated. A total of twenty graduate level classes were listed in the same Calendar. Some of these were half-term offerings. Research for the M.Sc. and for the Ph.D. also had class numbers. Classes have remained nearly in the same pattern since 1966 although the number of sections in some classes has increased. Graduate class lists have changed and expanded as new staff have appeared.

A first class in Chemistry was offered in 1971-72 which was intended to be an introduction to the science, but terminal, in that it would not serve as entrance to higher level classes. It was hoped that such a class would prove attractive to Arts students, or others, who desired a broader education encompassing some science. Following a two year trial the class was abandoned since it did not attract sufficient following to warrant continuation.



The 1967-68 term saw the addition of J. W. S. Jamieson, B.Sc., M.Sc. (Queens) (1954), Ph.D. (McGill) (1956), as an Associate Professor. Dr. Jamieson had obtained experience in industrial research, and teaching experience in both St. John's College, Winnipeg, and the University of Manitoba. He had been in London on Royal Society and Nuffield Foundation support of a sabbatical year in 1965-66.

J. S. Grossert, B.Sc., M.Sc., Ph.D. (Natal) joined the Department as an Assistant Professor in 1967. Dr. Grossert had held recent post-doctoral appointments at Oxford and Brandeis. He took up teaching and research in organic chemistry.

The year 1966 had seen the establishment of the Izaak Walton Killam Memorial Fund for Advanced Studies. This benefaction was to aid in bringing good research students and post-doctoral research fellows with commitments to research into the Department.

The later day functions of the Chemistry Department could not have proceeded without the assistance of a number of people. The Department had, until the middle nineteen-forties, only part-time aid in preparing reagents and taking care of chemicals and apparatus.

Several generations of students gave part-time attention to the storeroom, or occasionally someone held the position for a teaching term. Mr. E. Doran undertook the post of storekeeper from 1953-1965. Although he could be cantankerous, he performed many services with honesty and reliability. Mr. D. A. Giffin, B.Sc., M.A. (Dalhousie) accepted the position of chief laboratory steward in 1966. Several persons assisted him, but Mr. John Sutton remained as a reliable lieutenant.

Technical assistance first came to the Department with Mr. W. Oxner taking charge of the workshop in 1963. Mr. E. Kenny joined the Department in 1970 as

an expert in electronics.

The Department had shared stenographic services with Physics and, for a period, the first Dean of the Faculty of Graduate Studies, Dr. J. H. L. Johnstone of Physics. When the Physics Department removed from the 'old' science building, Miss D. Craswell began as secretary to the Department, in 1959, and continued until 1969. Mrs. M. Pritchard took up secretarial duties in 1968-69. She was later assisted by Mrs. Goodwin and Mrs. Coles.

June 30, 1969 brought the retirement of W. J. Chute as Head of the Department. He went to England on sabbatical leave in 1969-70. The Faculty of Arts and Science had accepted a system of rotating chairmanships of the various departments in 1968.

D. E. RYAN - The Seventh Professor  
and the first Chairman of the Department  
(1969-1973)

Dr. D. E. Ryan had become McLeod Professor of Chemistry in 1963. He had developed the most active research group in analytical chemistry to be found in Canada. His reputation was international. He was a member of a number of advisory committees to the Defence Research Board and the National Research Council of Canada. Dr. Ryan accepted the chairmanship of the Department for a three-year term. He was subsequently reappointed for a second term. This period marked a resurgence of activity in the Department, particularly in areas of research.

Since two staff members, T. P. Forrest and Chute were absent on sabbatical leave in 1969-70, several interim lecturers were appointed. C. A. Armour, B.Sc. (Mt. A.), M.Sc. (Dalhousie), Ph.D. (London), took up organic chemistry. Dr. Armour has remained at Dalhousie as University Archivist. D. J. Stewart, Ph.D. (Wellington) and K. K. Yee, Ph.D. (U.B.C.), who has been postdoctoral fellows in the Department, became teaching staff for the academic year.

The 1970-71 term brought four new staff members, L. Ramaley, B.A. (Colorado) (1959), M.A., Ph.D. (Princeton) (1964), was appointed an Associate Professor. Dr. Ramaley had particular interests in electrochemistry as applied to analytical problems. He had been on the staff of the University of Arizona. J. B. Faught, Ph.D. (Illinois) had research background in inorganic chemistry. J. C. T. Kwak, Ph.D. (Amsterdam), specialized in solution physical chemistry and C. H. Warren, Ph.D. (McMaster) was a theoretical chemist. These three men were appointed Assistant Professors.

The 1971-72 term saw the addition of two new staff members. G. D. Abrams, B.A., M.A., Ph.D. (Toronto) (1969), had been engaged in post-doctoral work at

Stanford University. He was to teach classes in organic chemistry. P. D. Pacey, B.Sc. (McGill), Ph.D. (Toronto) (1967) had experience in industry and later as an I.C.I. Fellow at Swansea. His field was physical chemistry.

One of the most encouraging events in more than a century of chemistry at Dalhousie had recently occurred. A Negotiated Development Grant to a value of more than a third of a million dollars was awarded by the National Research Council of Canada to support research in trace analysis. The award recognized the position of Professor Ryan and his colleagues and would do much to enhance Dalhousie's considerable reputation as a centre of excellence in analytical chemistry. The Trace Analysis Research Centre (TARC) was initially located at 6090 University Avenue but subsequently removed to the Oceanographic wing of the Life Sciences Building.

Dr. R. W. Frei had joined the Department in 1966. Dr. L. Ramaley had arrived in 1970 as an Associate Professor. These two men became early members of TARC. It must be stressed that all members of TARC are regular members of the Chemistry Department and carry their full share of undergraduate teaching and administrative duties. The research and teaching are within the areas of analytical chemistry. Dr. R. Stephens joined TARC in 1971 as an Assistant Professor. He held degrees of M.A. (Cantab.), M.Sc. (Bristol); Ph.D. (Imperial College, London; D.I.C.). His special interests lay in flame and flameless spectroscopy. His successes in investigation are attested to by publications and patents.

Dr. Frei left in 1973 to join Sandoz, Basle, Switzerland. Dr. W. A. Aue received appointment as professor in 1973. He had obtained the Ph.D. from Vienna and had undertaken postdoctoral and staff appointments in the U.S.A. Dr. P. M. Froelich, Ph.D., Purdue, with postdoctoral experience at Tennessee and Louisiana State joined the TARC group in the same year as an Assistant

Professor. He returned to the U.S.A. in 1976.

Dr. D. E. Ryan relinquished the Chairmanship of the Department as of December 1973 in order to devote more time to research and the development of TARC.

In 1974 Dr. A. Chattopadhyay, (Dr. A. Chatt) M.Sc. (University of Waterloo) Ph.D. (Toronto) was appointed as an Assistant Professor. His background in neutron and photon activation analysis made him particularly useful at this time.

The year 1976 saw the installation of the Slowpoke reactor (Safe Low Power Critical Experiment) which is a small 'swimming pool' type reactor. The reactor facility, under the day-to-day supervision of TARC is in the basement level of the Life Sciences Building, it included two medium level radiochemistry laboratories, two 'clean-room' laboratories and additional handling and counting rooms with office space. The Slowpoke provides neutrons for trace analysis by neutron activation and radioisotope production applicable to a variety of problems.

Another staff member, Dr. R. D. Guy, Ph.D. (Carleton) was added to the TARC group in 1976 as a replacement for Dr. Froelich.

It has been a matter of convenience to trace the evolution of the analytical group, (TARC) through the decade between 1971 and 1981. For the most part staff members adhering to TARC have had a geographical centre apart from the Departmental building. The group has been preeminent in research and the development of analytical chemistry within Canada. There have been a considerable number of visitors from many parts of the world who have been drawn to TARC because of the expertise of the group.

Twice within the decade members of TARC have been awarded the Fisher Scientific Award for "distinguished contributions to and leadership in

analytical chemistry". Dr. D. E. Ryan received the award in 1972. Dr. W. A. Aue was given the same honour in 1980.

Dr. Ryan devoted time and effort in 1980-81 to a development program funded by the Canadian International Development Agency with a grant of \$461,000 over five years. The project involves cooperation between Dalhousie University and the University of Colombo, Sri Lanka in the establishment of a Centre for Analytical Research and Development (CARD) in Sri Lanka. TARC, at Dalhousie trains personnel and advises on the purchase and operation of equipment. As noted above, Professor D. E. Ryan relinquished the Chairmanship of the Chemistry Department in 1973 in order to have more time to devote to the development of TARC. It has been a matter of convenience to carry forward events surrounding the Trace Analysis Research Centre even though some of these took place during the Chairmanship of Professor W. E. Jones.

W. E. JONES

The second Chairman of the Department

(1974-1983)

It has been mentioned earlier that the advent of Chairmen of Departments had commenced in 1969. It now became impractical to list a unique position of Professor of Chemistry. Growth in the number of faculty and a relatively stable complement of senior staff members had seen several elevations to the full professorship. Dr. Ryan became McLeod Professor in 1963; Dr. Knop, Professor in 1969 and Harry Shirreff Professor of Chemical Research in 1982; Dr. Hayes, Professor in 1971; Dr. Leffek, Professor and Dean of the Faculty of Graduate Studies in 1972; Dr. Jones, Professor in 1973. Dr. W. A. Aue was appointed as Full Professor in 1973; Dr. Coxon as Killam Research Professor in 1974; T. P. Forrest as Professor in 1975. Subsequent promotions have raised other persons to Professorial ranks.

Dr. W. E. Jones arrived at Dalhousie in 1962. His early researches involves active nitrogen. He soon enlarged his interests to activated hydrogen and nitrogen coupled with spectroscopic studies. Among his early achievements was the establishment of a first-class laboratory in physical chemistry for students of the second year. Dr. Jones was made Professor in 1973 and as of the first of January 1974, became Chairman of the Department.

While developments in TARC have been used to illustrate advances in the Chemistry Department, all other areas have expanded in personnel and programmes. The influx of students into first-year classes is an index of the probable numbers to be found in later undergraduate years. In 1972 there were 711 first-year students. This number increased to about 825 in the later 1970's. Though demographic data suggested a falling number the intake has continued to rise to



W. J. Chute  
Head of Department  
1954-1969



D. E. Ryan  
Chairman of Department  
1969-1973



W. E. Jones  
Chairman of Department  
1974-1983



W. A. Aue  
Chairman of Department  
1983-1986

about 975 in 1984.

Postgraduate registration for the M.Sc. or Ph.D. had risen to 42 in 1971. A drop in this number appeared within the next few years. The phenomenon was world wide resulting from a over-production of post-graduates in Chemistry and other sciences. Despite inflation and fewer job opportunities the numbers have stabilized between 35 and 50.

The teaching programme in the Department remained quite constant in the decade between 1970's and 1980's. As numbers increased the first-year General Chemistry was divided into 12-13 sections each with its own instructor. Subject content remained comparable. One section (Chemistry 120) was developed for those students possessing a superior background. Two others, Chemistry 111 for engineering students and Chemistry 112 for pharmacists were established through consultation with the related department or faculty so that laboratory periods could be held in morning hours. Extreme pressure on laboratory facilities necessitated laboratory periods at all possible hours, morning, afternoon and on some evenings. From 1979 a late afternoon-evening section of Chemistry 110 was provided to meet the wishes of those with regular jobs. The time-table also satisfies some full-time students.

Two specialized classes, Chemistry 105 for dental hygiene students and Chemistry 243 (later 143) for students of nursing went through stages of development.

The second year organic class (Chemistry 240) has proven to be embarrassingly popular. Lectures have been given through 3-5 sections. All would be chemists, most biologists, all those with a pre-medical or pre-dental inclination, pharmacists etc. find the class a necessity for their programmes. As will be recorded later the 1984-85 candidates outnumber available facilities.

Two new second-year classes were instituted in 1978. One, (Chemistry 213),

deals with "The Inorganic Chemistry of Life", a second (Chemistry 233) developed "Physical Chemistry for the Life Sciences". Both have proven popular with science students not specializing in Chemistry.

The programme of graduate classes was reviewed in 1977-78 and resulted in the offering of advanced level core classes as well as more specialized classes.

To provide the expanded number of classes and class sections required additions to staffing. A survey of those added to analytical chemistry, (TARC group), has been completed. Others are to follow.

The appointment of Dr. K. T. Ieffek as Dean of Graduate Studies during 1972 necessitated some immediate help with teaching. Dr. C. A. Armour was again 'borrowed' from his position of University Archivist. Dr. G. D. Lutwick, M.Sc. (Dal.) Ph.D. (Alberta), was appointed special lecturer to assist with an analytical chemistry class. Dr. J. Greedan, Ph.D. (Tufts) was added to staff in 1972 as an Assistant Professor with specialization in inorganic chemistry. He departed in 1974 to take up a position at McMaster University.

Four new staff were appointed in 1973. These included Aue and Froehlich who have been mentioned under the TARC account. Dr. J. A. Pincock, Ph.D. (Toronto) with postdoctoral experience at Wisconsin and Western Ontario was appointed as an Assistant Professor with responsibilities for organic chemistry. Dr. A. M. Last, Ph.D. (Essex) was given a temporary appointment to assist with an organic chemistry and E. V. Martin, M.Sc. (Dal.) was called into service as a special lecturer to help with an overflow section of the organic class.

The 1974 calendar year brought the appointment of Dr. J. A. Coxon, BA, M.A. (Cantab), Ph.D. (East Anglia) as the first Killam Research Professor in Chemistry. Dr. Coxon had specialized in gas phase kinetics and electronic spectroscopy of small molecules. He had continued spectroscopic research at Queen Mary College, University of London, and had worked as a research scientist

for the British Gas Corporation. Dr. Coxon continued as Killam Research Professor 1974-1978. Since 1979 he has become part of the regular faculty and makes a considerable contribution to undergraduate teaching as well as continuing research and administrative duties.

Dr. T. B. Grindley, Ph.D. (Queens) was appointed Assistant Professor in 1974. He was to become a replacement for Dr. G. Abrams. Dr. Grindley had postdoctoral experience at East Anglia and the University of Ottawa.

Dr. T. W. Melnyk, Ph.D. (London) was appointed Assistant Professor in 1974 to aid with an expanded first-year class. He had been a postdoctoral appointment in the Mathematics Department and returned to a bio-mathematics programme.

A replacement for Dr. Greedan in inorganic chemistry was found in Dr. A. Terzis, Ph.D. (Princeton) who had been a postdoctoral appointee at the University of Montreal. Dr. Terzis remained with the Department until 1976 when he took leave of absence to aid in the establishment of a Raman Laboratory at the National Hellenic Research Foundation, Athens, Greece. He did not return to Dalhousie.

In 1974, Dr. M. L. Heit, Ph.D. (Dal.) who had been a senior demonstrator in the Department for some years, received appointment as lecturer.

The year 1975 brought Dr. R. J. Boyd to the Department as Assistant Professor. Dr. Boyd had a first degree from the University of British Columbia and the Ph.D. from McGill. He had enjoyed postdoctoral experience at Oxford and U.B.C.

In the same year Dr. T. S. Cameron, B.A., M.A., D. Phil. (Oxon) joined the Department as an Associate Professor. Dr. Cameron had postdoctoral experience at Goteborg University, Sweden, and at Oxford. He had held an appointment in inorganic chemistry with particular emphasis on X-ray crystallography at the

University of Ulster, Coleraine.

The departure of G. Abrams, P. M. Froelich, J. B. Faught and T. W. Melnyk during 1976 as previously noted, provided requirements in the teaching programme which had to be filled. The absence of other staff on sabbatical leave also created temporary posts.

Prof. J. W. Scheeren, Ph.D. (Leiden) was appointed Visiting Professor in the Department for the 1976-77 term. He gave assistance with the second-year organic class. The 1977 year also saw Dr. R. Langler, Ph.D. (Dal.) and Dr. J. Wasson, Ph.D. (Western Ontario) created temporary lecturers. In 1978 Dr. K. R. Grundy, Ph.D. (Auckland) who had postdoctoral experience at Cambridge and who had spent two years as a Visiting Assistant Professor at the Scarborough Campus, University of Toronto, joined the inorganic division of the Department. Dr. Grundy was a replacement for Dr. Terzis who had chosen not to return from Greece where he was on leave of absence.

The summer of 1979 brought Dr. D. R. Arnold to the Department as Killam Research Professor of Chemistry. Dr. Arnold had his Ph.D. from the University of Rochester followed by industrial experience gained while working in the research laboratories of Union Carbide Corporation. He had been with the University of Western Ontario since 1970 and had held the rank of professor from 1971. Dr. Arnold was widely recognized for his research in photochemistry. A principal objective of his research in the area of organic photochemistry has been to develop synthetic methods for the preparation of organic compounds not readily available by more classical methods. His approach has been to study the mechanism of novel, potentially useful, photochemical reactions since it is through this understanding that the scope and limitations of the reactions can best be determined. Progress in this area depends heavily upon modern procedures of product isolation and characterization as well as the latest in

spectrochemical techniques.

Attention should be drawn to the four more senior appointments to the Chemistry Department within the 1971-78 decade. Professor Arnold in organic chemistry; Aue in analytical chemistry, Coxon in physical chemistry and Cameron in inorganic chemistry have added greatly to the depth of offerings in the research and postgraduate field.

The 1979 term brought a measure of cooperation with other colleges in the Maritimes through the appointment of two adjunct professors. Dr. Michael Liu of the University of Prince Edward Island has common interests in physical chemistry with Dr. W. E. Jones. Dr. K. Vaughan of Saint Mary's University has carried out research in cooperation with Dr. D. L. Hooper of this Department.

It could be noted that a rather close association with the Atlantic Regional Laboratory, National Research Council had provided external staff as Dr. C. R. Masson, professor; Dr. R. A. Heacock and Dr. A. G. McInnes, Associate Professors and Dr. M. Falk as Research Associate. The research of some graduate students had been directed by these men while classes at advanced levels had been provided from this source. The official association became inoperative on June 30, 1971, although informal cooperation has continued to exist.

The 1979 year brought the formal retirement of Dr. W. J. Chute who had joined the Department in 1943 as an Associate Professor. From 1954 to 1969 he had been Head of Department; the sixth in a succession beginning in 1863 and quite probably the only Dalhousie professor of Chemistry to survive until retirement. Colleagues tendered a banquet in the spring of 1979. In 1980 the Department instituted the Walter J. Chute Distinguished Lecture Series with Professor R. U. Lemieux from the University of Alberta as the inaugural speaker. Dr. Chute has continued a part-time association with the Department into 1986.

The year 1980 brought the retirement of Dr. (Senator) H. D. Hicks as

President of Dalhousie. Dr. W. A. MacKay was installed as President early in 1981.

Departmental Chairman, Dr. W. E. Jones became Vice-Chairman of Senate at Dalhousie in 1980. He was also appointed Chairman of the Senate Financial Planning Committee. These appointments foretold expanded demands of administrative duties on his time and energies.

Three developments in the Chemistry Department during the 1970's have added much to the services provided by the Department.

A resource centre for first-year students was given a small start in an out-of-the-way corner of the attic in 1971. Two removals have provided expansion and the satisfactions generated among first-year students supplied demand for similar facilities to be available to second or higher level class members. From 1980-81 two resource centres operate in the basement level of the Department. Each provides study areas, reference materials, models, audio and visual tapes, computers and a resource person who can provide counsel, aid in problem solving, and general advice in the study of Chemistry. Mrs. D. Silvert, M.Sc. (C.W.R.U.) has worked with the first-year group for some years. The later year centre has had a variety of tutors from several areas of Chemistry. It might be expected that the opportunities of the resource centres would appeal to those students with a lesser background, which is true, but many of the most proficient students find the centres to be a place to discuss common problems and to gain new insights.

An attempt to develop a continuity in chemical education was approached in 1975. Contact was made with high school teachers of chemistry in Nova Scotia, and eventually with the Nova Scotia Department of Education, which allowed twenty grade XII students, recommended by their schools, to come to Dalhousie for a week of experience in Chemistry. Students who attended in a particular year

were drawn by a form of lottery. These students were housed in Dalhousie residences. A contribution was made to their travel costs. During the week on campus the students performed experiments that are not available in high school laboratories. They visited representative research areas in the Department and enjoyed several social gatherings with staff. The initial group appeared in early July. In later years the visitation took place in early May. In the 1981 year it was possible to accept two groups of twenty in successive weeks.

Organizational work and much of the contact with these students while on campus has been carried by Professor G. A. Dauphinee, but a considerable number of other staff have assisted in all phases of the efforts.

As a result of the liaison established with the high schools, several one or two day seminars for high school teachers have been centred upon the Department. Staff have gone to schools to hold discussions on careers, safety, etc. Of later years a number of staff has taken part as judges at Science Fairs.

It is evident that students from all parts of Nova Scotia have reason to think that Dalhousie is a good place to study Chemistry.

A third innovation of the decade was the DALCHEM CO-OP. This was the first of several cooperative study programmes at Dalhousie.

Cooperative education provides students with an integrated pattern of academic study and practical experience. The DALCHEM concept can lead to a Bachelor of Science with Honours in Chemistry but at the same time supply four supervised work terms. Dr. J. C. T. Kwak performed much of the organizational work which led to the roster of summer employers. Both industry and governmental agencies have been willing to provide summer employment which has educational value. The programme also includes a series of lectures on the more industrialized aspects of Chemistry. Six students were enrolled in the first (1980) summer programme for the 1980-81 term.

Although all students taking part in this enterprise will continue to completion, entrance has been placed on temporary abeyance. In a measure, the suspension must be attributed to the state of the economy which has made suitable work experience difficult to locate.

In the 1981 year Dr. M. L. Heit, who had been a lecturer in the Department for ten years, departed to take up teaching at Simon Fraser University, Burnaby, B.C. To provide for the classes given by Dr. Heit, Dr. C. G. C. Flinn, Ph.D. (Dalhousie) was given a term appointment. The post was continued in 1982 after which Dr. Flinn joined Memorial University at Corner Brook, Newfoundland.

Dr. B. J. Forrest, B.Sc. (Bishop's), Ph.D. (Simon Fraser) joined the Department in the summer of 1982 as an NSERC University Research Fellow. Dr. Forrest's research has involved the use of nuclear magnetic resonance in the study of molecules of biological significance.

Dr. R. E. Wasylshen, Ph.D. Manitoba, D.Sc. Waterloo, joined the Department in 1982 as an Associate Professor. His appointment, in a measure, compensated for the departure of J. Wasson and M. Heit in previous years. His research interests within physical chemical aspects of NMR were a fortunate complement to the installation of the Atlantic Magnetic Resonance Centre.

The year 1982 also saw Dr. J. A. Pincock receive the prestigious Dalhousie Alumni Award for Excellence in Teaching. Dr. Pincock had enjoyed a very large following for entrance to his chemistry 240 classes. Students had held line over night for early registration into his class.

One measure of the progress in research is to be found in the ability of departmental members to attract grants in support of research from bodies external to Dalhousie. The year 1982 brought more than 1.475 million. A not inconsiderable part of this arose through the purchase of instrumentation for the Atlantic Region Magnetic Resonance Centre. The Nicolet 360 MHz spectrometer



had a price of \$384,100. It can be seen that other projects also drew support. Indeed external sources have accounted for more than a million dollars in each of the succeeding years.

The production of papers published in refereed journals has also increased from 125 in 1982 to nearly two hundred in subsequent years.

The Atlantic Region Magnetic Resonance Centre is deserving of larger mention. This centre arose from the cooperative efforts of eleven Atlantic Regional Universities, the Atlantic Research Laboratory of the National Research Council and other governmental laboratories. Although the other sponsors enjoy services, the Chemistry Department is the operator and a major user. Dr. D. L. Hooper of the Chemistry Department is Manager of the Centre. Bruce Macdonald, B.Sc., M.Sc. (Guelph) is the operator. The users have said that Dr. Jones as Chairman of the Department was invaluable in securing cooperation and premises which made the Centre possible.

Progress made in the operation of the Chemistry Department during the decade ending in 1983 cannot be attributed only to the academic faculty. A number of other persons have made significant contribution to the total effort.

The Office of the Administrative Assistant to the Chemistry Department was created in September, 1971. The first incumbent was Dr. W. D. Courrier, Ph.D. Dr. Courrier left the Department to take part in the Admissions Office and later the Registrar's Office of the University in 1974. The post was taken up by Dr. D. A. Othen, Ph.D. (Alberta) who remained with the Department until 1984. These two men have assisted the Chairman in many aspects of the routine operations. Purchasing of supplies, the creation of time-tables, the organization of such activities as registration, and the supervision of non-academic staff attached to the Department has been part of their work.

A number of persons who had been listed as senior demonstrators but, more

lately as instructors, have played a significant role in undergraduate instruction. Mrs. D. J. Silvert, M.Sc. has been mentioned under resource centres. Other persons have made their major contributions in full time activity with the laboratory programmes of first and second year. Among those who have been with the Department for several years are: P. Renault, M.Sc., M.D. (Dal); M. A. Yeats, M.Sc. (U.B.C.); S. A. Sawler, B.Sc. (M.S.V.U.), B.Ed. (Dal); J. Gabor, M.Sc. (Budapest); C. D. Burkholder, B.Sc. (Waterloo), W. Tacreiter, M.Sc. (Cracow), K. E. Thompson, B.Sc. (Acadia) and M. E. Warren, B.Sc. (Western).

Technical assistance in the Department received a major enhancement with the hiring of a master glassblower, Mr. J. Mueller in 1972.

W. Oxner had operated a rudimentary machine shop since 1963. He was followed by S. Whittleton, assisted by B. Carpenter. From 1975 Mr. R. Myatt has had charge of the machine shop where, since 1979, he has been assisted by M. R. Conrad.

Mr. E. Kenny, who had brought experience in electronics to the Department in 1970, retired in 1979. He was succeeded by Mr. C. Roper.

Several persons have served as instrument technicians for short periods of time but Dr. J.-H. Kim has continued to operate and provide services with major instruments since 1975.

Mr. D. Giffin having resigned from the stores staff about 1974, Mr. J. D. Sutton became chief of this operation. For a few years M. LeBlanc assisted in this area but since his departure the staff has had a stable complement consisting of B. H. Moore, F. Bermundo and K. K. MacDougall.

The life and activity of the Department seem to centre about the Departmental Office. A number of persons have contributed to the throughput of paper as well as the general well-being of the enterprise. To list all who

have taken part would be tedious but among those who have given longer and significant service are B. Embley, L. Ziola, P. Daniel, V. Church, B. Ross, S. Simmons, D. Cosman and E. Lindsay.

At the end of June 1983, Dr. W. E. Jones yielded up the Chairmanship of the Department. He has continued his teaching and research while occupying the position of Chairman of the Senate of Dalhousie University.

Dr. and Mrs. Jones were honoured with a reception and presentation held at the Waegwoltic Club in the autumn of 1983.

Dr. W. A. Aue took up the Chairmanship with July, 1983.

W. A. Aue - The Third Chairman of The Department

(1983-1986)

Dr. Aue was born in Vienna, Austria where he attended the University of Vienna to receive the Ph.D. in 1963. He had been on the staff of Western Reserve University 1963-65, and from 1965-69 as Assistant Professor of analytical chemistry at the University of Missouri-Columbia. He was Associate Professor and Research Associate at the Space Science Centre, 1969-73.

In 1973 he was appointed Professor specializing in analytical chemistry at Dalhousie University where he became a member of TARC. Throughout his years in North America he had received grants in aid of research from numerous sources in the United States and Canada. Dr. Aue's researches have centred upon pesticide residue analysis, specific detectors for gas chromatography, and support bonded chromatographic phases. The significance of his work was recognized through the granting of the "Fisher Scientific Award for distinguished contribution in the field of analytical chemistry", at the Chemical Institute of Canada Conference of 1980.

Dr. Aue's acceptance of the chairmanship coincided with a difficult period in the working of the Chemistry Department. Utilization of undergraduate laboratories had reached capacity in 1982-83. The period between 1982-83 and 1984-85 saw an eleven percent increase in student numbers in first-year general chemistry, while second-year classes also expanded. The Chemistry 240 class met an increase of twenty-five percent in the same period. Only through the most careful internal arrangements coupled with the cooperation of other Departments and the office of space management, was it possible to accept almost all of the candidates for class space.

That the period was one of financial stringency and restraint added to the problems.

Despite constraints, progress has been maintained.

Dr. Mary Anne White, B.Sc. (U.W.O.), Ph.D. (McM.) was appointed Assistant Professor (Research) under the NSERC University Research Fellowship programme in 1983. Dr. White became the first woman to be appointed to the teaching faculty of the Department; although a considerable number of women have held positions as laboratory instructors. Dr. White's area of research was physical chemistry. Her enthusiasm and energy are appreciated.

Dr. R. L. White, B.Sc. (Dal.), Ph.D. (McM.) was also appointed as an NSERC Research Fellow in 1983. He removed to Acadia University in 1984 where he is an Assistant Professor.

Dr. J. C. T. Kwak was promoted to full Professor in 1983. He spent the 1983/84 academic year on leave of absence as professeur titulaire at the Universite de Sherbrooke, in Quebec.

A serious dislocation in the Department's teaching programme occurred in 1985 when Professor G. A. Dauphinee announced his intention of taking early retirement. Professor Dauphinee has carried a heavy load of teaching and administration with general chemistry but also with specialized classes for nursing and dental hygiene. His work with the organization and operation of the annual visitations by groups of high school student had the effect of bringing many good students to Dalhousie classes. Fortunately, Professor Dauphinee has agreed to continue teaching with the Chemistry-Biochemistry 143 class for nurses in the 1985-86 term. Professor Dauphinee was recognized at a farewell reception for retiring staff hosted by President McKay and also at a Departmental reception which was attended by colleagues and a considerable number of high-school principals and science teachers who had worked with him.

In the 1985 year Dr. R. J. Boyd and Dr. A. Chatt received elevation to the full professorship. Dr. K. R. Grundy was made an Associate Professor.

The 1982-83 year had seen Professors G. A. Dauphinee, J. S. Grossert and K. E. Hayes on sabbatical leave. The 1983-84 year had Drs. R. J. Boyd and R. D. Guy on leave. Although both spent part of the year at Dalhousie, Dr. Boyd was for two months at the Lehrstuhl fur Theoretische Chemie of Bonn University, West Germany. Dr. Guy was involved with studies on the application of NMR to biological systems at the University of Alberta.

In January-June 1984-85 Dr. T. S. Cameron was a Visiting Professor under the auspices of the Indian Academy of Sciences followed by a period as a Royal Society Visiting Fellow at Oxford. Dr. J. A. Pincock spent his sabbatical year in photo-chemical research at the University of Texas at Austin. Dr. T. P. Forrest was engaged in studies on computer based instruction in chemistry at the Centre de Recherche Pedagogique et de Renovation Didactique en Chemie, Universite de Nice, France. During a portion of his sabbatical year Dr. R. Stephens engaged in collaborative research with Professor Kankare of the University of Turku, Finland. Dr. Stephens' visit was under the auspices of the Finnish Academy of Science.

In February 1984 it was announced that Dr. R. J. Boyd had been awarded the APICS/Fraser Medal for 1983. This award is made annually to a young scientist or engineer who has done outstanding research work in the Atlantic Provinces. Presentation of the award occurred at a luncheon on June 22, 1984.

Dr. Ramaley had been elected to the fellowship of the Chemical Institute of Canada in 1983. Dr. Boyd received the same recognition in 1984 and Drs. Chatt and Pincock became fellows in 1985. The election of these men brought the number of FCIC's in the Department to 13.

The Chemical Institute of Canada named Professor J. A. Pincock the 1985 recipient of the Union Carbide Award for Chemical Education. The award is presented annually to a person who has made outstanding contributions in Canada

to education in the field of chemistry or chemical engineering. This was the first occasion on which the award had gone to a scientist working in Nova Scotia.

Professor D. E. Ryan visited Colombo, Sri Lanka, in August, 1984. There he spoke to the International Conference on Analytical Chemistry in Development. He took as his theme, "The Trace Analysis Research Centre. Its role in Canada and in international cooperation". On May 11, 1985, Dr. Ryan presented the inaugural lecture on 'Aspects of Trace Analysis' at the UNESCO Workshop on Analytical Chemistry held in Dhaka, Bangladesh.

Professor K. T. Leffek, Dean of the Faculty of Graduate Studies and a member of the Chemistry Department, was elected to serve as President of the Chemical Institute of Canada. He will assume his duties in June, 1986.

Members of the Chemistry Department have continued to secure significant additions to research equipment. Drs. R. E. Wasylshen and B. J. Forrest obtained a Bruker MSL-200 NMR Spectrometer. This instrument supplements the Nicolet NT-360, superconducting NMR spectrometer in the Atlantic Region Magnetic Resonance Centre. At a cost of about \$325,000 it allows access to the study of solids and other systems requiring wide spectral width.

Professor D. R. Arnold acquired through NSERC funding a Hewlett-Packard Gas Chromatograph coupled with a Quadrapole Mass Spectrometer. This instrumentation is capable of separating complex reaction mixtures with the identification of components present in very small quantities.

Drs. Chatt, Hayes, M.A. White and others received substantial increases in instrumentation.

An innovation suggested by Dr. Aue has provided a number of third and fourth-year students of Honours Chemistry as tutors in the Resource Centre for first year classes. The tutors supplement the work of Mrs. D. Silvert. Each

tutor spends two hours per week helping the new students in an approach to chemistry and its problems. The tutors, who are not far removed from their own challenges of first-year, but who have survived to become first-class students, (One tutor of 1984-85 obtained the Governor-General's medal and a Rhodes Scholarship.), have made a valuable contribution. The tutors, themselves, have found values in re-thinking their chemistry in order to help others.

The most exciting prospect in Chemistry over several decades results from a proposal to renew the physical facilities of the Department. It has been noted earlier that laboratory space for undergraduate classes has been utilized to the extreme. Departmental operations have been fragmented with laboratory classes being held in the Biology area of the Life Sciences Building and in the Dunn Building. The whole research activity of the valued Trace Analysis Research group is sited in the Oceanographic wing of the Life Sciences Building, and other research is conducted in a house on University Avenue. Most of the research space in the old Science building is out-moded and, occasionally, dangerous for such operations.

A first, most cheering, step came through the acceptance of the Windsor Foundation of a proposal for the renewal of space for Chemistry. The Foundation offered one million dollars toward the project.

It is contemplated that the renewal will operate in three phases.

First, the construction of a podium to house undergraduate laboratories.

This to be followed in later years by a complete refurbishing of the existing chemistry building to house research facilities and, also a reconstruction of the MacDonald Science Library for Chemistry purposes.

The podium, a one-storey building, will supply about 20,000 sq. ft. of new space. It has been sited adjacent to, and immediately north, of the present Chemistry Building. The first-year teaching laboratory makes it feasible

to provide laboratory space each week for all students of General Chemistry. The Department had reluctantly gone to laboratory periods on alternate weeks some fifteen years ago. A modern laboratory for second-year organic classes allows students to work with adequate fume-cupboard space. Such facility has become essential under the late day demands for health in the environment. Provision has also been made for second-year and advanced laboratories for inorganic chemistry, as well as an advanced analytical laboratory. Stores and dispensing area are also being supplied. Following preliminary acceptance of a plan by the University, a building committee from the Department, chaired by Dr. C. H. Warren, has worked many hours to incorporate the latest and best ideas from both internal sources and new laboratory construction elsewhere. The Committee has utilized the advice from the Dalhousie planners and the architects, Duffus, Romans, Kundzins and Rounsefell Ltd. It has been anticipated that with construction beginning in the spring of 1986, the new area would be available for the term of 1987-88. Due to slight delays, the official opening of the Podium has been set for October 1988 although the laboratories were used for summer school 1988. Renovation of the old building must await removal of undergraduate laboratories and the availability of financing.

Changes among faculty have been noted earlier. The Department still awaits a replacement for Professor G. A. Dauphinee. The near future will bring the retirement of several senior professors. These must be replaced to maintain the strength of the Department. At the same time however, the Department welcomed the addition of Dr. Neil Burford in January 1987 and looks forward to the arrival of Dr. Peter Wentzell in the near future.

Two instructors were appointed in 1984. These were Mrs. N. E. Somers, B.Sc. (McGill) and Mrs. M. Warren, B.Sc. (Western Ontario).

The year 1982 brought Brian Millier as chief of the Electronics Shop and as Administrative Assistant Technical. He has been aided by D. D'Entremont and, later, W. LeMoine.

Dr. D. A. Othen, general Administrative Assistant departed in May, 1984. He was not replaced until March, 1985 when Mr. C. G. Owen, M.Sc. (Dal.) in Chemistry, took up this position. Mr. Owen subsequently left the Department in June 1988 and was replaced by Ms. Lucia Fanning, B.Sc. (Guelph).

In the Departmental Office B. A. Embley, S. J. Simmons and, in 1985, H. M. Gray departed. They have been replaced by A. Salsman and C. Shea. The present Office staff consists of Ms. D. Cosman, Ms. C. Shea and Ms. J. Walsh.

The several other areas of work have maintained the staffing which has been in place for a number of years.

Within 1985-86, Dr. W. A. Aue, Chairman, declined reappointment. He opted instead for a sabbatical year beginning July, 1986. A review and search committee met with members of the Department to find a large measure of support for the appointment of Dr. J. C. T. Kwak as Chairman from July 1986. The Search committee accepted this suggestion and put it forward as their nomination. Dean D. D. Betts of the Arts and Science Faculty added his approval and Dr. Kwak was appointed as the fourth Chairperson of the Department effective July 1986.

As a closing note it must be recognized that a most recent event is of importance to the Chemistry Department. President W. A. MacKay, whose six-year term of office expired at the end of August, 1986, was succeeded by Dr. Howard C. Clark. Dr. Clark who has been vice-president (academic) at the University of Guelph is an internationally known chemist and researcher as well as a recognized administrator. Dr. Clark became on September 1, 1986 the ninth president of Dalhousie, the vice-chancellor, and a professor of Chemistry.

A SUPPLEMENTChemistry at King's College

Since the session of 1924-25 undergraduates in Arts and Science from the University of King's College have been members of the Chemistry classes at Dalhousie. King's men have graduated with Honours in Chemistry from Dalhousie-King's.

Though it is claimed that King's was founded in the pattern of Oxford, as Dalhousie is of Edinburgh, and it is generally accepted that Chemistry and other sciences were taken up at Oxford and Cambridge at least two decades later than in American colleges and, perhaps Edinburgh, sound teaching of Chemistry began at King's College before it appeared at Dalhousie.

Dalhousie can be proud to accept the tradition of teaching in Chemistry that comes through the King's affiliation.

King's College at Windsor was a lineal descendant of King's in New York which was founded in 1754. It closed its doors as King's College at New York in 1776, though the institution was re-opened to become Columbia University. Loyalists, particularly Charles Inglis who had the M.A. degree from the first King's, were instrumental in founding King's College at Windsor. King's College opened its doors in 1788, but the Act of Incorporation dates from 1789. It received Royal Charter in 1802. Thus King's is the oldest, English-speaking, University of the British Commonwealth. At the laying the cornerstone of the first college building in 1791, the institution was dedicated "to sound religion, useful learning and science....."

It was 1825 before Pierce (or Perez) Morton, B.A. Trinity College, Cambridge, was appointed Professor of Mathematics and Natural Philosophy. This was the first appearance of class work in experimental science. Morton did not

remain long. In 1826, leaving his books, instruments and money, he took ship to Saint John and worked his passage back to England. A few years later an intent was expressed to bring Morton back as Professor of natural history but it does not appear that he came.

In 1854 or 1855 Henry How of the University of Glasgow was appointed Professor of Chemistry and Natural Philosophy. His specialties were Chemistry and Mineralogy. he was a pioneer scientist in the province and, in probability, had a greater impact in Chemistry than Lawson who came to Dalhousie in 1863 as Professor of Chemistry. Lawson was by practice a botanist.

It does not appear that How had a university degree when he came to King's although he had experience from both Glasgow and English laboratories. He was given an honorary D.C.L. by King's in 1861.

He soon began two classes in Chemistry. The first contained general chemistry both theoretical and applied. Chemical Physics formed a part of the course as well as the Chemistry of minerals. The second course specialized in analyses both qualitative and quantitative. "...each student is furnished with a set of analytical apparatus and has the use of the larger apparatus of the laboratory when necessary." Later, organic chemistry was part of the curriculum.

How's laboratory was equipped to carry out analyses of minerals, soils, waters, manures, etc. From 1865 the annual calendar of King's College carried an advertisement for custom analyses ranging from, "For ascertaining the nature of any such mineral or substance: 1.0.0" to; "If complete analyses of any coal or other complex substances be required, such as soils, minerals of a mixed nature: 6.0.0" Requests for analyses or information were placed with the Secretary of the Board of Governors in Halifax. The results of How's analysis of the waters of Spa Springs in Annapolis Co. appeared in the Transactions of

the Nova Scotian Institute of Science. (Nothing very rare or interesting was found). How was an indefatigable mineralogist. He first found the borate mineral Howlite in the gypsum deposits near Windsor. This may be the one instance of a mineral named after a resident of Nova Scotia. He listed other minerals of lesser note and added considerably to the knowledge of the zeolites from the Bay of Fundy shore. In 1869 he published the 'Mineralogy of Nova Scotia'.

From How's laboratory came several mine managers and at least one consulting chemist.

There are accounts for the purchase of laboratory chemicals, apparatus, and 'scientific periodicals of the highest standard'. King's had the largest library in the province. There can be little doubt that Dalhousie was not as well equipped for Chemistry until the opening of the Forrest Building in 1886.

From 1871-72 King's offered degrees and diplomas in science. In the same year J. E. Oram, B.E. was appointed professor of mathematics, natural philosophy and astronomy, and Oram together with How proceeded to produce a course in Civil Engineering. The 'Mining Journal' of London, dated May 2, 1875 read: "King's College..... considered as a college of physical science ..... it may fairly be described as excellent since the range of subjects taught is fully as large as in the College of Physical Science connected with the University of Durham, which is recognized as one of the leading science schools in Great Britain, whilst the professors occupying the several chairs are thoroughly competent."

How died in 1880 after 24 years of service. Professor Oram resigned in the same term. Although the engineering program continued until the opening of the Nova Scotia Technical College in 1909 the course did not have the chemical and mineralogical content provided by How.

How's successor was J. W. Spencer, B.Sc., Ph.D., Gottingen, as Professor of

Chemistry, Geology and Mining. He was a Geologist by training. In two or three years he was replaced by G. T. Kennedy, M.A. (King's, ad eund.), B.Ap. Sc., (he later obtained the D.Sc. from King's) also as Professor of Chemistry, Geology and Mining.

Kennedy provided the Chemistry for Arts and the Engineering degree, and apparently, acted as examiner in Chemistry when in 1896-7 King's offered degrees in Medicine and Surgery to students who completed a course at the Halifax Medical College. Chemistry, however, did not flourish as in How's day. Advertisements for the analytical laboratory ceased. Expenditures on the laboratory fell, to a low of \$0.60 in a year, but apparently the practical course was a source of general revenue since income such as \$107.75 against expenditure of \$22.00 was common in several years.

Professor Kennedy disappeared from the King's faculty when the Engineering degree was abandoned with the beginning of the Nova Scotia Technical College. The degree of medicine was abandoned also. S. Theodore Parkinson and J. W. Mavor appeared in rapid succession as professor or lecturer in natural science. Probably only one class in Chemistry was provided though two were sometimes listed. In 1908 J. B. McCarthy, B.A., M.A., was appointed Professor of Science and in 1910 E. Howarth became lecturer in physics and engineering. The calendar of that year reads: "King's College was the pioneer of scientific training in the province and has a well-equipped chemical laboratory and a valuable collection of scientific instruments". A new science wing built in 1912 - "makes ample provision for lecture rooms and up to date, well stocked, chemistry and physics laboratories". The calendar offerings suggest that major emphasis was upon the pre-engineering course which would provide entrance to the Nova Scotia Technical College.

In 1917-18, R. L. Nixon, B.Sc. was lecturer in science. He was followed in

74.

1921-22 by A. A. Sturley, M.A. as professor of Chemistry and Physics. The principal college building at Windsor burned on February 5th, 1920. The science wing survived. Work was continued at Windsor, but the 1924-25 calendar shows King's in affiliation with Dalhousie in Halifax. No chemistry staff made the transfer to Halifax. The first conjoint faculty list shows one Assistant Professor of mathematics under the King's foundation. King's has continued to provide mathematics instructors to the present day, and at one period supported G. H. Henderson, B.A., B.Sc., M.A., Ph.D. (Cantab.) as Professor of Mathematical Physics.

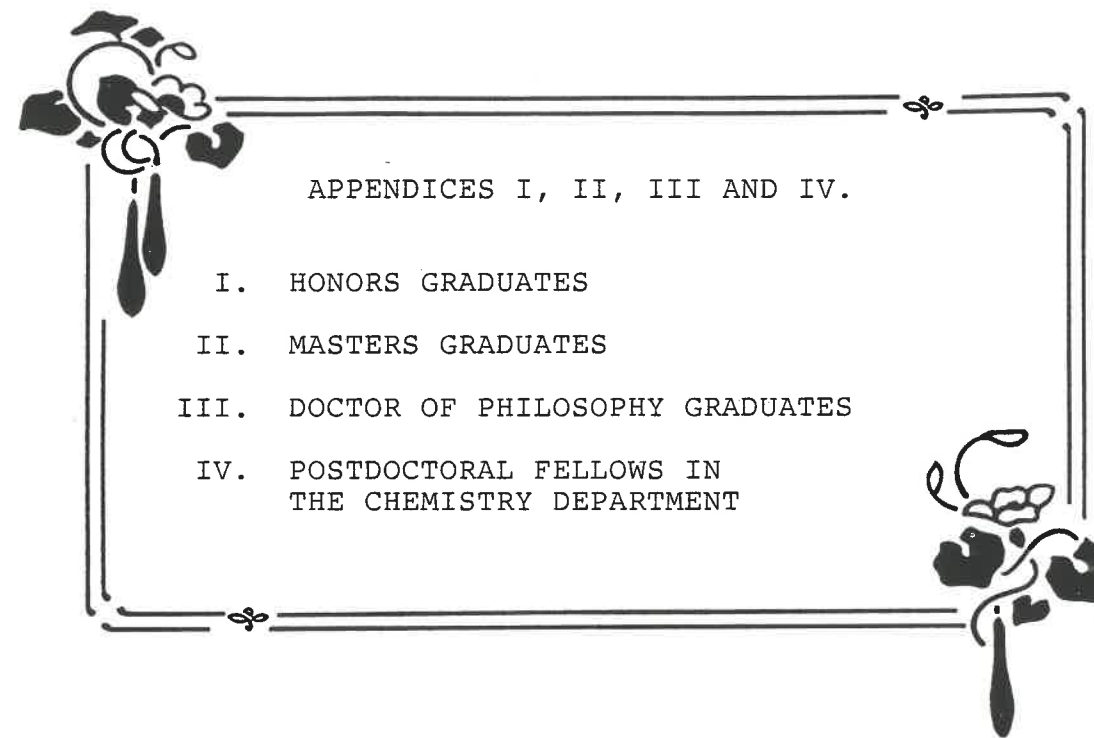
King's tradition in the teaching of Chemistry has fallen to Dalhousie.

SOURCES:

King's College, A Chronicle, 1789-1939; Vroom, F.W.

Imperial Publishing Co. Ltd., Halifax.

Calendars of the University of King's College 1855 to date.





## APPENDIX I

## HONOURS GRADUATES

1886	Ebenezer MacKay	First Class Honours in Experimental Physics and Chemistry.
1900	Elizabeth H. Stewart	Honours in Chemistry & Physics
1901	R. A. Boehner	Honours in Chemistry & Physics
1902	L. M. Alexander	Honours in Chemistry & Physics
1903	W. H. Ross	High Honours in Chemistry & Physics
1905	H. J. M. Creighton	High Honours in Chemistry & Physics
	G. M. J. MacKay	High Honours in Chemistry & Physics
1909	C. C. Wallace	Honours in Chemistry & Physics
1910	H. S. Davis	High Honours and medal in Chemistry and Chemical Physics.
	H. W. Watson	High Honours and medal in Chemistry and Chemical Physics.
1915	H. B. Vickery	High Honours in Chemistry and Chemical Physics
1925	K. H. Butler	High Honours, Chemistry
1929	F. F. Musgrave	Honours, Chemistry
1930	W. F. Hampton	Honours, Chemistry
1932	J. F. Horwood	Honours, Chemistry
1934	W. B. Beazley	Honours, Chemistry
1936	J. R. Dacey	Honours, Chemistry
1937	A. C. Topp	Honours, Chemistry
1938	J. R. E. Smith (Kings)	High Honours, Chemistry
1939	J. C. Arnell	High Honours, Chemistry

1941	J. R. Dingle	High Honours, Chemistry (Governor-General's Medal)
1949	I. H. S. Henderson	High Honours, Chemistry
1950	W. D. Jamieson	First Class Honours, Chemistry
	D. H. Andrews	Honours, Chemistry
1952	G. E. Cheney	Honours in Chemistry
	M. J. Fraser	Honours in Chemistry
	J. M. Reeves	Honours in Chemistry
1953	Natasha Coffin	First Class Honours in Chemistry and Governor-General's Medal
	Marion C. Chepeswick	Honours in Chemistry
1954	E. Arnold	Honours in Chemistry
1955	Bernadine M. Melanson	First Class Honours in Chemistry and Governor-General's Medal
	J. T. Lauder	Honours in Chemistry
1957	Janet M. Conrad	First Class Honours in Chemistry
	Dorothy C. D. Naftel	Honours in Chemistry
	Joy M. Cunningham	Honours in Chemistry
1958	E. M. Levy	First Class Honours in Chemistry
	A. S. Reeves	Honours in Chemistry
1959	M. Ali	Honours in Chemistry
	Nadine R. M. Haase	Honours in Chemistry
	Margaret A. Sinclair	Honours in Chemistry
1960	I. D. Gay	First Class Honours in Chemistry and Governor-General's Medal
	R. A. Haines	First Class Honours in Chemistry
	D. L. Whalen	First Class Honours in Chemistry
	M. L. Heit	Honours in Chemistry
	W. A. MacDougall	Honours in Chemistry

1961	J. R. Jackson	Honours in Chemistry
1962	T. R. Mason	First Class Honours in Chemistry and Governor-General's Medal
	N. W. K. Chiu	Honours in Chemistry
	J. R. Dean	Honours in Chemistry
	T. E. C. Hogan	Honours in Chemistry
	K. E. L. Matheson	Honours in Chemistry
	H. M. Whitehead	Honours in Chemistry
1963	W. R. MacDonald	First Class Honours in Chemistry
	Madeline R. Evans	Honours in Chemistry
	J. P. Sherren	Honours in Chemistry
1964	Yim Ha Lee	First Class Honours in Chemistry
	Diana T. Messervey	First Class Honours in Chemistry
	R. C. Waterfield	Honours in Chemistry
1965	J. W. MacDonald	Honours in Chemistry
	A. E. J. Pitts	Honours in Chemistry
	F. A. Sommerville	Honours in Chemistry
1966	W. F. Miles	Honours in Chemistry
	G. G. Sims	Honours in Chemistry
	M. E. Smith	First Class Honours in Chemistry
1967	I. D. Abraham	Honours in Chemistry
	C. D. Myers	Honours in Chemistry
	M. A. Puttock	Honours in Chemistry
	Nancy B. Smith	Honours in Chemistry
	J. W. H. Sutherland	First Class Honours in Chemistry
	W. Y. Yue	Honours in Chemistry

1968	Charalyn D. Freeman	Honours in Chemistry
	R. J. Harrison	Honours in Chemistry
	R. F. Langler	Honours in Chemistry
1968	D. W. Lemon	Honours in Chemistry
	R. W. MacDonald	First Class Honours in Chemistry
	T. P. Meyerhof	Honours in Chemistry
1969	J. F. Lawrence	Honours in Chemistry
	W. Mohammed	Honours in Chemistry
	Valerie J. Robertson	Honours in Chemistry
	D. G. Short	Honours in Chemistry
	Gwendolyn H. Thomas	First Class Honours in Chemistry
1970	S. D. MacKnight	Honours in Chemistry
1971	Jean M. Cooley	First Class Honours in Chemistry
	H. D. Fawcett	Honours in Chemistry
	C. J. Penney	Honours in Chemistry
	P. G. Rushton	First Class Honours in Mathematics and Chemistry
1972	J. L. Brown	First Class Honours in Biology and Chemistry and University Medal in Biology
1973	J. W. H. Dacey	First Class Honours in Biology and Chemistry (King's)
	D. G. Ettinger	Honours in Chemistry
	R. B. Flemming	First Class Honours in Chemistry
	C. G. C. Flinn	First Class Honours in Chemistry and University Medal in Chemistry
	J. K. LeDue	First Class Honours in Chemistry
	R. R. Shields	Honours in Chemistry

1974	K. E. Beall	Honours in Biology and Chemistry
	S. M. Cameron	First Class Honours in Biology, Geology and Chemistry
	D. E. Veinot	Honours in Chemistry
	R. L. White	First Class Honours in Chemistry and University Medal
1975	P. C. Alme	First Class Honours in Chemistry
	P. P. Davis	Honours in Chemistry
	I. Hall	First Class Honours in Biology and Chemistry (King's)
	J. M. Hartwell	First Class Honours in Chemistry
	J. R. Leahy	Honours in Chemistry
	G. K. Lepine	Honours in Biology and Chemistry
	D. A. MacLean	First Class Honours and University Medal in Chemistry
	J. B. Murphy	Honours in Chemistry
	D. H. North	First Class Honours in Chemistry
	T. J. Schaus	Honours in Chemistry and Mathematics
	E. A. Ulesoo	Honours in Biology and Chemistry
1976	L. M. Druet	Honours in Chemistry
	A. J. Johnston	First Class Honours in Chemistry
	P. A. H. Keating	Honours in Mathematics, Chemistry and Biology
	W. M. Neaves	Honours in Chemistry
	A. G. Rand	First Class Honours and University Medal in Chemistry
	C. Q. A. Soward	Honours in Chemistry
1977	P. A. Bloxham	Honours in Chemistry
	M. K. Burns	First Class Honours in Biology and Chemistry

1977	D. A. Boudreau	Honours in Chemistry
	S. E. Campana	First Class Honours in Biology and Chemistry
	C. A. Courneya	First Class Honours in Chemistry
	R. J. Fiander	Honours in Chemistry (King's)
	N. J. Morrison	First Class Honours in Chemistry
1977	G. F. Murphy	First Class Honours and University Medal in Chemistry and Governor-General's Gold Medal
	P. D. Nash	Honours in Chemistry
	R. W. P. Nelson	Honours in Chemistry
1978	D. W. Brown	First Class Honours in Chemistry
	C. M. Clancey	Honours in Chemistry
	R. M. Gordon	First Class Honours in Chemistry
	K. W. Ling	Honours in Chemistry
	T. D. McLean	Honours in Chemistry
	W. E. Nearing	Honours in Chemistry
	F. J. Northrup	First Class Honours and University Medal in Chemistry, Governor-General's Gold Medal
	C. G. Owen	Honours in Chemistry
	L. J. Seto	Honours in Chemistry
	T. E. Vessey	Honours in Biology and Chemistry
1979	R. T. Boere	First Class Honours and University Medal in Chemistry
	W. T. Couldwell	First Class Honours in Biology and Chemistry
	E. P. D. Hamilton	First Class Honours in Chemistry
	J. R. Hancock	Honours in Chemistry
	A. R. Jurgens	Honours in Chemistry

1979	P. D. Mack	First Class Honours in Chemistry
	G. E. Markus	Honours in Chemistry
1980	R. B. Amero	Honours in Chemistry
	C. H. M. Chisholm	First Class Honours in Chemistry
	M. F. Haley	Honours in Chemistry
	M. P. Haley	Honours in Chemistry
	D. J. Levandier	First Class Honours and University Medal in Chemistry
	P. E. Meindl	Honours in Chemistry
	G. G. Moujaes	Honours in Chemistry and Biology
1981	S.-C. Choi	Honours in Chemistry
	L. E. Donald	Honours in Chemistry
	J. A. Jenkins	Honours in Chemistry
	L. F. Leveck	Honours in Chemistry
	S. Naxakis	Honours in Chemistry
	M. L. Robicheau	Honours in Chemistry
	D. R. Stirling	Honours in Chemistry
	M. C. Yee	First Class Honours and University Medal in Chemistry
1982	P. A. Gardner	Honours in Chemistry
	J. B. King	Honours in Chemistry
	L. A. MacDonald	Honours in Chemistry
	P. D. Wentzell	First Class Honours and University Medal in Chemistry
1983	B. R. Arnold	Honours in Chemistry
	C. C. Hale	Honours in Chemistry by Certificate
	S. E. H. Niven	Honours in Chemistry (Cooperative Education)
	J. P. G. Santerre	Honours in Chemistry

1983	B. R. Vincent	Honours in Chemistry
	Z. H. Walker	Honours in Chemistry
1984	S. G. Armstrong	Honours in Chemistry
	B. A. Collings	Honours in Chemistry (Cooperative Education)
	B. J. Fahie	Honours in Chemistry
	P. G. Hajigeorgiou	Honours in Chemistry
	M. D. McPhee	Honours in Chemistry
	S. L. Roberts	First Class Honours in Chemistry and University Medal
	D. E. Slauenwhite	Honours in Chemistry
	J. P. Thomson	First Class Honours in Chemistry
	M. A. Vaughan	First Class Honours in Chemistry (Cooperative Education)
	E. M. Verpoorte	Honours in Chemistry
1985	R. S. Brown	Honours in Chemistry
	D. R. Drover	Honours in Chemistry
	J. W. Ervine	(King's) Honours in Biochemistry and Chemistry combined
	G. A. Facey	Honours in Chemistry
	G. C. Fisher	Honours in Chemistry (Cooperative Education)
	B. J. Flinn	First Class Honours in Chemistry
	J. O. Friedrich	First Class Honours in Chemistry; University Medal; Governor-General's Gold Medal; Rhodes Scholarship
	J. N. M. Glover	Honours in Biochemistry and Chemistry combined
	D. L. Moir	Honours in Chemistry (Cooperative Education)
	B. D. Wagner	First Class Honours in Chemistry

1985	K. M. Young	First Class Honours in Chemistry
1986	V. M. Allen	Honours in Chemistry
	A. L. Bailey	Honours in Chemistry
	R. M. Dickson	First Class Honours in Chemistry and Computing Science combined
	T. A. Duggan	Honours in Biochemistry and Chemistry combined
	J. H. Graham	Honours in Chemistry
	G. D. Hamilton	Honours in Chemistry (Cooperative Education)
	K. L. Leighton	First Class Honours in Chemistry
	I. N. MacInnis	(King's) Honours in Chemistry and Geology combined (Cooperative Education in Chemistry)
	S. A. Moore	Honours in Chemistry
	D. E. Peeler	Honours in Chemistry (Cooperative Education)
	A. M. Quinn	Honours in Chemistry (Cooperative Education)
1987	P.L. Folkin	Honours in Chemistry
	S.H-C. Ng	First Class Honours in Chemistry and University Medal
	M.D. Powell	Honours in Geology and Chemistry
1988	H.A. Avison	Honours in Chemistry and Geology
	D.B. Froom	Honours in Biochemistry and Chemistry
	J.D. Gordon	Honours in Chemistry
	K.A. McManus	Honours in Chemistry
	D.B. Moore	Honours in Chemistry

1988	A.L. Perrott	First Class Honours in Chemistry and a University Medal and the Governor-General's Silver Medal
	Wm.P. Power	Honours in Chemistry
	P.I. Presunka	Honours in Chemistry
	C.M. Trottier	First Class Honours in Chemistry

APPENDIX II

## Masters Graduates

Students who had obtained a B.A. as a first degree were given the M.A.

Master of Arts

1871	James Forrest	for a thesis, "The Science of Chemistry, its History and Progress"
1872	Herbert A. Bayne	
1906	G. M. J. MacKay	
1907	H. J. M. Creighton	
1912	H. S. Davis	"in Physical Chemistry"
1921	E. F. Whyte	"in Chemistry"
1922	L. A. Munro	"in Chemistry"
1926	K. H. Butler	"in Chemistry and Physics"
1927	A. S. Cook	"in Chemistry"
1928	R. A. MacDonald	"in Chemistry"
1930	G. F. Frame	"in Chemistry"
1934	Mary K. Merriam	"in Chemistry"

Master of Science

Where no first degree is listed the student held a Bachelor's Degree from Dalhousie.

1904	W. H. Ross	"in Chemistry"
1913	W. C. Stapleton	"in Chemistry"
1925	Margaret F. McCurdy	"in Chemistry"
1928	D. LeB. Cooper	"in Chemistry"
	Anna M. Wilson	"in Chemistry"
	J. C. Hall	"in Chemistry and Geology"
1929	J. R. Morton	"in Chemistry"
1931	A. C. Bell	"in Chemistry"
	Pauline A. Miller	"in Chemistry"
1932	H. R. Fraser	"in Chemistry"
1934	A. L. Geddes	"in Chemistry"
	S. Johnston	"in Chemistry"
	G. R. Smith	"in Chemistry"
1935	W. B. Beazley	"in Chemistry"
	Anna M. Olding	"in Chemistry"
1936	R. L. McIntosh, B.A.	"in Chemistry"
1937	N. A. D. Parlee	"in Chemistry"
1938	R. L. Cunningham	"in Chemistry"
	J. R. Dacey	"in Chemistry"
	F.B. Maddock	"in Chemistry"
1939	A. C. Topp	"in Chemistry"
1940	J. C. Arnell	"in Chemistry"
	C. A. Reilly	"in Chemistry"

1940	J. P. Walsh	"in Chemistry"
1941	G. S. MacKnight	"in Chemistry"
1943	J. R. Dingle	
	G. B. Rosenfeld, B.A. (N.Y.U.), M.A. (Col.)	
1944	A. K. Archibald	
	J. C. Devins	
	J. H. Greenblatt	
	A. G. Wood	
1945	T. R. Ingraham	
	G. R. Vavasour	
1946	E. J. Caule	
	B. L. Funt	
	C. E. Hubley, B.Sc. (Acadia)	
	S. Schrage	
1947	P. M. Laughton, B.A. (Toronto)	
	R. M. MacDonald	
1948	G. N. Milford, B.Sc. (Mt. A.)	
	Thora A. Reid	
	P. Yates, B.Sc. (London)	
1949	Rosemary W. Blount	
	I. I. Tingley	
	S. G. Whiteway	
1950	J. A. Brothers, B.Sc. (St. F.X.)	
	A. R. Reid	
	J. S. Rose	
1951	D. H. Andrews	

- 1951 W. D. Jamieson  
D. F. MacLennan  
I. H. S. Henderson  
L. C. Johnston  
W. D. L. Sherren  
D. G. Smith
- 1952 R. G. Ackman, B.A. (Toronto)  
G. H. Richardson, B.Sc. (Acadia)  
K. A. Shelstad, B.Sc. (Sask.)
- 1953 E. R. Hayes, B.Sc. (Acadia)  
G. A. Dauphinee
- 1954 G. E. Cheney  
G. D. Lutwick  
S. M. Tancoo
- 1955 D. C. Santry
- 1957 Bernadine M. Melanson  
D. L. Simmons, B.Sc. (Acadia)
- 1958 C. A. Armour, B.Sc. (Mt. A.)
- 1959 T. P. Forrest, B.Sc. (Mt. A.)  
W. R. Ritcey
- 1960 D. S. Gamble  
E. M. Levy
- 1961 E. C. Brown, B.Sc. (Mt. A.)
- 1962 I. D. Gay  
R. A. Haines  
D. L. Whalen

- 1963 M. L. Heit  
W. G. MacIntyre  
Frances E. Piercy, B.Sc. (Mt. A.)
- 1964 J. R. Dean  
J. W. MacLean, B.Sc. (Mt. A.)
- 1965 R. R. Trenholm, B.Sc. (Mt. A.)
- 1966 G. A. Brydon, B.Sc. (Acadia)  
C. Heitner, B.Sc. (Sir Geo. Williams)  
D. A. Horne  
Yim Ha Lee  
Diana T. Messervey
- 1967 A. V. Campbell, B.Sc. (St. F.X.)  
J. D. Castell  
J. A. Hall, B.Sc. (Mt. A.)  
A. E. J. Pitts  
H-C F. Tsao, B.Sc. (Taiwan)  
R. G. Waterfield
- 1968 J. T. Burns, M.A. (St. Mary's)  
R. M. Cassidy  
C-H Huang, B.Sc. (Taiwan)  
G. E. Jackson  
K.-J. Lee  
D. P. Ritcey, B.Sc. (Mt. A.)  
L. Teng, B.Sc. (Chung Yuan)
- 1969 Jean M. Hartley, B.Sc. (Imperial College, London)  
C. D. Myers



- 1969 G. G. Sims  
F. S. Wu, B.Sc. (Taiwan)
- 1970 I. D. Abraham  
Eleanor L. Kulin, B.Sc. (Marianopolis)  
Nancy B. S. Lowery
- 1971 Charalyn D. Freeman  
L. M. Harding, B.Sc. (U.N.B.)  
G. H. Jamro, B.Sc. (Sindl)  
T. P. Meyerhof  
W. F. Miles  
V. Parthasarathy, B.Sc. (Bedford Coll.)  
S-I Wie, B.Sc. (Nanyang)  
M. G. Win-Pe, M.Sc. (Rangoon)
- 1972 Karen Anne Crouse, B.Sc. (St. F.X.)  
Paul D. Keizer, B.Sc.
- 1973 Gordon D. Hebb, B.Sc.; L.LB.  
Scott D. MacKnight, B.Sc.  
Donald E. Morrison, B.Sc. (St. F.X.)  
Paul S. Renault, B.Sc. (St. F.X.)  
Daniel K.-W. Wang, Dip. Chem. (Hong Kong Baptist College)
- 1974 Man-Ching Chan, B.Sc. (Chinese University of Hong Kong)  
Charman W. Ching, B.Sc. (National Taiwan)  
Robert C. Hayes, B.Sc. (Brock)  
Claudine M. Pothier, B.Sc. (Mt. St. V.)  
Sean G. Wong, B.Sc. (Polytech of London)

- 1975 Gerald Felsky, B.Sc. (McGill)  
Brian J. Ferguson, B.Sc. (West. Ont.)
- 1976 Chiu-Long Chou, B.Sc. (Tamkang College)  
Christopher G. C. Flinn, B.Sc.  
Sonia O. Gaul, B.Sc. (Mt. St. V.)  
Mayra Maria Granda Valdes, Lic. (Havana)  
Chan-Yee Law, B.Sc. (Chinese University of Hong Kong)  
Alexis Moutsokapas, Dip. Chem. (Aristotelian)  
Dwight E. Veinot, B.Sc.
- 1977 Linda M. Druet, B.Sc.  
Thanthrimudalege Don Juan Dunstan, B.Sc. (Ceylon)  
Vijeyalakshmi Gulasekharam, B.Sc. (Sri Lanka)  
Kriyani Paramasigamani, B.Sc. (Ceylon)  
F. Gail Ross, B.Sc. (U.N.B.)  
Paula A. Sherman, B.Sc. (Delaware)  
B.A. (Wilson College)  
Chandrasiri Somawardhana, B.Sc. (Sri Lanka)  
Subramaniam Sukumar, B.Sc. (Ceylon)  
Tiu Swee, B.Sc. (National Ching-Hsing University)  
Dein Bander Tulshian, B.I.T.S. (Pilani)
- 1978 Thomas D. Cunningham, B.Sc. (U.N.B.)  
Katherine M. Ellis, B.Sc. (Queens)  
Masahiro Ieki, B.Sc. (Kyushu)  
Walisundra N. Ratnayake, B.Sc. (Sri Lanka)  
Dominik M. Wernik, B.Sc. (Warsaw)
- 1979 John A. Dalziel, B.Sc. (St. Mary's)

- 1979 Alan R. Kean, B.Sc. (Acadia)  
 Daniel H. North, B.Sc.  
 Rathy Ponnampalam, B.Sc. (Sri Lanka)  
 Margaret R. Sandeman, B.Sc. (M.U.N.)
- 1980 Richard W. P. Nelson, B.Sc.
- 1981 Thomas D. McLean, B.Sc.  
 K. A. Saman Pathiratne, B.Sc. (Sri Lanka)
- 1981 Stephen W. Veysey, B.Sc. (U.N.B.)
- 1982 Julian M. M. Dust, B.Sc. (Waterloo)  
 Kenneth E. Edgecombe, B.Sc. (M.U.N.)  
 Michael P. Haley  
 Alex R. Jurgens  
 Kenneth W. Ling  
 Allan L. MacKenzie, B.Sc. (UPEI)  
 Charles Gordon Owen
- 1983 Dale J. Levandier  
 Joyce E. Milley, B.Sc. (Mt. Allison)
- 1984 Sai-Cheng Choi  
 Joseph L. Ma, B.Sc. (Tunghai)
- 1985 James A. Jenkins  
 Alcides E. Rodriguez Gonzalez, Chem. Ing.  
 (High. Inst. Chem. Tech., Bulgaria)  
 James R. Hancock
- 1986 Peter D. Mack  
 Dong Cuan Liang, Diplomas (Guangzhou) (Zhongshan)  
 (South China Sea Inst.)  
 Linda S. McDowell, B.Sc. (Waterloo)

- 1986 Giovanna T. Valente, B.Sc. (McGill)
- 1987 Barbara E. Foster, B.Sc. (U.P.E.I.)  
 Kevin McMahon, B.Sc. (Edinburgh)  
 Miles S. Snow
- 1988 Shelley A. Mines, B.Sc. (Acadia)

## APPENDIX III

Doctor of Philosophy in Chemistry

- 1964 St. John H. Blakeley, M.Sc. (Imperial College, London)
- 1965 M. Sweeney, B.Sc., M.Sc. (Mt. A.)
- 1966 M. L. Heit, B.Sc., M.Sc. (Dalhousie)
- 1967 S. R. L. Baig, B.Sc. (Mt. A.)  
 F. R. D. Brisse, B.Sc. (Bordeaux)  
 T. E. C. Hogan, B.Sc. (Dalhousie)  
 T. McEwan, B.Sc. (Queensland)  
 H. M. Whitehead, B.Sc. (Dalhousie)
- 1968 N. Madhavan, B.Sc. (Madras)
- 1969 T. A. Ford, M.Sc. (Wales)  
 W. R. MacDonald, B.Sc. (Dalhousie)  
 R. Rahman, M.Sc. (Dacca)  
 K. I. G. Reid, B.Sc. (Durham)  
 H. F. Wallace, B.Sc. (Sask.)
- 1970 A. F. Matheson, B.Sc. (Edinburgh)
- 1971 Diana T. Drmaj, M.Sc. (Dalhousie)  
 J. C-H Huang, B.Sc. (Taiwan Normal), M.Sc. (Dalhousie)  
 S. Ray, B.Sc. (Calcutta), M.Sc. (Dalhousie)
- 1972 Permod K. Kaushal, M.Sc. (Panjab)  
 Kwang J. Koh, B.Sc. (Nat. Seoul. Univ.)  
 M.Sc. (Sung Kyun Kevan)  
 Dirkson D-S Liu, B.Sc. (Nat. Taiwan)  
 Victorin Mallet, M.Sc. (Moncton)  
 Badri B. Muhammad, B.Sc. (St. F.X.)

- 1972 William St. J. Powell, B.Sc. (Sask.)  
 Michael E. Smith, B.Sc.  
 Lei Teng, B.Sc. (Chung Yuan Christian College)
- 1973 Conrad Ayasse, B.Sc. (Tor.) M.Sc.  
 Paul E. Belliveau, M.Sc. (Moncton)  
 Jaroslav Kriz, M.Sc. (Inst. Chem. Tech.)  
 Gerald Kwong-Chip, B.Sc. (London)  
 James F. Lawrence, B.Sc.  
 Robie W. Macdonald, B.Sc.  
 James D. MacNeil, M.Sc. (St. F.X.)  
 Peter S. White, B.Sc. (Kent.)
- 1974 Jiri Holzbecher, M.Sc. (Tech. Univ. of Prague)  
 Muhammed N. Islam, B.Sc. (Rajshahi)  
 M.Sc. (Moncton)  
 Robert A. F. Matheson, M.Sc. (Mt. A.)  
 Manet Rujimethabhas, B.Sc. (Sydney)
- 1975 Herbert H. Hill, M.S. (Missouri)
- 1976 Shubhender Kapila, B.Sc. (P.A.U. Ludheana)  
 M.Sc. (Missouri)  
 Gregory Matinopoulos, B.Sc. (Athens)  
 Ramabhadran Vasudev, M.Sc. (Delhi)  
 Madan M. Bharadwaj, M.Sc. (Delhi)  
 Anna Matinopoulos (Scordou), B.Sc. (Athens)  
 Richard F. Langler, B.Sc., M.Sc. (U.N.B.)
- 1977 Suzanne R. Macaulay, B.Sc. (Carleton)

- 1979 Christopher G. C. Flinn, B.Sc.  
 Yatindra M. Joshi, M.Sc. (Delhi)  
 Veluppillai Paramasigamani (Sri Lanka)  
 Maduwegedara A. Wickramaratchi (Sri Lanka)
- 1980 Deoraj R. Narine, B.Sc. (Univ. of Guyana)  
 M.Sc. (Acadia)  
 Walesundra M. N. Ratnayake, B.Sc. (Sri Lanka)  
 Laurier L. Schramm, B.Sc. (Carleton)  
 Chi Sang Tse, B.Sc. (Chinese University of Hong Kong)  
 Palitha P. Wickramanayake, B.Sc. (Sri Lanka)
- 1981 Nimalasiri K. DeSilva, B.Sc. (Sri Lanka)  
 Asoka I. Kulathilaka, B.Sc. (Sri Lanka)  
 K. W. Michael Siu, B.Sc. (Hong Kong)  
 M.Sc. (Birmingham)  
 Bentara H. D. J. H. Wimalasena, B.Sc. (Sri Lanka)
- 1982 Stephen C. Foster, B.Sc. (Manchester)  
 Jairajh Mattai, B.Sc., Dip. Educ. (Guyana)
- 1983 Mahmooda G. Ahmed, B.Sc. (Dacca), M.Sc. (Alberta)  
 Robert M. Borg, B.Sc., M.Sc. (Malta)  
 Gurvinder S. Jolly, B.Sc., M.Sc. (Gurununak)  
 Naresh C. Mathur, B.Sc. (Delhi), M.Sc. (I.I.T. Kanpur)  
 Paula A. Michalik, B.Sc.  
 John J. Sandberg, B.A. (St. John's University, MN)  
 Wee Tee Tan, B.Sc., M.Sc. (Canterbury)
- 1984 A. Latiff Ayub, B.Sc. (Guyana), M.Sc. (Acadia)  
 Charles L. Bourque, B.Sc., M.Sc. (Moncton)  
 Samitha P. Deraniyagala, B.Sc. (Colombo)

- 1984 Srianthie A. Deraniyagala, B.Sc. (Colombo)  
 Shantha M. DeSilva, B.Sc. (Sri Lanka)  
 Shixue Dou, Diploma (Jilin)  
 Jeffrey Hoyle, B.A. (honours) (York)  
 M.Sc. (Leeds)  
 Sylvio Quezado de Magelhaes, B.Sc. (Universiidade de Brasili)  
 M.Sc. (Universiidade de Sao Paula)  
 Bishop B. Sithole, B.Sc. (Sierra Leone)  
 M.Sc. (Aberdeen)  
 Daniel D. M. Wayner, B.Sc. (McMaster)
- 1985 John A. Hiltz, B.Sc. (McGill)  
 Aloysius Martin de P. Nicholas, B.Sc. (spec.) (Sri Lanka)  
 Brian A. Pettitt, B.Sc., M.Sc. (Manitoba)
- 1986 Margaret Ann James, B.Sc.  
 Phillip Oltmann, B.Sc. (Calgary)  
 David K. Rodham, B.A., M.A. (Oxford)
- 1987 Kathirevet P. Brabakaran, B.Sc. (Peradeniya)  
 Kenneth E. Edgecombe, B.Sc. (Memorial), M.Sc. (Dalhousie)  
 Hewa Patinge Channa Kumar Jayawickreme, B.Sc. (Sri Lanka)  
 James B. King, B.Sc. (Dalhousie)  
 Adam W. McMahon, B.A. (Oxford)  
 Sandra A. Mooibroek, B.Sc. (Winnipeg)  
 Michiel M. Van Oort, B.Sc. (Waterloo)
- 1988 Palitha Jayaweera, B.Sc. (Sri Lanka)  
 Sarath Y. Namaratne, B.Sc. (Sri Lanka)

- 1988 You-Zhi Tang, B.Sc. (Zhong Shan University, China)  
 Beverly R. Vincent, B.Sc. (Dalhousie)  
 Chandra Wickramage, B.Sc. (Peradeniya)

APPENDIX IV

Postdoctoral Fellows and Visiting Scientists in the Chemistry Department

The dating which follows is approximate. Fellows arrived and departed at other than the beginnings of academic years. Accurate records are not available.

- 1950-51 P. M. Laughton, B.A. (Toronto), M.Sc. (Dalhousie)  
 Ph.D. (Wisconsin) under N.R.C.
- 1957-59 V. S. Gaiind, Ph.D. (Panjab) under N.R.C.
- 1959-61 G. A. Dean, Ph.D. (London) under N.R.C.
- 1961-62 D. Prakash, Ph.D. (Alld.)
- 1963-64 A. Metcalfe, Ph.D. (Bristol)
- 1964-66 D. M. MacKinnon, Ph.D. (Edinburgh)
- 1964-66 D. Rouvray, Ph.D., D.I.C. (London)
- 1965-67 S. P. Singhal, Ph.D. (Delhi)
- 1965-67 R. Barchet, Dr. Rer. nat. (Freiburg)
- 1965-66 R. W. Frei, Ph.D. (Hawaii)
- 1967-69 B. K. Afghan, Ph.D. (London)
- 1967-69 V. Seidl, Ph.D. (Prague)
- 1967-69 J. Jonas, Ph.D. (Prague)
- 1967-68 M. T. El Chamry, Ph.D. (London)
- 1968-70 B. K. Pal, Ph.D. (Jadavpur)
- 1968-71 D. J. Stewart, Ph.D. (Wellington)
- 1968-70 K. K. Yee, Ph.D. (U.B.C.)
- 1968-69 J. Abraham, Ph.D. (McMaster)
- 1968-70 W. W. Barker, Ph.D. (Western Australia)
- 1969-70 S. A. Berger, Ph.D. (Conn.)
- 1969-70 A. Jarczewski, Ph.D. (Poznan)

- 1969-71 A. N. Kardos, Ph.D. (Prague)  
 1969-70 E. C. F. Ko, Ph.D. (Western Australia)  
 1969-70 O. Navratil, Ph.D. (Brno)  
 1969-70 P. Price, M.Sc. (Witwatersrand)  
 1969-70 V. Zatka, Ph.D. (Prague)  
 1969-70 M. Katyal, Ph.D. (Delhi)  
 1970-71 T. Bergendahl, Ph.D. (Vermont)  
 1970-71 K. S. Bhatia, Ph.D. (U.B.C.)  
 1970-72 T. Bidleman, Ph.D. (Minnesota)  
 1970-71 M. Walter, Ph.D. (Illinois)  
 1970-71 F. Snape, Ph.D. (Swansea)  
 1970-71 J. W. Thorpe, Ph.D. (McMaster)  
 1970-71 P. H. Tremaine, Ph.D. (McGill)  
 1970-71 R. Vivilecchia, Ph.D. (Northeastern)  
 1971-72 D. B. Armitage, Ph.D. (Hawaii)  
 1971-73 R. Cassidy, Ph.D. (McM.)  
 1972-72 F. Chen, Ph.D. (Col.)  
 1971-72 J. H. Kim, Ph.D. (Penn.)  
 1971-73 K. Koh, Ph.D. (Dal.)  
 1971-72 P. Mathiaparanam, Ph.D. (McGill)  
 1971-74 T. L. Pollock, Ph.D. (Ala.)  
 1971-74 P. Price, Ph.D. (Toronto)  
 1971-72 S. Ray, Ph.D. (Dal.)  
 1971-72 R. G. Stevenson, Ph.D. (Mo.)  
 1971-72 J. W. Thorpe, Ph.D. (McM.)  
 1971-72 M. Walter, Ph.D. (Ill.)  
 1972-74 J. S. Carlow, Ph.D. (Exeter)

- 1972-73 K. E. Curtis, Ph.D. (Waterloo)  
 1972-73 M. Janmohamed, Ph.D. (Texas)  
 1972-73 D. Kunzru, Ph.D. (Pitt.)  
 1972-74 H. P. Longerich, Ph.D. (Indiana)  
 1972-74 A. Mishra, Ph.D. (Monash)  
 1972-73 D. A. Othen, Ph.D. (Alberta)  
 1972-73 R. Prime, Ph.D. (McM.)  
 1972-75 A. Held, Ph.D. (Montana State)  
 1972-73 J. Holzbecher, Ph.D. (Dal.)  
 1972-74 C. B. Kim, Ph.D. (Northern Illinois)  
 1972-74 P. Kobrinsky, Ph.D. (Santa Barbara)  
 1972-73 A. Lumb, Ph.D. (Panjab)  
 1972-73 H. Rollier, Ph.D. (Lausanne)  
 1972-75 E. G. Skolnik, Ph.D. (Maine)  
 1972-76 K. V. Subbaram, Ph.D. (Kanpur)  
 1972-75 D. Tsui, Ph.D. (Sask.)  
 1972-77 J. G. K. Webb, Ph.D. (Queens)  
 1974-75 M. Daniewski, Ph.D. (Warsaw)  
 1974-75 O. Liardon, Ph.D. (Lausanne)  
 1974-77 I. A. Oxtton, Ph.D. (Aberdeen)  
 1974-75 T. Thomas, Ph.D. (Toronto)  
 1974-77 J. Wasson, Ph.D. (West. Ont.)  
 1975-76 R. Aigner, Ph.D. (Graz)  
 1975-76 M. Cheung, Ph.D. (McGill)  
 1975-76 M. Fairhurst, Ph.D. (Alberta)  
 1975-76 K. Iwasa, Ph.D. (Nagoya)  
 1975-76 J. Kurzawa, Ph.D. (Poznan Tech.)

- 1975-77 R. Langler, Ph.D. (Dal.)
- 1975-77 A. Matinopoulos, Ph.D. (Dal.)
- 1975-76 M. S. Quereshi, Ph.D. (York)
- 1975-76 B. A. Rao, Ph.D. (Dal.)
- 1975-76 R. Shanker, Ph.D. (U.N.B.)
- 1975-76 T. Tsuda, Ph.D. (Nagoya)
- 1976-77 B. Furst, Ph.D. (Bern)
- 1976-77 A. Gupta, Ph.D. (Institute of Technology, Kanpur)
- 1976-77 G. Matinopoulos, Ph.D. (Dal.)
- 1977-81 H. Furue, Ph.D. (Queens)
- 1976-77 F. Jackman, Ph.D. (Toronto)
- 1976-77 F.-M. Wang, Ph.D. (Seattle)
- 1977-80 N. Ward, Ph.D. (Massey, N.Z.)
- 1978-80 W. J. Westerhaus, Ph.D. (Cologne)
- 1978-80 G. Krishnamurty, Ph.D. (Andhra)
- 1978-79 M. N. Islam, Ph.D. (Dal.)
- 1978-79 K. K. Sharma, Ph.D. (Delhi)
- 1978-81 F. Sauriol, Ph.D. (Montreal)
- 1978-79 R. E. Tout, Ph.D. (Surrey)
- 1979-80 S. A. Barton, Ph.D. (Alberta)
- 1979-80 H. Bem, Ph.D. (Lodz, Poland)
- 1979-82 P. K. Dubey, Ph.S. (Osmania)
- 1979-80 J. E. Nawrocki, Ph.D. (Poznan, Poland)
- 1979-80 M. J. Oren, Ph.D. (Jerusalem)
- 1979-80 V. Paramasigamani, Ph.D. (Dal.)
- 1979-80 P. Pruszyński, Ph.D. (Poznan, Poland)
- 1979-80 K. Ramakrishnan, Ph.D. (McMaster)

- 1979-80 J. Thiel, Ph.D. (Poznan, Poland)
- 1979-80 P. C. Wong, Ph.D. (Western Ontario)
- 1979-80 M. Yoshida, Ph.D. (Tokyo)
- 1980-82 K. Hayakawa, Ph.D. (Osaka)
- 1980-81 G. Keresztury, Ph.D. (Budapest)
- 1980-83 R. Murthy, Ph.D. (I.I.T. Madras)
- 1980-81 S. Nyarku, Ph.D. (Cantab)
- 1980-81 R. Ramani, Ph.D. (Bangalore)
- 1980-81 G. Schroeder, Ph.D. (Poznan)
- 1980-81 M. Stark, Ph.D. (Freiburg)
- 1980-81 P. P. Wickramanayake, Ph.D. (Dal.)
- 1981-84 O. Fadaley, Ph.D. (Alexandria)
- 1981-82 G. Goodin, Ph.D. (City Univ., London)
- 1981- K. R. Grant, Ph.D. (Keele)
- 1981-82 K. Haapakka, Ph.D. (Turku)
- 1981 K. W. M. Siu, Ph.D. (Dal.)
- 1982 M. Biswas, Ph.D. (Kalyani, India)
- 1982-84 K. N. DeSilva, Ph.D. (Dal.)
- 1982-84 M. Gimpel, Ph.D. (Mainz)
- 1982-84 M. Hojatti, Ph.D. (Essex)
- 1982-84 S. M. Kaushik, Ph.D. (I.I.T., Delhi)
- 1982-84 A. Kumari, Ph.D. (I.I.T., Delhi)
- 1982-84 S. Kusuma, Ph.D. (Osmania)
- 1982-84 A. Malovikova, Ph.D. (Bratislava)
- 1982-83 J. Mattai, Ph.D. (Dal.)
- 1982- H. Nakamura, Ph.D. (Kyushu, Japan)
- 1982- U. V. Pandya, Ph.D. (Bangalore)

- 1982-86 U. Roychowdhury, Ph.D. (Dalhousie)  
 1982-84 M. Sajjad, Ph.D. (Waterloo)  
 1982-84 B. Subramanian, Ph.D. (Madras)  
 1983-85 D. Adhikesavalu, Ph.D. (Bangalore)  
 1983-84 A. D. Becke, Ph.D. (McMaster)  
 1983-84 M. Daniewski, Ph.D. (Warsaw, Poland)  
 1983-84 S. Peiris, Ph.D. (Concordia)  
 1983-86 N. S. Vempati, Ph.D. (I.I.T., Kanpur)  
 1983-85 A. B. Yamashita, Ph.D. (Western Ontario)  
 1984-86 S. Dou, Ph.D. (Dalhousie)  
 1984-85 H. Flakus, Ph.D. (Jagiellonian Univ., Krakow)  
 1984-85 U. Macieziwska, Ph.D. (Gdansk, Poland)  
 1984-85 S. N. Muddukrishna, Ph.D. (I.I.T., Kanpur)  
 1984-85 G. Neshvad, Ph.D. (I.I.T., Kanpur)  
 1983-85 A. Okamoto, Ph.D. (Univ. of Tokyo)  
 1984-85 S. Pihlajamaki, Ph.D. (Turku)  
 1984-86 H. Furue, Ph.D. (Queen's)  
 1984-85 G. J. Reimer, Ph.D. (Queen's, Belfast)  
 1984-85 V. N. Sarma, Ph.D. (I.I.T., Kanpur)  
 1984-85 T. Shimizu, Ph.D. (Nagoya Univ., Japan)  
 1984-85 P. Sunkada, Ph.D. (I.I.T., Bangalore)  
 1984-85 J. M. Ugalde, Ph.D. (Valladolid, Spain)  
 1984-85 J. Wierzchowski, Ph.D. (Warsaw, Poland)  
 1984 N. Mathur, Ph.D. (Dalhousie)  
 1985-86 K. Darvesh, Ph.D. (U.N.B.)  
 1985-86 A. Jarczewski, Ph.D. (Poznan)  
 1985-87 Martin de P. Nicholas, Ph.D. (Dalhousie)

- 1985 Tohru Miyajima, Ph.D. (Kyushu)  
 1985 Christopher P. Peters, Ph.D. (McMaster)  
 1985-86 Stephen P. Roe, Ph.D. (LaTrobe)  
 1985-86 Fumitaka Yamashita, Ph.D. (Hokkaido)  
 1985-87 Ranjith Dharmaratne, Ph.D. (Peradeniya)  
 1985-86 H. S. Dang, Ph.D. B.A.R.C. (I.I.T., Bombay)  
 1985-86 Michael S. McKinnon, Ph.D. (Guelph)  
 1986 Jesus Ugalde, Ph.D. (Valladolid, Spain)  
 1986-87 James F. Britten, Ph.D. (McMaster)  
 1986-87 Anthony Lindon, Ph.D. (Melbourne)  
 1986-87 Yong Chong Luo, Dip. (Sichuan Teachers College)  
 1986-87 Przemyslaw Pruszyński, Ph.D. (Adam Mickiewicz, Poznan)  
 1986-87 Ravinutha R. Rao, Ph.D. (I.I.T., Bombay)  
 1986-87 Hock S. Tan, Ph.D. (Queen's)  
 1987-88 Kuthur S. Chandrasekhar, Ph.D. (Bhabha A.R.C., Bombay)  
 1987-88 Liang Chen Wang  
 1987-88 Palitha Jayaweera, Ph.D. (Dalhousie)  
 1987-88 Channa Jayawickreme, Ph.D. (Dalhousie)  
 1987-88 Glenn H. Penner, Ph.D. (Manitoba)  
 1987-88 Amini Semlani, Ph.D. (Montreal)



SOURCES

An outline of the history of Chemistry at Dalhousie was rather hastily gathered by the late Professor Coffin and the present author for "A History of Chemistry in Canada" by Warrington and Nicholls (Pitman and Sons, Toronto, 1949).

In this chronicle the older material has been augmented through references to papers of the Senate and Board of Governors now in the custody of the Dalhousie Archives. Dalhousie Calendars from 1865-66 to 1985-86, together with Presidents' Annual Reports and Convocation Programs have provided the bulk of the data. Particular points have been checked in the Minutes of the Senate and Minutes of the Board of Governors. Transactions of the Nova Scotian Institute of Science and the Royal Society of Canada have been useful.

ACKNOWLEDGEMENTS

Professor D. E. Ryan should have the credit for suggesting that the original compilation of 1971 on Chemistry at Dalhousie be made. Professor W. E. Jones had encouraged an up-dating of information to 1981. Professor W. A. Aue has promoted and abetted this second edition reaching to 1984-86.

Especially thanks are due Dr. C. A. Armour, Dalhousie Archivist and his colleagues. Dr. Lola Henry, Professor E. G. Mercer, Professor A. F. Chisholm as University Engineer, Miss Sylvia Fullerton, Miss P. Lutley and others of the Science Library staff made the gathering of information a pleasure. Dr. Robert L. McIntosh, Dean of Graduate Studies at Queens, with others, who took time to offer corrections and the extension of information are gratefully acknowledged. Photographs have been supplied by Carlos at Photography Services.

W. J. Chute  
March, 1986