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100 YEARS OF  
**biochemistry** at UofT

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*An Illustrated History by*

MARIAN A. PACKHAM

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100 Years of Biochemistry  
at the University of Toronto  
1908 – 2008

*An Illustrated History*

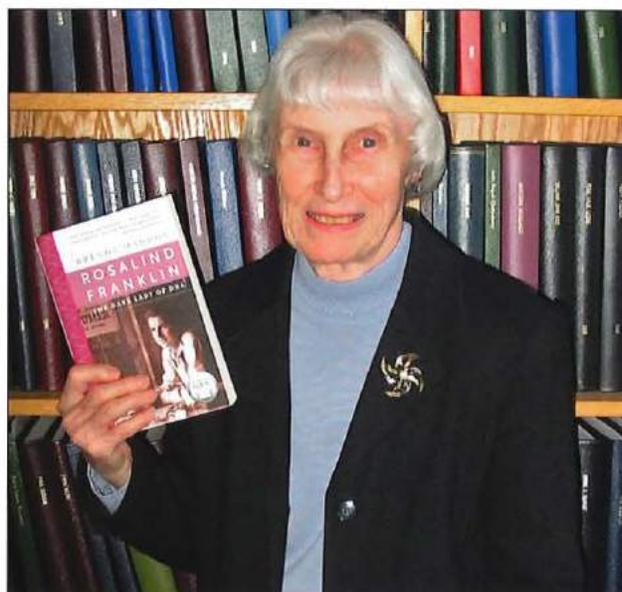
by  
Marian A. Packham  
University Professor Emeritus

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## MARIAN A. PACKHAM

**M**arian Packham is one of the world's leading authorities on the biochemistry and physiology of blood platelets, publishing close to 300 papers and is credited with major contributions to the understanding of platelets and their role in heart attacks and strokes. She received her B.A. in Biochemistry from the University of Toronto in 1949 and her Ph.D. in 1954 under the supervision of Gordon Butler. From 1955 to 1963 she was a Part-time Senior Fellow/Lecturer in the Department. Prof. Packham re-joined the Department in 1966 as a Lecturer. She is a University Professor Emeritus and a Fellow of the Royal Society of Canada. Prof Packham is also the official historian of the Department of Biochemistry.



Marian Packham with biography of Rosalind Franklin

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Andrus Hunter | Harold Wastenburg

Marvin Darrach

Fritz Lullow

A TEA  
in honour of

W. D. McFarlane. Arthur Boyne

W. D. McFarlane. Dick. George East  
W. R. Graham,

MISS MOLLY E. DELAMERE

Ray (French) Leslie (Roth)

given by members of

THE DEPARTMENT OF BIOCHEMISTRY

1918-1961.

John Brannon

Ing. (MacFarlane)

The Duncan Room, Medical Building.

February 3, 1962.

Margaret Dwoef

Saul L. Cohen

David a Scott.

Prof. W. R. Graham, Jr.

Charles S. Hanes

Henry Borsook

Elizabeth Macpherson

Turner

Jim Drayton

E. J. Wally

Pauline Stewart

Sid Bathurst

Saul (Roth)

S. Lumberd

Alex. Moore

Margaret Brien Walter

Alick Little

Desmond Beal

J. B. Schachter

Gene (Stewart)

Marion Johnston

Sorden S. (Stewart)

A. T. Mathe

Robert Howard

Rose Rhein

Alec

Len Cohen

J. A. McCarter,

D. Laurence Wilson, M.D.

Beth Wade

Paul Boyndin

Jim Reelin

Jeffrey Long

Paul O'Brien

Kathernie Puzal

Nancy Schachte

Helen Gordon

Rose G. Donovan

Solwig Bjune

Mario Moscarello

Saul W. French

F. Gray

A. Gross

G. R. Williams

June Saul

W. Blough Douglas Simpson

Colleen Dunkley

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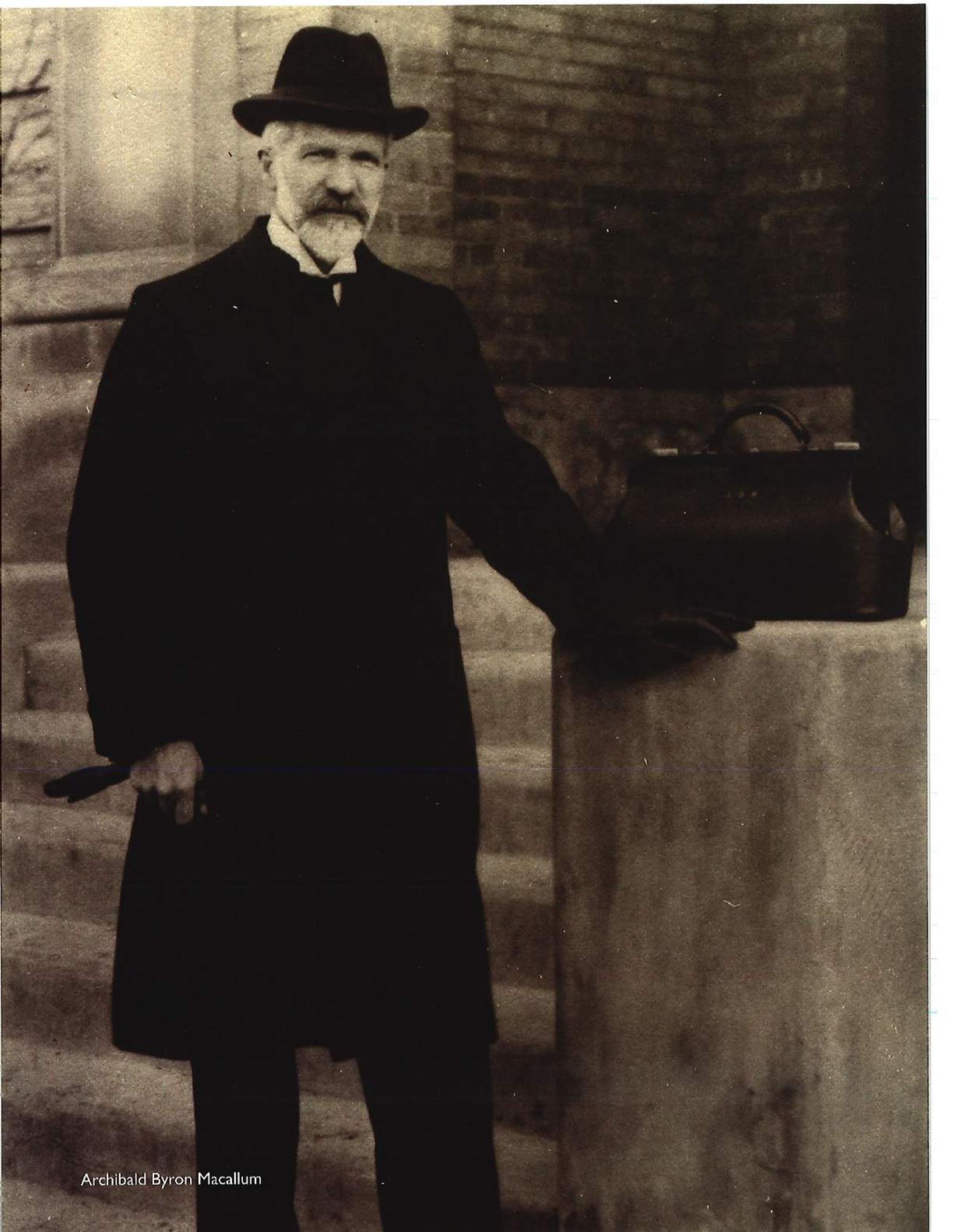
## PREFACE

In 1973 the Chair of the Department of Biochemistry, Prof. G. Ronald Williams, asked me to write a short history of the Department for submission to Prof. Robin Harris, the University Historian, who was writing a sesquicentennial history of the University of Toronto. Although no book by Prof. Harris was published, the history of our Department that I wrote kindled my interest and since that time I have collected many documents and memorabilia.

My involvement with the Department goes back to September, 1947, when I took my first biochemistry lectures and laboratory classes as a third year undergraduate student in Physiology and Biochemistry (P&B). With the exception of three years, I have been associated with the Department ever since – as undergraduate, graduate student, demonstrator, fellow, lecturer, and professor (assistant, associate, full, and University). I have overlapped with all except 7 of the 120 professors who have held (or hold) appointments in our Department, and I taught at least 12 of them when they were students.

The office staff has helped me greatly by providing access to information in the departmental office, and I am indebted to the records kept by the many professors who have been Graduate Coordinators of the Department. The staff at the University Archives have been knowledgeable and efficient in making their records available to me. The current Chair of the Department, Prof. Reinhart Reichmeier reviewed early versions of the manuscript and made helpful suggestions and additions. I am deeply indebted to Prof. David Williams for combing through his 4000 + digitized pictures and scanning many other pictures to illustrate the text. Thanks are also due to David Isenman for the graphs, and to Matthew Cheng, an undergraduate biochemistry student who designed the logo. Everyone I have asked for help has provided it willingly, and I am grateful to you all. Being part of the Department since 1947 has been a wonderful experience.

*Marian A. Packham*  
*University Professor Emeritus*



Archibald Byron Macallum

# CHAPTER I

## The Founding of the Department of Biochemistry

**T**here is no doubt that the Professor of Physiology, Archibald Byron Macallum, was the founder of the Department of Biochemistry, but the actual date that should be given is difficult to establish. The weight of the evidence favours 1907-08, although dates given by different sources range from 1906 to 1910.

*Evidence for 1906-07:* Macallum's entry in American Men of Science, 1927, page 609 (which one would surmise he himself had submitted) lists him as Prof. of Physiology 1891-1906 and Prof. of Biochemistry 1906-1917. The Report of the Board of Governors of the University for the year 1906-07 lists him for the first time as Professor of Physiology and Physiological Chemistry (previously he was listed as only Professor of Physiology). Also in 1906-07, the Calendar lists, for the first time, a course in Bio-chemistry for students of Biology in the third year of the Arts Faculty, and of the Biological and Physical Sciences in the fourth year.

*Evidence for 1907-1908:* Macallum's salary had been \$3,200 for many years, but in the academic year 1907-08 he was paid \$4,000 according to the Report of the Board of Governors, and he continued at this salary for a number of years. The Calendar heading changed from 'Physiology' to 'Physiology and Physiological Chemistry', there were major additions and changes in the courses listed, and the teaching staff was expanded. In the President's Report of 1907-08, the title given is the 'Department of Physiology and Biochemistry', whereas previously it had been only 'Physiology'.

*Evidence for 1908-09:* In this academic year, the Report of the Board of Governors lists T.G. Brodie as Professor of Physiology at a salary of \$4,000 and Macallum as Professor of Physiology and Physiological Chemistry. Macallum had been instrumental in recruiting Brodie, judging from Macallum's letters to President Falconer.

The 'Corporate Name Authority' states that the Department of Biochemistry was established in 1909 as the Chair of Biochemistry in the Department of Physiology, and that it became an independent department in July of 1910.

In 1910-11, the Calendar heading changed to 'Physiology and Biochemistry' and for the first time an Honours course in Physiology and Biochemistry (P&B) was listed.

In 1911-12, there was a separate Calendar heading for Biochemistry as a department for the first time. One of the recommended texts was Hawk's 'Practical Physiological Chemistry' second edition, and it is of interest that the twelfth edition of this text by Hawk, Oser and Summerson was still in use in the department forty years later (a copy is in the departmental archives).

It should be noted that the Department of Biochemistry was in the Faculty of Arts until July 1, 1921, when it moved to the jurisdiction of the Faculty of Medicine.



Medical Building 1903-1968

## CHAPTER 2

### Chairs of the Departments of Biochemistry and Zymology

**D**uring its 100-year history (1908-2008), the Department of Biochemistry at the University of Toronto has had 17 Chairs (Table 1), with Archibald Byron Macallum as the founding Chairman. Hardolph Wasteneys was Chair for the longest time for 22 years from 1929-1951. Since the 1960s the term of a Chair is 5 years, renewable for a second term. A number of faculty members have served in an acting capacity during academic leaves or while searches for a permanent Chair were underway. This history is organized by events that occurred during the term of each Chair.

**Table 1**  
**Chairs of the Department of Biochemistry**

Archibald Byron Macallum	1907-1917
Andrew Hunter	1917 (acting) and 1919-1929
Thorburn Brailsford Robertson	1918-1919
Horace Bradbury Speakman (Zymology)	1919-1929
Hardolph Wasteneys	1929-1951
Arthur Marshall Wynne	1951-1960
Charles Samuel Hanes	1960-1965
George Edward Connell	1965-1970
George Ronald Williams	1970-1977
Keith John Dorrington	1977-1982
Marian Aitchison Packham	1983 (acting)
Harry Schachter	1984-1989
William Thompson	1989-1991 (acting)
Peter Noel Lewis	1991-1996 and 1997-2001
David Bruce Williams	1996-1997 (acting)
David Elliot Isenman	2002 (acting)
Reinhart Reithmeier	2002-

## CHAPTER 3

### The Early Years 1907-1960

#### Professor Archibald Byron Macallum, F.R.S., F.R.S.C. (1858-1934)

**T**he Department of Biochemistry at the University of Toronto was established in 1907-08 with Professor Macallum as the first chairman. At that time, he had been associated with the university for more than 30 years, having achieved his baccalaureate together with the medal in natural science in 1880. For three years he taught high school in Cornwall, Ontario,



Archibald Byron Macallum

but continued his research, collaborating with Prof. R. Ramsey Wright on a study of the anatomy and physiology of the catfish. In 1883 he was appointed Lecturer in Biology and the first assistant of Professor Ramsay Wright, the Professor of Natural History in University College. In 1887, Macallum's title became Lecturer in Physiology.

He took a Ph.D. at Johns Hopkins University under H. Newell Martin in 1888, and the M.B. at Toronto in 1889. When a separate Department of Physiology was formed in 1891, he became a full professor of the subject and head of the department. In 1907-08 the Physiology Department was divided and Prof. Macallum took the chair of Biochemistry which he held until 1917. This was the first Department of Biochemistry in Canada, and one of the first in the world. The Biochemistry Department at Liverpool is older, having been founded in 1902. Dr. R.A. Reeve was Dean of Medicine at the time of the creation of the Department of Biochemistry. Prof. Macallum introduced the Honour course in



Medical Building 1903-1968

Physiological and Biochemical Sciences (known as P and B by the many students who graduated from it) and carried out almost all the teaching in the department, while continuing his own research, often until midnight.

The Department of Biochemistry was housed on the third floor of the Medical Building which had been erected between 1902 and 1904. Prof. Macallum's biographer (Prof. L.A. MacKay, "Canadian Who was Who" 1875-1937) noted that Prof. Macallum was "active in the organization and extension of the medical school" and that "It is generally acknowledged that the international reputation of the medical school of the University of Toronto owes much to his untiring diligence and unflinching resolution." Indeed, at the official opening of the medical building in October, 1903, Dr. William Osler praised Prof. Macallum, saying "He has carried the name of this university to every nook and corner of the globe" and "how much you owe him in connection with this new building I need scarcely mention".

According to E. Horne Craigie (A History of the Department of Zoology at the University of Toronto up to 1962), Macallum was "terribly serious and had a gloomy manner and slow, ponderous speech that did not

make him an inspiring lecturer". This opinion, however, was not shared by his biographer, Prof. MacKay, who described him as "a stimulating and inspiring teacher with the power of stating clearly and forcibly the conclusions to which his detailed investigations led. He was of a somewhat hasty and imperious temperament, strongly defined opinions, and a caustic wit which did not always do justice to the intellectual attainments of some of those with whom he disagreed; but his rugged personality, and his calm, deliberate utterance held the attention of all who listened to him, while his scientific honesty was never questioned. He was a tall, lank Highland Scot (he spoke and heard only Gaelic until he went to school from a pioneer farm near London, Ontario), beloved by his numerous friends, among whom the dourness that characterized him in public completely vanished. He was fond of congenial company, of good cheer, of a good story well told, of a game of golf, his only physical recreation, and above all, of good poetry. He was especially fond of the poetry of Byron, and it is said that he gave himself that name when he entered university and was asked for a second initial."

His earliest half-dozen publications (1884-1890) were strictly morphological. The last of these, appearing in 1890 was "Contributions to the Morphology and Physiology of the Cell". Thereafter, the titles became increasingly physiological-chemical. Although E. Gordon Young in "The Development of Biochemistry in Canada" (1976) judged the volume of Macallum's research work as "comparatively small", James M. Neelin (Bulletin of the Canadian Biochemical Society, vol. XIX, 1982, pp. 29-35) has pointed out that his influence and the scope of his vision certainly was not. However, Young noted that Macallum "contributed to the localization of the elements calcium, potassium and iron in plant and animal tissues by microchemical tests. He also made a comparison of absolute and relative concentrations of the inorganic elements in seawater and in the body fluids of many animals which supported the concept of the origin of land animals

from the sea. This work was recognized by his election to Fellowship in the Royal Society of London in 1906, an unusual honour for a Canadian at that time". He was the first University of Toronto graduate to be elected. Prof. Macallum supervised some of the work of Maud L. Menten (of Michaelis-Menten fame) on these topics and there are some joint publications. In 1905 she is listed as a "Class Assistant" in Physiology at \$100.

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#### MAUD LEONORA MENTEN



Maud L. Menten

Maud Menten (b. March 20, 1879, d. July 6, 1960) is famous for the Michaelis-Menten equation, which is still used today to derive key parameters of enzyme kinetics. Maud Menten was a Canadian who obtained her BA (1904), MB (1907) and M.D. (1911)

from the University of Toronto and she was one of the first women in Canada to be admitted to medical school. She moved to Germany to do research and obtained her Ph.D. with Leonor Michaelis in 1916. For most of her career (1923-1950), Dr. Menten was a Professor at the University of Pittsburgh from 1923 to 1950. A plaque commemorating Maud Menten was erected in 1979 outside the Medical Sciences Building in Toronto.

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Prof. Macallum appointed our department's first cross-appointed professor – and it was a woman, Clara Cynthia Benson. Prof. Macallum and Prof. Clara Benson were part of a small group who organized the American Society of Biological Chemists in December, 1906, and both presented papers at the first meeting in 1907. He was active on the executive of the Society and served as its president from 1911 to 1913 at the time that the Federation of American Societies of Experimental Biology (FASEB) was created. He served on the editorial board of the Journal of Biological Chemistry from its founding, although he seldom published in it. He was president of the Royal Society of Canada in 1916-17 and its Flavelle medallist in 1930. He was also the recipient of a number of honorary degrees.

His interests were many and varied. He was trustee of

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the Toronto General Hospital, treasurer of the Ontario Public Library Association, honorary trustee of the Folklore Society, a foreign member of the American Philosophical Society, and president of the Canadian Institute.

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#### CLARA CYNTHIA BENSON



Clara Cynthia Benson

Dr. Benson had earned her Ph.D. in Chemistry in 1903 with Prof. William Lash Miller, and then Prof. Macallum became her mentor, appointing her as a Lecturer in Physiology. In 1906, he arranged her appointment as Associate Professor of Physiological Chemistry in

the newly formed Faculty of Household Science and she is listed this way as a member of our department from its beginning in 1907-08 until 1927-28. By that time she was Professor of Food Chemistry. Clara Benson was one of the first two women to hold professorial rank at the University of Toronto. Dr. Benson became known for her research in food science, so much so that she was elected to the American Men of Science in 1920. A wing of the Athletic Centre at the University of Toronto is named in her honour.

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Prof. Macallum's most notable contribution to the University of Toronto was the establishment of research and scholarship as essential functions of the university. At the time when he was first appointed to the staff of the university, it was primarily a teaching institution, involved in the preservation and dissemination of knowledge, but not with its advancement. He was instrumental in the establishment of the Ph.D. degree that he saw as a research degree requiring a thesis. President Loudon's 1901-1902 Annual Report states that "the chief credit for this step is due to professor A.B. Macallum, whose persistent efforts on behalf of this statute were continued in the face of many obstacles until success was finally achieved in 1897". In 1903, Prof. Macallum moved that a small advisory board for post graduate studies be placed in charge of

the program, instead of the unwieldy body initially given this task, and he subsequently chaired this advisory board. In 1915, a separate Board of Graduate Studies was set up with Prof. Macallum as chairman, leading eventually to the establishment of the School of Graduate Studies in 1922.

Prof. Macallum was the supervisor of the student, Frederick Hughes Scott, who completed his thesis on nerve cells in 1899 and in 1900 obtained the first Ph.D. awarded at the University of Toronto. Another distinguished student who completed his M.A. in 1913 and his doctoral studies with Prof. Macallum in 1916 was James B. Collip, later involved in the purification of insulin for the first clinical trial in 1922, and the establishment of the Department of Biochemistry at the University of Alberta; he succeeded Prof. Macallum at McGill in 1928 and in 1976, E. Gordon Young suggested that Prof. Collip "may fairly be called our most eminent Canadian biochemist".

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#### JAMES B. COLLIP

James Collip was a graduate student with Professor Macallum. From 1915 to 1928 Dr. Collip was at the University of Alberta, becoming Head of the new Department of Biochemistry in 1920. While at Alberta, Dr. Collip discovered parathyroid hormone and later worked on placental and pituitary hormones when he moved to McGill in 1928, where he became Chair of Biochemistry at the age of 35.

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Prof. Macallum resigned from the department in 1917 following his appointment by the government to an Advisory Council for Scientific and Industrial Research - the body that would later be named the National Research Council of Canada. Dr. Macallum became its first Chairman. In 1920 he accepted a professorship at McGill. A separate department was established for him there in 1922 on his return from a trip to China where he had gone to lecture and assist in the organization of the Peking Medical School under the auspices of the Rockefeller Foundation. He retired from McGill in 1928.

Repeated attempts to have the Medical Sciences Building at the University of Toronto named in honour of Prof. Macallum were unsuccessful.

In 2006, Parks Canada recognized Prof. Macallum on the anniversary of his birthday (April 7, 1858) as the "Father of Canadian Biochemistry" in their "This Week in History Series". He had been designated a "National Historic Person" in 1938 with a plaque subsequently erected near London, Ontario, in his honour in 1947.

(More information about Prof. A. B. Macallum is available in the department's archives.)

### **Professor Andrew Hunter, C.B.E., F.R.S.C., F.R.S.E. (1876-1969)**



Sketch of Andrew Hunter by Arthur Lismer 1929

Upon Prof. Macallum's resignation in 1917, Prof. Andrew Hunter (at that time the Professor of Pathological Chemistry) was appointed as Acting Head of the Department for one year. Prof. Brailsford Robertson served as Chairman in 1918, but when he returned

to Australia, Prof. Andrew Hunter was appointed as Chairman in 1919 and held this position until 1929.

Prof. Hunter had been born and educated in Edinburgh, and after holding positions in the Department of Physiology at Edinburgh, the Friedrich-Wilhelm University in Berlin, the University of Heidelberg, and Cornell University, he became Professor of Pathological Chemistry at the University of Toronto (1915-1920). For one year during this time (1917) he was also the Acting Head of the Department of Biochemistry and in 1919, he became the Head of the Department. In 1929, he returned to Scotland to become Professor of Physiological Chemistry at the University of Glasgow and Dean of the Faculty of Medicine there from 1930-1935. At the 75<sup>th</sup> anniversary of the department in 1983, the guest speaker, Dr. Thomas Jukes, told the following anecdote. "Professor Hunter received the offer of chairmanship of Physiological Chemistry at Glasgow, and went to tell the president of the University of Toronto, Sir Robert Falconer, about it, expecting commendation for the recognition, following which Dr. Hunter was going to say that he would stay in Toronto. Instead, Sir Robert congratulated him on his new job, to Hunter's great but unspoken discomfiture."

In 1935 he returned to Toronto as Professor of Pathological Chemistry and was Dean of Graduate Studies, 1945-47. After his formal retirement at age 70, he actively engaged in research in the Research Institute of the Hospital for Sick Children until 1966. The story is told that during this later research period, a colleague mentioned to Prof. Hunter that he had "seen your last publication". Prof. Hunter corrected him, "Not my last, my latest". His last paper was published in *Clinica Chimica Acta* (12:2-16;1965), sixty-one years after his first. It described an excellent procedure for the determination of histidine. His definitive monograph on *Creatine and Creatinine* was published in 1928, before the discovery of phosphocreatine. The departmental copy of the monograph is in our archives.

Prof. Hunter died in 1969 in his 93<sup>rd</sup> year and in his will bequeathed to the department a sketch of himself

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in his laboratory in 1929 by Arthur Lismer, a member of the "Group of Seven" Canadian artists.

E. Gordon Young notes that "Andrew Hunter was an elegant, meticulous experimentalist, a devoted scientist, and an able teacher. He dressed fastidiously and spoke slowly and deliberately, with careful diction. Many students declared 'Andy's' courses to be the most lucid lectures in the whole Faculty of Medicine, based on perfectly organized material given with a polished delivery. He was elected a Fellow of the Royal Society of Canada in 1916 and served as president of Section V in 1924-25, and a Fellow of the Royal Society of Edinburgh in 1932. The CBE was conferred on him in 1946 for his services in the standing Committee on Nutrition."

The state of biochemistry in the 1920s while Prof. Andrew Hunter was the Chairman, was described by Dr. Blythe A. Eagles of the University of British Columbia in the Bulletin of the Canadian Biochemical Society, vol. XVI, #2, 1979. Dr. Eagles was a Ph.D. graduate (1926) from Toronto in Pathological Chemistry and had married Violet Dunbar (Ph.D. Biochemistry, 1929). He wrote: "As I entered biochemistry, its main concern was still the discovery, isolation and characterization of the chemical constituents of living matter. It had not as yet entered upon its enzymological and metabolic phases. We had no realization of the size of the nucleic acid molecule. We were wrestling with the Warburg and Weiland theories of biological oxidation. The vitamin doctrine had emerged but no vitamin had as yet been isolated. The use of microorganisms in studies on metabolic pathways was expanding. A Duboscq colorimeter, a pH meter of questionable reliability, a Van Slyke amino acid apparatus and a centrifuge were coveted laboratory acquisitions. Each issue of the Journal of Biological Chemistry and of the Biochemical Journal contained new or revised methods for the estimation of elements and compounds of biological significance. It was the era of Folin and of Benedict and the Duboscq colorimeter. We were largely concerned with the elements and the transformation of small molecules. Schaudinger had

not given us the word "macromolecule" nor had Sumner as yet crystallized urease. We were unaware of the potential application of X-ray diffraction photography to biological material. The epoch of instrumentation was yet to come. The ultracentrifuge, electron microscope, spectrophotometer, chromatographic and electrophoretic equipment were for future generations."

While Prof. Hunter was chairman, weekly seminars given by graduate students and staff members were begun (1924) and have continued until the present time, although the large number of graduate students and staff now restrict most of these seminars to presentations by the graduate students.

In 1924, the department was teaching undergraduate students in Biology, Botany, Biological and Medical Sciences (B&M), Physiology and Biochemistry (P&B), Household Science, Household Economics, Chemistry, Public Health, and Medicine. Both lecture and laboratory classes were provided. Graduate instruction also was provided to students majoring in biochemistry (8 at that time) and to graduate students from other departments. In 1925, the department began teaching students from the newly created Faculty of Dentistry. At that time, teaching responsibilities were very heavy; in his report to the Dean in 1923-24, Prof. Hunter pointed out that, "The Department of Biochemistry is handicapped by being understaffed and the appointment of an assistant professor is an urgent necessity. It is hoped that conditions may be partly met by the appointment of an additional demonstrator". The problem of understaffing continued until the 1960's and those who taught in the department during this 40 year period poured a great deal of their time and energy into the undergraduate teaching programs. The teaching responsibilities of the department remained heavy and the number of students in all the courses increased over the years (304 in 1928-29; 412 in 1939-40; 609 in 1967-68; 842 in 1970-71; >2000 in 2007).

From 1926 to 1930, Dr. Henry Borsook is recorded as "carrying out activities which were a constant stimulus

not only to his junior but also to his senior colleagues". Although he was never a member of the professorial staff (he is first recorded as a "volunteer worker", then as a "Research Fellow" and later as "a recent medical graduate") he was responsible for a large proportion of the research publications that came from the department at that time. He obtained his B.A. in Physiology and Biochemistry (P&B) in 1921, his M.A. in 1922, his Ph.D. with Prof. Wasteneys in 1924, and his M.B. (later converted to M.D.) as Gold Medalist in 1927. After two years as research fellow and lecturer, he left Toronto to become assistant professor of biochemistry at Cal. Tech where he was twice Chair of the Department and remained until his retirement in 1968.

H. Bruce Collier also obtained his Ph.D. (1930) with Prof. Wasteneys and taught in the department as Senior Fellow in 1927-28. He went to teach at the West China Union College of Medicine for seven years before returning to Canada. Eventually, he became the first chairman of the Department of Biochemistry at the University of Saskatchewan in 1946, and then became Head of the Department of Biochemistry at the University of Alberta (1949-61).

In 1928-29, Hugh D. Branion, a recent graduate of the Biology and Medicine course, began teaching in the department. He obtained his M.A. with Prof. Hunter in 1929, and his Ph.D. in 1933 with Prof. H.D. Kay. In 1931, he moved to the Ontario Agricultural College (OAC) at Guelph and eventually became head of the Department of Nutrition and then Dean of Graduate Studies there. Hugh Branion maintained close ties with the Department of Biochemistry in Toronto, and in the early 1950's he was often a guest at the daily 4 o'clock meetings for tea. From 1887 to 1964 (when the University of Guelph was established) students at OAC were examined by the University of Toronto and obtained a Toronto Bachelor of Science of Agriculture (BSA) degree. Several students who had graduated with a BSA went on to receive masters degrees through the Department of Biochemistry at the University of Toronto. One of these was George Edward (Eddie) Hall

(M.A. 1931) who later was president of the University of Western Ontario.

On January 30, 1928, a fire in the department caused \$50,000 damage. Although the teaching laboratories were untouched, some of the research students lost valuable records and materials. One of these was James Dauphinee who later became head of the Department of Pathological Chemistry at the University of Toronto. Records of his 3 years of research were lost, but he managed to duplicate the results within 3 months. Rumour had it that the cause of the fire may have been a wild rat that tipped over a Bunsen burner left burning under a water bath during the night.

Further information about these graduate students (and others who obtained degrees during this period) is available in the departmental archives.

### **Professor Thorburn Brailsford Robertson (1884-1930)**



T. Brailsford Robertson

Prof. Brailsford Robertson was Chairman of the Department of Biochemistry for only one year, 1918. He had originally come from Australia to California in 1906, to work with Jacques Loeb. He replaced Loeb as head of Physiology and Pharmacology at Berkeley in 1910, when Loeb went to the Rockefeller Institute in New York City. Prof. Robertson brought Hardolph Wasteneys with him from Berkeley when he came to Toronto.

During the one year that Prof. Brailsford Robertson was Head of the Department, the first group of veterans of World War I were studying biochemistry. This group included Dr. J.A. McFarlane who later (1946) became Dean of Medicine at the University of Toronto. He recalled that Prof. Robertson was "a tall and rather forbidding Australian. He was assisted by a young chap, Hardolph Wasteneys. A Mrs. Branch was Demonstrator, and there were two tutorial fellows – A.I. Muldrew and C.P. Lathrop."

Prof. Robertson returned to his native Australia in 1919 as Professor of Biochemistry and General Physiology at his alma mater, the University of Adelaide. Prof. Wynne later described Prof. Robertson as "a brilliant man and a most engaging person" and lamented his early death at age 46 from pneumonia.

Professor Wasteneys wrote Dr. Robertson's obituary in the *Biochemical Journal* in 1930 (vol. 24; 577-578), saying that Robertson had a most attractive personality and was beloved by colleagues in California, Toronto, and Adelaide. He was described as a "vigorous, fearless thinker" and a "fluid, lucid and inspiring writer" who wrote a textbook of Biochemistry. According to Dr. Thomas Jukes, while at California Robertson patented "Tethelin", a dried preparation of pituitary glands, fed to promote growth. However, the effect of tethelin was nutritional rather than hormonal, and the same effect could be produced by dried muscle. In short, he was measuring the effect of essential amino acids, which had not yet been discovered.

### **Professor Horace Bradbury Speakman (1893-1975)**



Horace B. Speakman

A small Department of Zymology, headed by Prof. Speakman, existed in the Medical Building of the University of Toronto from 1919 to 1929, when it was merged with the Department of Biochemistry.

Horace Speakman was born in Rochdale, Lancashire, England, and received his B.Sc. (1914) and M.Sc. (1915) at Manchester University. From 1916 to 1919 he was on the staff of the British Ministry of Munitions and was sent to Canada in 1916 to serve under the Imperial Munitions Board as Chief of the Bacteriological Department of British Acetones Ltd. that was housed in the Gooderham and Worts distillery in Toronto. It had been founded in 1832 and was the largest distillery in the British Empire. It ceased operation in 1990 and today is preserved as the Distillery District dedicated to arts and culture.

Horace Speakman brought with him to Toronto bacterial cultures for the industrial production of acetone by the fermentation of maize. (The method that was used was developed by Prof. Chaim Weizmann, the Zionist leader and first president of Israel, and it was based on the organism *Clostridium acetobutylicum*.) Acetone was urgently needed at the time as a solvent in the production of munitions (it dissolves nitrocellulose).

The 1918-1919 Report of the Board of Governors of the University of Toronto describes the creation of the Department of Zymology. "Colonel Albert Gooderham has again made it possible for the University to undertake special work in research, having put at its disposal a finely equipped laboratory for the purpose of conducting investigations in the process of fermentation. As a result of this, a research Department of Zymology has been created in the University and H.B. Speakman has been appointed director of this laboratory." Arthur Wynne, who had been Prof. Speakman's research associate during the war, came with him to the new department.

During the ten years of its existence, the Department of Zymology contributed to the undergraduate and graduate teaching of biochemistry. A number of graduate students obtained degrees in this department and the research that was conducted led to publications in major journals. In 1925, Arthur Wynne submitted a thesis on bacterial metabolism, and was granted a Ph.D.

In 1928, Dr. Speakman was appointed Director of Research at the newly created Ontario Research Foundation, and left the university. In 1949 he published a small volume titled "Faith of a Scientist" in which he recalls, "In 1943, Banting called to see me to ask whether I would assist in the discussion of yet another important and secret war project – bacterial warfare".

The Department of Zymology merged with the Department of Biochemistry in 1929 and Dr. Wynne became an Assistant Professor in the department. In the 1940's and 50's, Zymology was housed in the basement of the old Medical Building.

### **Professor Hardolph Wasteneys, F.R.S.C. (1881-1965)**



Hardolph Wasteneys

In 1929, Prof. Hardolph Wasteneys became Head of the Department of Biochemistry and remained in this position until 1951.

He had been born in England, the eldest son of Sir William Wasteneys, Bart., and thus he was a hereditary baronet, although he did not use the title of "Sir". According to a letter from Vladimir Ignatieff in our archives, because of family upsets Hardolph and his younger brother were landed in a nunnery in Australia and when he was old enough to start earning his own living, he became a lab boy in a waterworks and looked after the education of his brother. His obituary records that he worked for 9 years (1900-1909) as a government biologist and chemist in Brisbane. His work in water purification led to his move to California in 1909 where he joined Dr. Jacques Loeb as a lab assistant and then moved with him to the Rockefeller Institute in New York City for six years. His research with Loeb involved problems concerned with biological oxidation,

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antagonistic salt action, artificial parthenogenesis, heliotropism, and enzyme action. Some of these studies were incorporated into his Ph.D. thesis. The degree was awarded in 1916 by Columbia University, although he had no previous academic degree. He returned to Berkeley in 1916 as assistant professor in the Department of Physiology and Pharmacology, headed by Prof. T. Brailsford Robertson, and then moved with him to Toronto in 1918.

With his graduate students, his research was concerned with the action of enzymes in relation to the breakdown and synthesis of proteins, hydrolysis of glycogen, the nature and distribution of plant phosphatases, the synthesis of phosphoric acid esters, and the use of isotopes as labels. Probably his work with his student, Henry Borsook, on the synthetic as well as the hydrolytic effect of enzymes was his outstanding scientific contribution. For many years he also gave a series of popular lectures on the history of science and civilization. His kindness and scholarship are fondly remembered by all who were associated with him.

In addition to his responsibilities as Chairman of the Department, Prof. Wasteneys served in 1940-41 as President of Section V of the Royal Society of Canada to which he had been elected in 1930. He was a member of the governing body of Hart House for more than 20 years and worked with students in setting up its Art Gallery and selecting its pictures. In recognition of his contributions to the development of Hart House, its officers commissioned Mr. F.H. Varley (a member of the "Group of Seven") to paint his portrait that is now part of the permanent collection. One of Prof. Wasteneys' major interests was the University Settlement and for 25 years he was a member (and for some time Chairman) of its Board of Directors. His association with it led him into many areas of social activity, particularly during the depression of the 1930's. He was a member of the commission whose report led to the building of the first subsidized housing area in Toronto, and he was a member of the Central Committee on Education and Recreation for the Unemployed.

In 1928-29, the "defects in the heating system" of the attic of the Medical Building were corrected to permit nutritional experiments on rats. The rat colony, ably managed by Mrs. Lucy Lumbard for many years, was part of the department until 1968 when the building was demolished.

Meetings of the Toronto Biochemical and Biophysical Society began in 1930 and continued until at least the early 1970s when seminar programs became stronger. Prof. Robert Painter was the president in the early 1960s and recalls that it was an entry for him into the university when he was an employee of Connaught Laboratories. He pointed out that it facilitated interactions between the several departments in the medical building as well as outside institutions such as Connaught and the Defence Research Board Laboratories at Downsview. Prof. Theo Hofmann was the president in 1967-68 and was followed by Prof. Harry Schachter. Some of the meetings were held in a lecture room in the basement of the old Medical Building and professors, scientists and graduate students of the Life Sciences departments in the Faculty of Medicine presented papers describing their current research findings. For a number of years, Amy Britton organized the coffee and cookies that were served after the presentations. An undergraduate award in biochemistry was set up in her name after her death. In the early 1950's, I recall Prof. Wilber Franks demonstrating a crash helmet that he donned and proceeded to hit with a hammer, sending paint chips flying. He looked up at the audience and pointed out that, "These are blows that would kill a normal person".

In 1932 there were in the department three professors (Wasteneys, Wynne, and H.D. Kay), six Fellows, two of them senior (Bruce Crocker and Florence Hargreaves), a secretary (Miss Molly Delamere who had begun her career in the department as an assistant of Prof. Hunter), six graduate students financed in a variety of ways, three technicians, a lab man preparing reagents, and a person looking after experimental animals. All the Fellows were working toward higher degrees, usually Ph.D.'s.

The department had two sections, Biochemistry on the third floor of the Medical Building and Zymology in the basement, the latter occupied by Prof. Wynne and his graduate students.

During all the years of Prof. Wasteneys' chairmanship, there were only 3 to 5 on the professorial staff at any one time, but he appointed to the staff a succession of individuals who, together with their graduate students, did a great deal to advance the research activities of the department, as well as being heavily engaged in

Lewisite (BAL) – an antidote to mustard gas. During the war, Dr. Jeanne Manery Fisher collaborated with the physiologist, Dr. Donald Solandt, in research directed at problems in shock.

In 1941, Prof. Wasteneys recorded the first use of "tracers" in the department; the experiments involved work with radioactive sulphur in connection with the war effort and must represent one of the earliest applications of a technique that grew to be a major tool in biochemical research throughout the world.



Herbert D. Kay



Guy F. Marrian



Leslie Young



Gordon C. Butler



Bruce F. Crocker

undergraduate teaching. These individuals include Dr. Herbert D. Kay (1929-1932), Dr. Guy F. Marrian (1933-1938), Dr. Leslie Young (1939-1947), and Dr. Gordon C. Butler (1947-1959), all of whom left the department to take on heavy responsibilities elsewhere. Also appointed as professors in the department were Dr. Bruce F. Crocker (1946 until retirement in 1970) and Jeanne Manery Fisher (1948 until her retirement in 1976 and death in 1986). (Further information about all these professors is available in the departmental archives.)

In the years when Prof. Marrian's graduate students were isolating estrone, estriol and other steroids from large volumes of urine from pregnant mares or women, there was only one small cold room, and the few fume hoods that existed could not cope with the penetrating odours that were generated.

During World War II, Dr. Crocker was on leave from the department, serving in the Air Force, and many of the members of the department spent most of their research time on work for the Department of National Defence. Although the projects were secret at the time, one of them involved work on British Anti-

Dr. Jeanne Manery Fisher was the first woman to achieve professorial status in the core department. She had graduated with a B.A. from the Biological and Medical Sciences (B&M) course at the University of Toronto in 1932, and continued her education with an M.A. in 1933 and a Ph.D. in 1935 from the Department of Physiology in Toronto. After posts at the University of Rochester in New York and Postdoctoral Research with Dr. Baird Hastings at Harvard, she returned to Toronto in 1940 as Senior Demonstrator and an active researcher in the Department of Biochemistry. During the war years, when her husband, Prof. K.C. Fisher, was on leave from his position in the Department of Zoology, she assumed the extra load of his undergraduate teaching and supervision of his graduate students, as well as continuing with her own duties in the Department of Biochemistry. Throughout the many years that she was associated with the department she achieved world wide recognition for her research on electrolytes, during the development of this field from doubts about the reality of a true plasma membrane to the isolation from the membrane of the key molecule involved in transporting

Na<sup>+</sup> and K<sup>+</sup> across cell walls. She took more than her share of the teaching responsibilities of the department, chaired and served on major policy-making committees of the Faculty and the University, and (not the least) was an inspiration to all the students who were fortunate to have her as their friend and teacher. Her example had a major impact in the gradual recognition in the department, and in the university as a whole, that women should have the opportunity to assume academic responsibilities equal to those of the men on the staff.

#### CSBMCB JEANNE MANERY FISHER MEMORIAL AWARD



Jeanne Manery Fisher

Jeanne Manery Fisher was the first woman to be appointed as a Professor in the Department of Biochemistry. The Canadian Society of Biochemistry, Molecular & Cellular Biology created an award in 1988 to honour Dr. Manery Fisher's achievements as a scientist, teacher and for her role in the promotion of women in science. Amira Klip won the Jeanne Manery Fisher Memorial Award in 2000.

To illustrate the changes in attitudes that have come about, one need only recall that even in the 1940's, keys to the Medical Building were not issued to women staff members or graduate students because it was not "seemly" for them to work in the evenings unchaperoned! When Dr. Wasteneys was assigning me to my graduate supervisor, Prof. Gordon Butler, Prof. Wasteneys said to him, "You wont have to worry about finding a job for her when she completes her degree because she is already married"! One of my first memories as a graduate student was the daily break at 4 o'clock for tea. It was quite a formal affair with professors and graduate students gathered around the table and Miss Delamere pouring. Conversations over tea were wide-ranging – research findings, relevant scientific literature, university affairs, politics, and world affairs.

Even after the war, funding difficulties persisted. In 1947-48, Prof. Wasteneys recorded in the Report to the

Dean "Difficulty was experienced in providing essential teaching and research equipment and chemicals from the departmental appropriation".

When Prof. Leslie Young returned to the U.K. in 1947, Professor Gordon Butler was appointed. He had received his Ph.D. in biochemistry with Prof. Guy Marrian in Toronto in 1938, carried out research on chemical warfare with the Canadian Army during World War II, and spent two years with the Atomic Energy Project at Chalk River, Ontario. In the Department of Biochemistry, he established an active research group that made important contributions to the advancement of research on DNA and histones.

The Head of the Department traditionally gave the lectures in biochemistry to the medical students, and it is unfortunate that Prof. Wasteneys' deafness in his later years resulted in the students in these large classes being excessively noisy and disruptive.

In 1947, Prof. Wasteneys was honoured by his former students and associates at a dinner held in Hart House. His "Reply to the Toast" follows. It provides an insight into his enjoyment of his nearly 30 years in the department and his warm personal relationships with everyone in it. He paid tribute not only to the professorial staff, but also to the support staff of the department, naming each one and saying "Their quiet, competent, unacclaimed and always cheerful industry is the very bed-rock on which is built the whole structure of our work".

In 1949, the department was small enough that the annual Christmas party was held in Prof. Wasteneys home in the Annex, attended by professors, graduate students, technicians, office staff and other support staff, and spouses.

In 1976, Prof. Jeanne Manery Fisher recalled that in her third year (1930-31), she was intrigued by a course in biochemistry given by Prof. Wasteneys, and "my fate was sealed". She also pointed out that he was the University Advisor to Honour Science students and commented on his "encouragement and wise council" during her early years in training and in her later career.

She wrote "He was a 'career chairman' who found time for students and, though not actively engaged in research himself, created an atmosphere which begat research of the highest calibre, an atmosphere which was at the same time friendly and comfortable. In this department, everyone had room to grow."

### **Professor Wasteney's "Reply to the Toast"**

On May 26, 1947, Prof. Wasteney was honoured by at a dinner held in Hart House attended by past and present associates including professors, graduate students, technicians, and support staff. At the time, Prof. Wasteney had been in the Department since 1918 and had been its Chair since 1929. Although no record survives of the wording of the Toast to him, his "Reply to the Toast" is reproduced below. (The original was undoubtedly typed by Miss Delamere, the Departmental Secretary, who had been in the Department as long as Prof. Wasteney.)

"Ladies and Gentlemen

I should have liked very much to take advantage of the condition which I myself laid down for this dinner, - that there be no speeches. It would be more than ungracious, however, if I failed to say something in an attempt to express my gratitude for your extraordinary kindness.

It is about 10 weeks since Professor Wynne and others of the Staff came to my room in the Medical Building to tell me something of this plot. It seemed incredible to me then and I have been wondering about it ever since, seeking for an explanation. Because, you see, as in all our biological problems, the solution, while it eventually may turn out to be quite simple, is seldom obvious. One must formulate and test one hypothesis after another, until the correct one is found. The first hypothesis, that you and the other absent - conspirators - I call you - are honouring simply me, in this splendid and kind manner, could hardly be correct. I know myself and my accomplishment too well, after more than three-score years of, as nearly as possible,

objective criticism, to imagine that anything, or all that I have done for you or for the department or for the university, could begin to merit such a tribute. It is true that I could easily imagine that your generosity might lead you to respond to a suggestion that some kindness be shown to the nominal head of the department which gave obstetrical service at your parturition in Science, because, as I told Professor Wynne ten weeks ago, there has been in this department, during the past 29 years, a succession and in some cases a continuity, of the grandest and kindest people on this earth. That hypothesis, viz. that you are honouring me, I soon replaced by another, which subsequent reflection leads me to believe, gives the correct solution. As so often happens, it came to me quite illogically, through a phrase which recurred to my mind whenever I pondered the problem. The phrase was from the introductory chapter of T.E. Lawrence's "Seven Pillars of Wisdom". It introduces what is, to my mind, some of the grandest prose and noblest sentiment in modern written English. Lawrence is speaking of the reasons for which he wrote the history, not, he says, of the Arab movement, but of himself in it. He speaks of his pleasure in recalling the fellowship of the revolt, as you and I tonight recall the pleasure of our fellowship during our years together here, in Biochemistry. This is the phrase which gave me the explanation I sought. He says - "We were fond together" because "of...the hopes in which we worked." "The morning freshness of the world-to-be intoxicated us". there you have it. - We were fond together - we had hopes in common and the morning freshness (isn't that a perfect expression!) of our biochemical world-to-be was, and is, intoxicating. We were happy together not only because of our common interests and because, fortuitously, there have always been, in the department's metabolic mill, some extraordinarily fine people (many of whom are here tonight) but particularly because the continuing metabolism, as Harry Borsook would say, or perhaps the basal metabolism, has been supplied by some very grand persons.

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I should like to pay tribute to the first of these though only a few of you knew him. He was in the department when I came in 1918, Mr. Giddens, his name was. To know him was a benediction. He was a very old servant of the university and, if I had had the decision, his funeral would have been from Convocation Hall. The next, perhaps the most basal of our basal metabolites, has also completed more than a quarter century in the department. Can any of you think of your years in the department, without thinking first of Molly Delamere! Who first registered you, who sometimes scolded you, when you deserved it, but to whom you went for help in many a difficulty, and for sympathy in your troubles, who took your temperature if you looked unwell, who sent you home if the thermometer gave her any excuse for doing so, who, moreover, saw that you had a competent doctor if that was necessary, who was, and is, the master enzyme and the mistress vitamin of our metabolic mill.

Many of you remember Professor Hunter, for several years our Head. His lectures, models of lucidity and of presentation, his technique in the laboratory, incomparable, his steady unrelenting search for the solutions of his biochemical problems in his laboratory, a perfect exemplar of the ideal scientist and scholar. True, he deserted us for his native Scotland, but soon discovered that his attachment to Canada was still stronger, and he happily returned to us. Some of you remember Dr. Speakman. His rank in the department was only Honorary, that meant only that he received no honorarium, but he was for years, and still is, our helpful colleague. Not the least of the blessing he bestowed on us, in fact the greatest, is Professor Wynne. Others, grand fellows all, Professors Kay, Marrian, and Young, have made their splendid contributions, as those of you who benefited from them well know, to return, like Dr. Hunter, whence they came. But Dr. Wynne has remained, a continuing and most basal metabolite, who will always be first in your minds when your thoughts return to the department and to your early adult adventures in advance biochemistry

and Zymology and in biochemical and zymological research. Others too, Dr. Jeanne Manery, and Professor Crocker, will form a very essential part of the pattern which the department has impressed on the memories of more recent graduates. I want to speak, too, of a group who perhaps, deserve much, if not most of the credit for the fragrant memories of your years with us, which, as I think, have prompted this celebration. Their quiet, competent, unacclaimed and always cheerful industry is the very bed-rock on which is built the whole structure of our work. Mr. Sloan, who has cheerfully made gadgets for us for the past 26 years, Mrs. Lumbard who, during 20 years, sight unseen, mostly, in all seasons, has tenderly and conscientiously cared for countless generations of our laboratory creatures. Our old friend, Mr. Fletcher, who struggled, as we now know, in ill-health, to the end, so that our classes for Zymology and now, *ex profundis* for biochemistry has done, for the past 22 years, and is still doing, a splendid job for us. Mr. Edson, who inherited the microchemical analytical mantle of the incomparable Dorothy Skill and, during the past 10 years has been the envy, for his analytical accuracy, of the graduate micro-analysts in the university. He also performed miracles, at least so they seemed to us, with electronic contrivances for war research. Alas! He has left us, to work in a field of wider opportunity, but we count him still a friend in need. Mr. Clough who, for 13 years, with never failing kindness and great courtesy, in a thousand emergencies, as in the daily round, has helped to smooth our path. And Mrs. Wilkie, alas! she soon leaves us for well-merited retirement. Can any of you ever forget her cheerful never flagging industry! In 12 years I have never seen her rest a minute and I have never seen her face without its happy smile. Words cannot express what we owe to these ladies and gentlemen who have been our friends and comrades for so many years. They set a fine example for the young folk now preparing to succeed them. It is, I think, to this simple fact, that for periods varying from 10 to nearly 30 years, all the splendid people I have

mentioned, have worked loyally and happily together in our department, that an environment was created there, which made the years you spent with us such pleasant and fruitful years, that you seized on this occasion to renew those memories.

I wonder if you realise how significant this gathering is and how much happiness for those of us who are the continuing members of the department. To us, and by "us" I mean all those I have mentioned. To us, nothing gives greater pleasure, nothing is a more satisfactory recompense for our labours, than the occasional homing visits of our Graduates. You can understand then, that to see you all together, all the generations merged in one gathering is, to us, pure joy.

We miss some who could not be here tonight. Some of them have been to see us during the last few days but could not stay over until tonight. Others were unable to come to Toronto at all at this time. It would have been perfect, of course, if they had, but only a miracle could have brought us all together. We miss Fishman with his Ocarina – Elizabeth Macpherson with her bagpipes – Jules Tuba – Clare Morrell – Jim Ignatieff, the sound of his songs still echoes around the laboratories – Florence, his wife – I'd love to catch her rolling peanuts down the hall with Elizabeth and other quite dignified members of the department – once again. – Tony Brown, we still have his grasshopper cages – Margaret Butler – Violet Dunbar – Marion Lawson – Frank Root – Harley Jenner – Shen – and Chang, the last three all away in China. All these and many others are in my mind tonight. And there are three in my mind who can never come back. That grand man Barbour, what fun we had together in the Lab., good old Fletcher and Mr. Lumbard.

And now – As members of the mother of parliaments say, on private occasions, I spy a stranger! I want to take a Parthian Shot at him. Mr. Bickersteth may not have meant as much to some of you as he has meant to generations of undergraduates. You were too busy, most of you, too busy with study and research, or thought you were, to avail yourself of the opportunities afforded by this house, under his wardenship. But I want to say how

great a joy it was to me, to work with him, for 26 years, in the service of the undergraduates of the university in this lovely building. He too, alas! having given the best years of his life to our service in Hart House, is returning whence he came and he will be succeeded by a brother of our own Jim. (Nicolas Ignatieff).

And what shall I say to you, who spent your two, three, four or more years in the department and are now spread all over the habitable globe. I think, perhaps, if you had time to return and stay a season you would find many changes in the university, if few in the department. There is a spirit of change abroad, and time-honoured customs and institutions are being rather blithely overthrown, apparently, with no sense of sacrilege. One cannot always see what advantage has been gained; indeed, the iconoclasts are too busy, I think, to consider the profit or loss of what they do. One thing they have not changed. Nothing yet prevents us from carrying on the best work possible for us, in our departmental laboratories.

Well, we tried to give you here the best we could of training in biochemistry and in biochemical research. That was our first and bounden duty. But for myself, I should feel more happy if I were always sure that we had contributed also to the development of your character; that we had helped you to achieve a sense of purpose in your lives, that we had taught you to feel that good workmanship and solid accomplishment were in themselves worth-while ends, that you had learnt to value the approval of your peers in Science before the meretricious and evanescent acclaim of the daily press. I should feel happy if I knew that we had helped you to achieve a sense of values which might guide you towards some contribution to a solution of the problems of our troubled world. Science is our vocation! True, and we must follow it. None-the-less, the great need of our world today is not more science, but a marriage of science and Humanism (and transcendentalism too, if you must have it) in a new and true religion, to the end that we may at last achieve a real "brotherhood of Man" and be freed from the "slough of Despond" in which

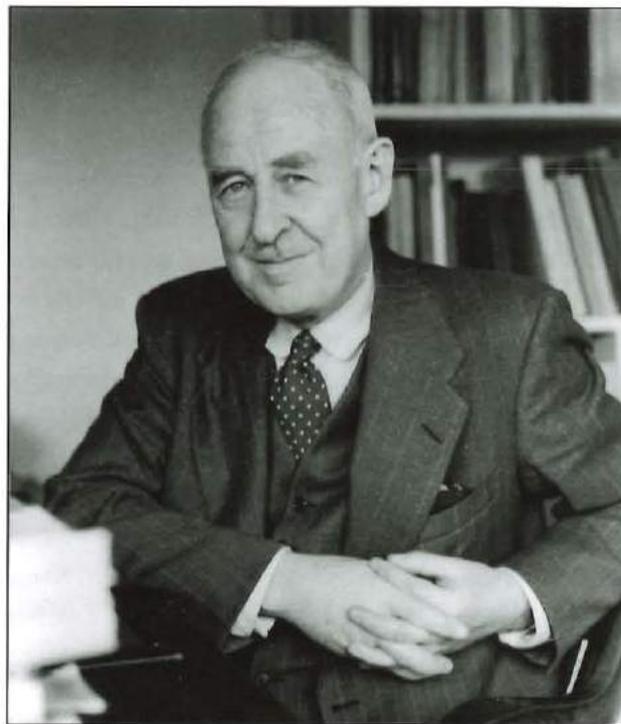
we now wallow. Oh! I know our Governments and our Governors, today are protesting that science, scientists, and our universities, for a while, they say, must sacrifice many of their ideals to the imminent needs of National Defense and National Industry. But what shall it profit us, if we gain the world – to lose our souls. I pray too, that in this new era of highly organised, highly specialized, highly oriented research, our successors may not be discouraged from pursuing those exciting and glorious adventures of the mind and spirit which have made our lives so worth living. The danger that this may happen is not immediately apparent, but I think it is real.

One last thing I must make clear to you is this; that, whether your splendid gift to me, and our reunion at this happy, lovely dinner, are to be interpreted as honouring the department, as I believe; or me, as I think you would have me believe; - Not all the Nobel Prizes, medals, or other honours which the world bestows, could mean one half as much to me, as these kind acts of yours. “

### **Professor Arthur Marshall Wynne, F.R.S.C. (1891-1972)**

Prof. Wynne was head of the Department of Biochemistry from 1951 to 1960.

He was born in Brigdon, Ontario and obtained his B.A. and M.A. in biochemistry at Queen's University. In 1916, he became a research associate with H.B. Speakman at British Acetone, Ltd. and at the conclusion of the war, moved with him to the University of Toronto in the newly established Department of Zymology. He is first listed in the calendar in 1921-22 as "Fellow and Research Assistant". His Ph.D. thesis in 1925 was on bacterial metabolism. When Zymology and Biochemistry merged in 1929, he was appointed an Assistant Professor. (A copy of his obituary in the Bulletin of the Canadian Biochemical Society, Vol. IX, no. 3, October, 1972 is in the departmental archives.) His principal external interest was music and he was a gifted pianist and organist. He served as organist of St. George's United Church and Eglinton United Church and sometimes substituted for the university organist at official ceremonies in Convocation Hall.



Arthur M. Wynne

He supervised the work of 21 Ph.D. and 14 M.A. students on bacterial amylases, invertase, lipases and phosphatases, with publications in the Journal of Bacteriology, the Biochemical Journal and the Journal of Biological Chemistry. Graduate students in the department recall that he carried a little brown book in which, whenever the occasion arose, he wrote down questions to be used in oral examinations at a later time. During World War II he worked on classified projects for the Department of National Defence. In 1943 he was elected to a Fellowship in the Royal Society of Canada.

During the years that Prof. Wynne was in the department, biochemistry was seriously underdeveloped in Canada, and many graduates from Toronto's biochemistry Ph.D. program joined the professorial staffs of other biochemistry departments in Canada, as well as the Department of Biochemistry in Toronto where, in 1973, six of them were on the full time professorial staff. In 1957-58, Prof. Wynne was elected as the first president of the Canadian Biochemical Society.

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#### CSBMCB ARTHUR WYNNE GOLD MEDAL

In 2008, to mark the 50<sup>th</sup> anniversary of the Society (now the Canadian Society of Biochemistry, Molecular & Cellular Biology) the Society began the yearly award of a medal named in honour of Prof. Wynne – The CSBMCB Arthur Wynne Gold Medal. The recipients of this life-time achievement award are to have attained an international profile in research, played a major role in the development and promotion of the discipline in Canada, and have a long-standing record of service to the academic community.

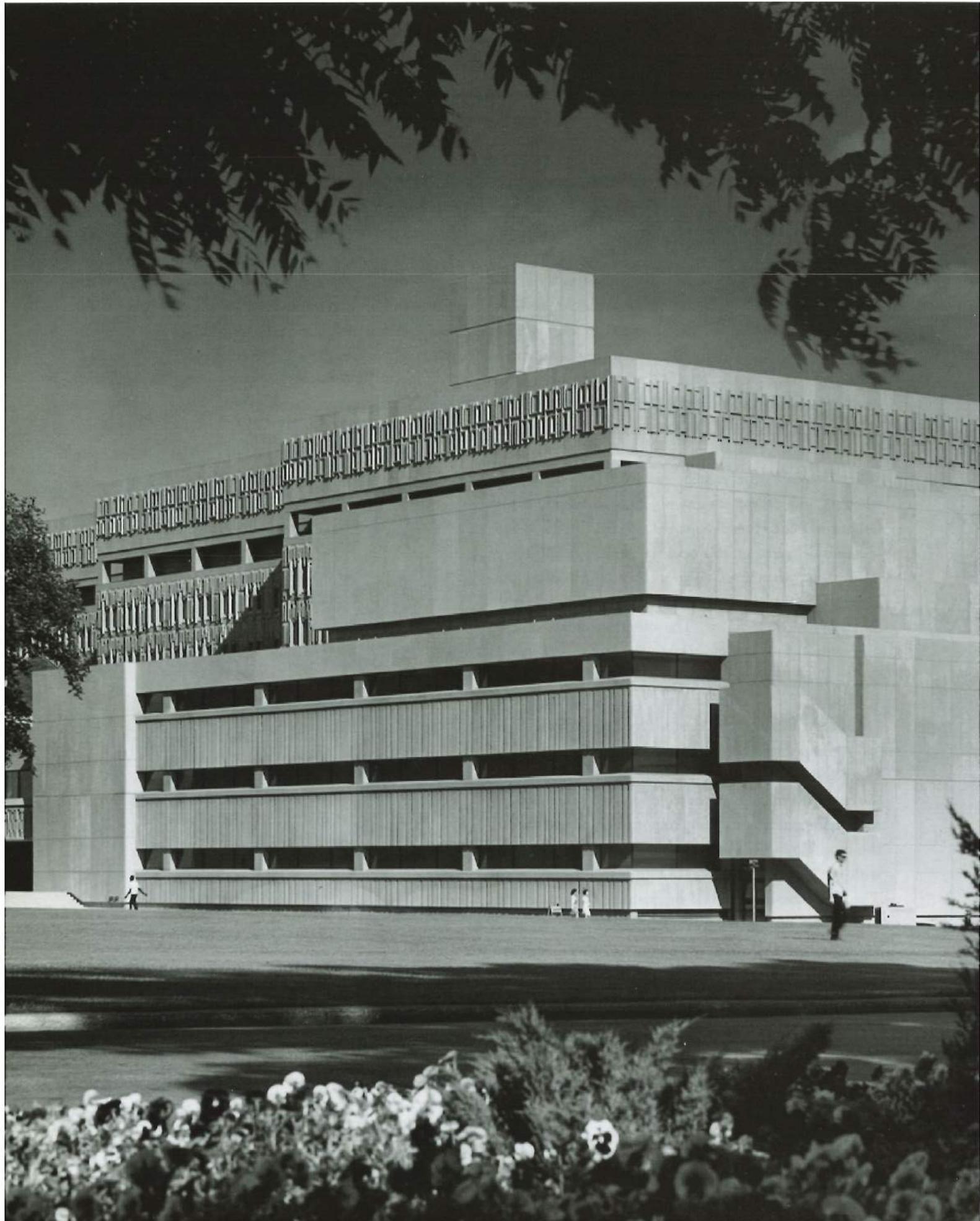
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When Prof. Wynne retired, over 150 of his former students and colleagues assembled at a dinner in his honour at Hart House (Sept. 30, 1960). Copies of the speeches delivered on this occasion are in our archives.

In 1951 when Prof. Wynne became Head of the Department and Prof. Wasteneys retired, Prof. Charles S. Hanes was appointed. The other members of the professorial staff at that time were Prof. Gordon C. Butler, Prof. Jeanne Manery Fisher and Prof. Bruce F. Crocker. Prof. Butler resigned in 1957 to direct the Division of Biology and Health Physics at Chalk River for Atomic Energy of Canada Ltd., and George E. Connell was appointed to the professorial staff. Despite the fact that a major part of their efforts were occupied by their undergraduate teaching responsibilities, the staff at this time also carried heavy graduate teaching loads, often with 5 or 6 graduate students in each of their laboratories. The list of theses submitted by graduate students in the department during the decade 1950-60 indicates the extent and scope of the original research projects pursued in the department in this period (See Chapter 16).

In 1956 the old Zymology laboratories in the basement of the Medical Building were transferred to the Department of Pharmacology and much of the space on the second floor, formerly occupied by the Department of Physiology, became part of the Department of Biochemistry. The research and undergraduate teaching laboratories on both floors were remodelled and re-equipped.

After 41 years in the department, Prof. Wynne retired as Professor Emeritus in 1960 and then served as a Special Lecturer for a further year.

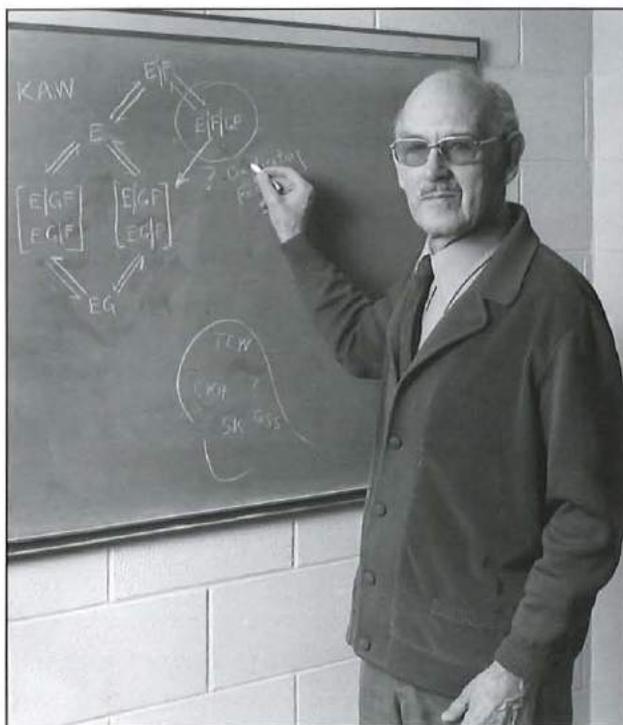


Medical Sciences Building 1968

## CHAPTER 4

### The Middle Years 1960-1991

#### Professor Charles Samuel Hanes, F.R.S., F.R.S.C. (1903-1990)



Charles S. Hanes

Prof. Hanes was head of the Department of Biochemistry from 1960 to 1965, and retired from the department as Professor Emeritus in 1968.

He was born in Toronto, completed high school at the age of 16, and before entering university he held several jobs, including an assistantship in an instrument-making shop attached to the Weather Bureau. At the University of Toronto, he specialized in Biology and graduated with a First Class Honours B.A. in 1925. He lectured at Queen's University for two years and then the award of an Overseas Scholarship took him to Cambridge, which, with a few interruptions, was to be his base for more than 25 years. For his Ph.D. project, he investigated the amylases, and the interconversions of starch and soluble sugars in plant tissues. One of the interruptions occurred in 1931 when he returned to Toronto, hoping

to find a teaching post, but times were hard. However, H.B. Speakman, by now the director of the Ontario Research Foundation, offered him a fellowship and he worked for three years at the Foundation, with a little part-time teaching at the University of Toronto. He returned to Cambridge in 1934 when he was offered an appointment on the staff of the Low Temperature Station for Research in Biochemistry and Biophysics.

In his review of starch structures published in the *New Phytologist* in 1937, he illustrated the usefulness of enzymes as probes of macromolecular structure and made the first suggestion of a helical conformation for a macromolecule, starch, on the basis of its iodine-colouring property. He is best known for his discovery and initial characterization of the plant phosphorylases, completed just before he took up wartime duties. In 1941-1944 he served as scientific member of the British Food Mission in North America, dividing his time between Washington, Ottawa, London and Cambridge, working on technical problems of production and handling of war-time food supplies. From 1943-1947 he was the director of Food Investigation and was then appointed Reader in Biochemistry at Cambridge where he used the new tool, paper chromatography, to separate phosphoric esters and was involved in the discovery of a number of transpeptidases. During his years in Cambridge, he collaborated with and formed close associations with many of the leading biochemists in the world at that time. When he returned to the Department of Biochemistry at the University of Toronto in 1951, he continued and expanded these studies. His first two graduate students at Toronto were George E. Connell and Gordon H. Dixon.

In the *Bulletin of the Canadian Biochemical Society*, Vol. XVI, #1, 1979, George Connell wrote an "appreciation" of Prof. Hanes who had been appointed as one of two Honorary Presidents of the 11<sup>th</sup> International Congress of Biochemistry, held in Toronto in 1979. He pointed out that Prof. Hanes had been "prominent among the group

of biochemists in Cambridge, England, who organized the first Congress in 1949” and that Prof. Hanes “often referred to the (first) Congress as one of the milestones in his scientific career”. George Connell also described the “profound influence that Prof. Hanes had not only on his students and colleagues, but in the councils of the University of Toronto, and, more widely, in Canadian Biochemistry”. He had infinite patience for attention to details in all his endeavours and his working places were always meticulously tidy, but he was also capable of a remarkable breadth of intellect, from polysaccharides to proteins, from simple kinetics to matrix algebra, as well grasping the significance of his work in the context of the whole organism. He was elected a Fellow of the Royal Society of London in 1942 and of Canada in 1956 and was the Flavelle medallist in 1955.

Prof. Hanes’ impressive scientific accomplishments were matched by his personal warmth and humanity; he was always alert to the needs of those in distress. After his death, at the observance in honour of his memory held on Nov. 7<sup>th</sup>, 1990, his colleagues and former students paid tribute to him as a warm and thoughtful teacher, willing to share his knowledge and full of encouragement. He was also a gifted amateur painter.

While Prof. Hanes was Head of the Department, the core professorial staff was greatly expanded with the appointment of G.H. Dixon, R.K. Murray, G.R. Williams, R.A. Anwar, T. Hofmann, H. Schachter, W. Thompson, J.T. Wong and W.A. Green. All of these professors, except Professors Dixon, Green and Wong, remained associated with the department until they retired. There is no record of any cross-appointments or status-only appointments during this time. Dr. Edith Anderson, Dr. Dorothy McLean Johnson, Dorothy Painter and Jacqueline Giles were appointed as part-time lecturers with supervision and modification of the teaching laboratory classes as their main responsibilities. In 1965 the first sabbatical leave ever granted by the department was given to Dr. Jeanne Manery Fisher who spent six months at Cambridge University, U.K. after “finishing her teaching duties”.

## MOLLY DELAMERE



Molly Delamere

Molly Delamere was Departmental Secretary for 43 years. To say that she ran the Department is an understatement. A glimpse of her character can be gleaned from an encounter she had with Bill Fishman a potential graduate student newly arrived from Saskatchewan in 1935.

*“To my knowledge, I had completed the registrations forms to enter graduate school and had mailed them two months before the start of the fall semester. However, although I had received no reply I decided to go to Toronto and if not accepted apply to other institutions.*

*My first priority then was to visit the Department of Biochemistry and find out whether or not I had been accepted into its graduate program. I found myself stating this question to the secretary of the Department.*

*Miss Molly Delamere was a formidable character who demanded that I explain why I had not answered her letter. Since I had not received it, I suggested that because the train brought the mail to Oakburn three times a week, the letter might have arrived after I left. She refused to accept this suggestion repeating over and over again, You did receive my letter! Why didn't you answer it?*

*I then asked very politely if I could see Dr. Wasteneys, the Chairman of the Department. Very reluctantly she ushered me into his impressive office. Dr. Wasteneys was seated behind a massive desk and gruffly said, sit down Fishman.”...*

*From the “La Jolla Cancer Research Foundation” by William H. Fishman.*

The year 1961 saw the end of an epoch in the history of the department with the retirement of Miss Molly Delamere who was the Departmental Secretary for 43 years. She had begun her career by combining the task with that of research assistant to Prof. Andrew Hunter. Her job as Departmental Secretary involved many responsibilities in addition to typing correspondence and manuscripts. She was also the Chief Purchasing Agent, Librarian and telephone operator. The

department had had only one telephone up until the early 1950's and everyone was summoned to Miss Delamere's office by a buzzer code when they received an incoming call. Needless to say, this system imposed considerable restraints on the use of the phone. Miss Delamere represented the department in the minds of many at the University to such an extent that at one time the Head of the Department was only somewhat taken aback to have the Department of Biochemistry referred to as "Miss Delamere's department" by one of his colleagues. Warm tributes to her were made by Professors Wasteneys and Wynne at the dinners held in their honour. Upon her retirement the staff and many former graduate students attended a tea held in the Duncan Room of the Medical Building to celebrate her contribution to the smooth running of the department for so many years.

In 1963, members of the department made their first appearance on television when Professors Crocker, Dixon and Williams developed and presented a program for the CBC "Live and Learn" series on the nature and significance of biochemistry.

There was little or no change in the teaching responsibilities of the staff during this time, or in the requirements for graduate degrees. The awarding of B.Sc. and M.Sc. degrees instead of B.A. and M.A. degrees began in 1965.

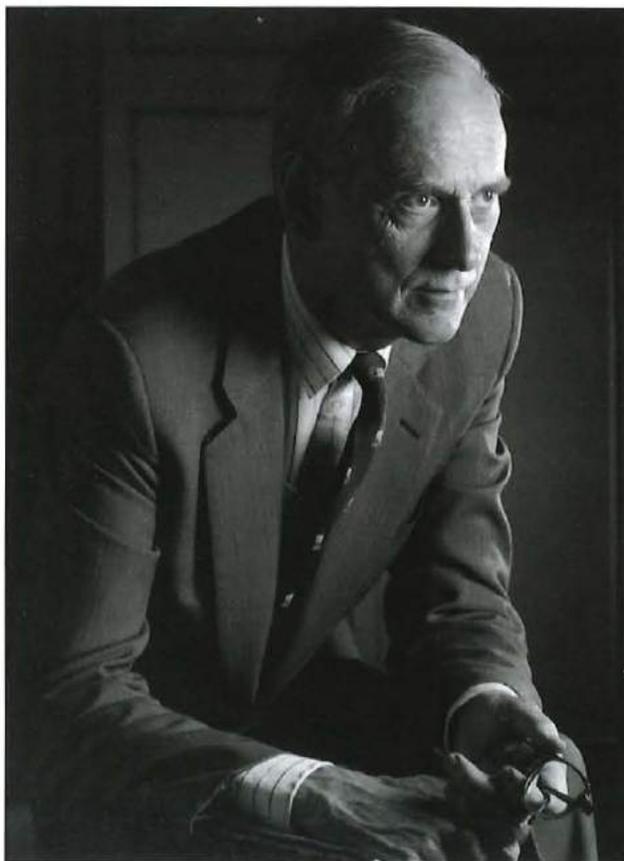
In 1964 and 1965, Prof. Hanes served on the Laskin Committee on Graduate Studies that involved 40 meetings and delegations to other graduate schools in the United States, the United Kingdom, and Europe. This committee stressed the importance of graduate studies and led to the central role of the Graduate School with control over appointments to the graduate departments.

When Prof. Hanes retired in 1968, an Emeritus Professor Book Prize was established in his honour. It was awarded each year to the most outstanding student graduating with a B.Sc. who had majored in biochemistry. The first recipient of this prize (1969) was R. Roy Baker who later became a professor in the

department. The fund that supported this prize was augmented at the time of Prof. Crocker's retirement as Professor Emeritus in 1970. The prize was last awarded in 1986 when the remaining money was combined with the Prof. Jeanne Manery Fisher fund. The interest on this money is now used to help fund the awards given on the annual poster day.

Prof. Hanes was the first chairman to step down after a five-year term. The "Haist Rules" introduced in 1957 had taken chairmanships away from being "life sentences" and introduced five-year terms, renewable once. Prof. Hanes was pleased to return to his laboratory in 1965 and he retained his interest in the activities of the members of the department even after his retirement in 1968.

**Professor George Edward Connell O.C.,  
LL.D., D.Sc., F.C.I.C, F.R.S.C. (1930-**



George E. Connell

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Prof. Connell was Head of the Department from 1965 to 1970. He was born in Saskatoon, graduated from the Physiology and Biochemistry program at the University of Toronto in 1951 and obtained his Ph.D. on the topic of transpeptidation reactions with Prof. Hanes in 1955. After post-doctoral studies in the NRC laboratories in Ottawa and in Prof. Ochoa's laboratory in New York, he joined the professorial staff in Toronto in 1957. His research work involved the chemistry of haptoglobulins and immunoglobulins, and with Gordon Dixon and Oliver Smithies he developed the technique of starch gel electrophoresis that at one time was used in protein research throughout the world. Because of his expertise in the study of immunoglobulins, in 1967-68 he chaired a planning committee of the Medical Research Council on antilymphocyte serum. In 1970-71 he spent a sabbatical year in Professor Porter's laboratory in Oxford. He served on many national bodies, including the Medical Research Council of Canada where he was a member of the Executive Committee and of the influential Priorities Selection and Review Committee. However, his administrative talents diverted his activities away from biochemistry; he became Associate Dean of Medicine at Toronto in 1972 and from 1974 to 1977 was the University's Vice President of Research and Planning.

In 1977 he left Toronto to become President of the University of Western Ontario and from 1981 to 1983 he was president of the Council of Ontario Universities (COU). He returned to the University of Toronto as its President from 1984 to 1990. On the occasion of his retirement from the Presidency, a dinner was held at the Convention Centre in Toronto. The proceeds of this dinner and other donations amounted to over \$160,000 and were given to the department to establish "The George Connell Biochemistry Lectureship". The income is used to support visiting lecturers and provide emergency funds for other academic needs of the department. Appropriately, the first lecture was given in 1991 by Prof. Connell's fellow graduate student, Gordon Dixon, who was then a professor at the University of Calgary.

Prof. Connell has had many honours bestowed upon him during his illustrious career, including becoming an Officer of the Order of Canada and receiving several honorary degrees. He was elected a Fellow of the Royal Society of Canada in 1975 and he is a Fellow of the Chemical Institute of Canada. He was the President of the Canadian Biochemical Society in 1973-1974 and in that role he was influential in arranging for the 11<sup>th</sup> International Congress of Biochemistry to be held in Toronto in 1979.

During Prof. Connell's term as Head of the Department, funding for new space, new equipment, and additional staff became available. While the new Medical Sciences Building was under construction, extended facilities for research in renovated laboratories in the Spadina Division of Connaught Laboratories were acquired (1966-1968). The staff members who occupied these quarters were Professors W.A. Green, E.R.M. Kay and D.O. Tinker who joined the department in 1966 and Professor K.G. Scrimgeour who joined in 1967. Mr. L. Pinteric was appointed as Research Associate to take the department into the discipline of electron microscopy. M.A. Packham rejoined the staff as a lecturer in 1966 and was appointed as an Assistant Professor in 1967. Other appointments to the core professorial staff were Professors R.H. Painter (1968), B.G. Lane (1969), N. Camerman (1969) and K.J. Dorrington (1970). The practice of giving members of other departments cross-appointments to the Department of Biochemistry was begun in 1965. Prof. Arnis Kuksis of the Banting and Best Department of Medical Research was the first such appointment in the 1960s. In addition to cross-appointments, some members of the research institutes were given "honorary" appointments; such individuals are now designated as "status only" appointees. All these members of the department who are outside the "core" have contributed, and continue to contribute to both the undergraduate and graduate teaching of the department. It was during these years that the department began to have Post Doctoral Fellows as members of the research teams. In 1966 Patricia Staton began her 15 years as the



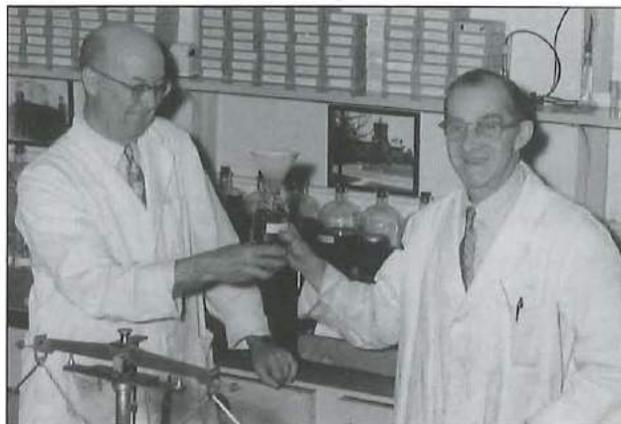
Arnis Kuksis

Business Officer and the office staff was expanded.

Late in 1966, the department adopted the policy of appointing a co-supervisor for each graduate student who would serve as an advisor to both the graduate student and the supervisor in all matters related to the degree program. From time to time, conferences were to be held to review the state of the work. In 1967, the comprehensive oral examination required for the Ph.D. degree was replaced with the requirement that the student write and defend a Research Proposal.

In July of 1968, the members of the department began their move out of the old Medical Building. There were few regrets to leaving behind the cockroaches, the mice, the mercury in the cracks between the floor boards from the van Slyke equipment, the inadequate cold rooms and animal quarters, and the lack of air conditioning. However, some members of the Department regretted the loss of the Duncan Room that had served as a popular meeting place for conversations with colleagues in biochemistry and the other departments that occupied the building. Block A of the new Medical Sciences Building was the first to be completed and occupied, but when more of the building came into operation, the staff members who had had laboratories in the Spadina Division joined the rest of the department. A new Department of Teaching Laboratories was formed with responsibilities for space, equipment, and support staff for all the undergraduate teaching laboratories in medical sciences. This arrangement was a major change in organization since previously the individual departments had each carried out these functions. Professor R.H. Painter was appointed jointly to this new department and to the Department of Biochemistry.

In the old building, the departmental technicians, Jack McClary and Bill Clough, had looked after the biochemistry undergraduate teaching laboratories, maintained the departmental stores of chemicals, and assisted with purchasing and receiving for many years



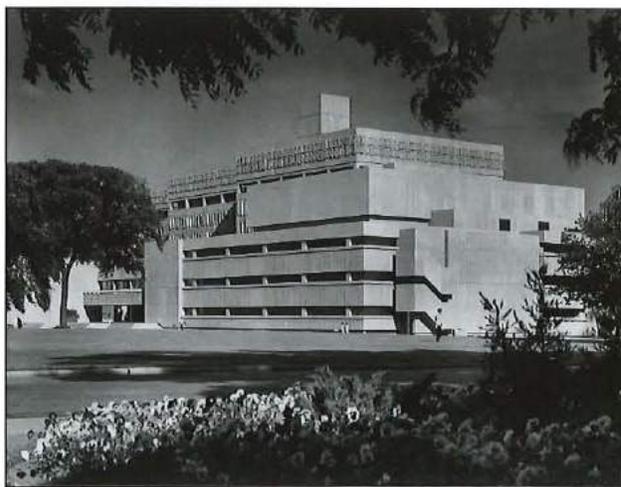
Jack McClary and Bill Clough

(Jack for 46 and Bill for 34). After the move, Bill Clough retired and Jack McClary became the department's senior technician until his retirement in 1973.

Following the move to the new building, some new equipment was acquired and the department decided to levy a 2% tithe on the research grants to cover the costs of service contracts and repairs to equipment that had been bought by the department or was in common use.

The department acquired its first photocopier in 1968, replacing the old mimeograph machines.

A new medical curriculum was introduced in 1969-70. Several members of the department had contributed to the planning and preparation for this change and Professors Manery Fisher and Murray assumed the chairmanships of two of the "systems" in the new curriculum.



Medical Sciences Building 1968

The MacPherson report of 1967 (which impinged on the department in 1970-71) led to the abolition of the honours courses in Arts and Science and changed the undergraduate programs of the university forever. No longer were there to be separate courses for students in the General Program. The Physiology and Biochemistry (P&B) program was split into two separate streams after the second year, and the Biochemistry Specialist program was established. As its last class graduated, the old Biological and Medical Sciences (B&M) Honours program was abolished.

In the spring of 1970, a planning committee met to draft a constitution for the department, which outlined its committee structure, including a Departmental Council with representation from undergraduate and graduate students, and support staff, as well as the professorial staff. After several revisions, the final version of the constitution was adopted in 1974.

### **Professor George Ronald Williams F.R.S.C. (1928-**



G. Ronald Williams

Professor G. Ronald Williams was chair of the Department of Biochemistry from 1970 to 1977.

He was born in Liverpool, England and received his Ph.D. in Biochemistry at the University of Liverpool in 1951. He came to Toronto in 1952 and spent over a year at the Banting and Best Department of Medical Research, publishing a series of papers on the intermediary metabolism of the sugar acids. He then spent two years with Britton Chance at the Johnson Foundation of the University of Pennsylvania, producing a most important contribution to biochemistry, namely, the elucidation of the sequence and function of the respiratory enzymes in oxidative phosphorylation. After a year at Oxford, Prof. Williams returned to Toronto in 1956, again at the Banting and Best Department of Medical Research. In 1961 he transferred to the Department of Biochemistry and became its chairman in 1970. During his second term in this position, he decided to pursue his interest in the stability of global environmental parameters, and he resigned the chairmanship to spend 1977-78 in the Lamont Geological Observatory outside New York City where he began to investigate the role which biochemical processes such as enzymatic catalysis play in establishing feed-back loops in the cycles of carbon, oxygen, nitrogen, phosphorus, sulphur etc. Upon his return to the University of Toronto in 1978 he became Chair of the Life Sciences Division at Scarborough College, and from 1984 to 1989 he was the Principal of Scarborough College. Prof. Williams then spent a sabbatical year in Victoria, B.C. and returned to the Division of Life Sciences at Scarborough College.

Prof. Williams was active in the committees of the Medical Research Council of Canada and in 1971-72 he was the President of the Canadian Biochemical Society. He was elected to a Fellowship in the Royal Society of Canada in 1978.

Before becoming Chair of the Department of Biochemistry, Prof. Williams played a major role in the 1960's in the design of the new Medical Sciences Building. In his first year as chairman, the department reached a new high in the number of graduate students enrolled (66).

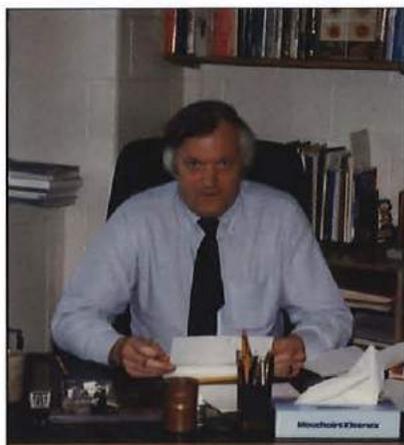
Consequently, a limit of 70 graduate students was set (no more than 2 per professor), partly in response to the request of the Biochemistry Graduate Students Union (BGSU), an organization that was formed in 1971. The BGSU is not a labour union, but functions as the co-ordinator of the graduate student activities in the department. The decision to curtail the number of graduate students was made because of the prediction that too many biochemists were being produced for the positions that would be available for them in Canada. The days of large expansions of the universities were judged to be ending.

In 1971 the Departmental Council came into

that would be of interest to biochemistry faculty and students. In 1975 he became the Assistant Dean of the School of Graduate Studies and served as Acting Dean in 1978. Biochemistry continues to distribute Cette Semaine to the University of Toronto biomedical community in an on-line and e.mail format.

The Institute of Immunology was formed in 1972 and Professors Dorrington and Painter were cross-appointed to it.

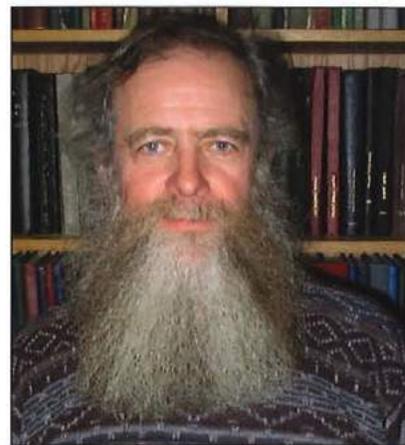
At a staff meeting at the Muir Park Hotel in 1972, the change brought about by the MacPherson report of having only one introductory lecture course in



Keith J. Dorrington



Anders Bennick



David E. Pulleyblank

being, a detailed constitution having been written by a committee appointed by the chairman. This constitution gave graduate and undergraduate students, post doctoral fellows, research assistants, and technical support staff a voice in the operation of the department. Previously, only the professorial staff and the Department Business Officer had been involved in decision making. (A copy of the final, 1974, version of the constitution is included in the departmental archives.)

Also in 1971, student evaluations of biochemistry courses were begun in response to a request by the Arts and Science students. A 'basic form' for these evaluations was developed in 1975 by the professorial staff.

Cette Semaine was started by Professor Painter as a weekly handout, listing seminars and lectures in Toronto

biochemistry for the Arts and Science students (two hours per week, with an additional tutorial hour for specialist students) was discussed and deemed unsatisfactory. As a consequence, in 1973 the department began to offer two separate introductory lecture courses - BCH 321Y for the Biochemistry specialist students (three hours per week) and BCH 320Y (two hours per week) for non-specialists. Also in 1973, the Biochemistry and the Chemistry Departments, jointly, began to teach students in the Faculty of Nursing who had previously been taught by the Faculty of Food Science. This responsibility continued until 1992. Although there were as many as 250 medical students in the first year, approximately 40 were exempt from biochemistry laboratory classes.



At The Time of Jeanne Manery Fisher's Retirement 1976

(back) Ron Williams, Les Pinteric, (Gray Scrimgeour), (David Isenman), George Connell, Keith Dorrington, Roy Baker; Gordon MacDonald, David Kells (middle) Rashid Anwar; Georgina Paterson, Ernie Kay, Jackie Giles, Norm Camerman, Bob Murray, Ilona Csermely, Dorothy Parr; Marian Packham, (middle cont'd) Pam McNaughton, Bob Painter; Pam Letts, Anders Bennick, Theo Hofmann, Hugh Lawford, Shirley Siu, Jeff Wong (front) Jeanne Orr; Jill Still, Carol Avola, Darinka Valcic, Barbara Lavers, Maria Guccione, Eleanor Dryden, Pat Staton

In 1974, BCH 320Y was offered in both the day and evening during the academic year, and in some years the department began to offer it in the summer also. In 1975, the summer student program for undergraduate students was introduced and continues to this day.

The Departmental Constitution was revised in 1974 and there were lengthy discussions at Departmental Council meetings about the future of the departmental library, the operation of the Tithe Committee, the purchase of a projector, and the acquisition of a lectern.

Appointments to the core department in the 1970's included Prof. K.J. Dorrington (who had been recruited by Prof. Connell), and Professors A. Bennick, L. Pinteric, P.N. Lewis, H.G. Lawford and D.E. Pulleyblank. Also considered to be members of the core department were Prof. J.W. Gurd who was appointed at the Scarborough campus, and Prof. J.K. Reed at the Erindale campus. In 1976, Prof. Jeanne Manery Fisher became Professor Emeritus and a celebration was held that was attended by many of her former students and associates. (A copy

of her reply to the toast is included in the departmental archives.)



Christmas Party, Fantasy Farm 1972 Kirsten and Anders Bennick

**Hoglobulin!**

with apologies to Rogers & Hammerstein

THE STAFF & STUDENTS OF THE DEPARTMENT OF BIOCHEMISTRY

Dec. 12, 1972

PRINCIPALS

DR. R.H. SCULPTOR (a sometime biochemist/immunologist)

.....Michael Paull

DAVID ISENGLASS (his shy retiring graduate student)

.....Harry Schachter

PATIENCE (Isenglass' girlfriend, and possessor of the

rare new antibody class, the hoglobulin)

.....Pam McNaughton

CHAIRMAN RON (no comment) .....Jim Ellerson

DR. K.J. BORRINTON (biochemist/immunologist etc)

.....David Appleton

GEF VANE (graduate student, author, friend of mankind)

.....Michael Asselin

THE CHORUS:

Rosemary Bruner

Norman Camerman

Brenda Drage

Jean Gagnon

Jack Komblatt

Blaine Moore

Jeanne Orr

Toni Schmitz

Gray Scrimgeour

MUSIC by Gordon MacDonald

PROPS by members of the chorus

STORY by Jack Komblatt

SCENE I The laboratory of Dr. Sculptor

Songs: Gamma G

Sculptor & Chorus

Many A Biochemist

Patience

Oh What A Beautiful Patient

Isenglass & Chorus

SCENE II The lab and the office of Chairman Ron

Songs: Everything's Up To Date With Cytochromy

Chairman Ron & Chorus

Scurvy With the Fringe On Top

The Chorus

Poor Gef is Daid

The Chorus

Don't Throw Phosphates at Me

Gef

I'm Just a Chairman Who Can't Say No

Chairman Ron

The finale

HbG

Christmas Party Musical 1972

Lively Christmas dinner parties with dancing, clever skits, and take-offs of current musicals were featured during the 1970s.

An overhead projector for the Seminar Room was donated by the "friends of Jack McClary" when he died in 1977. Jack had joined the Zymology section of the department in 1925, and was the senior technician in the department for many years until his retirement in 1973.

During his chairmanship, Prof. Williams was active in the planning for the 11<sup>th</sup> International Congress of Biochemistry that was held in Toronto in 1979.

## Professor Keith John Dorrington (1939-2002)



Keith J. Dorrington

Professor Dorrington was chairman of the Department of Biochemistry from 1977 to Dec. 31, 1982, during a difficult time of constant cuts to the departmental budget.

He had received his B.Sc. in Biochemistry in 1961 and Ph.D. in Biochemical Pharmacology in 1964 at the University of Sheffield. After work at Duke University, Sheffield, and the MRC Molecular Pharmacology Unit at Cambridge, he came to the Department of Biochemistry in Toronto in 1970 and quickly established a large and productive research group in molecular immunology. As a result of their accomplishments, Professor Dorrington received the prestigious Ayerst Award of the Canadian Biochemical Society in 1977.

Professor Dorrington's talents as an administrator were also impressive. In 1976, before becoming chairman of

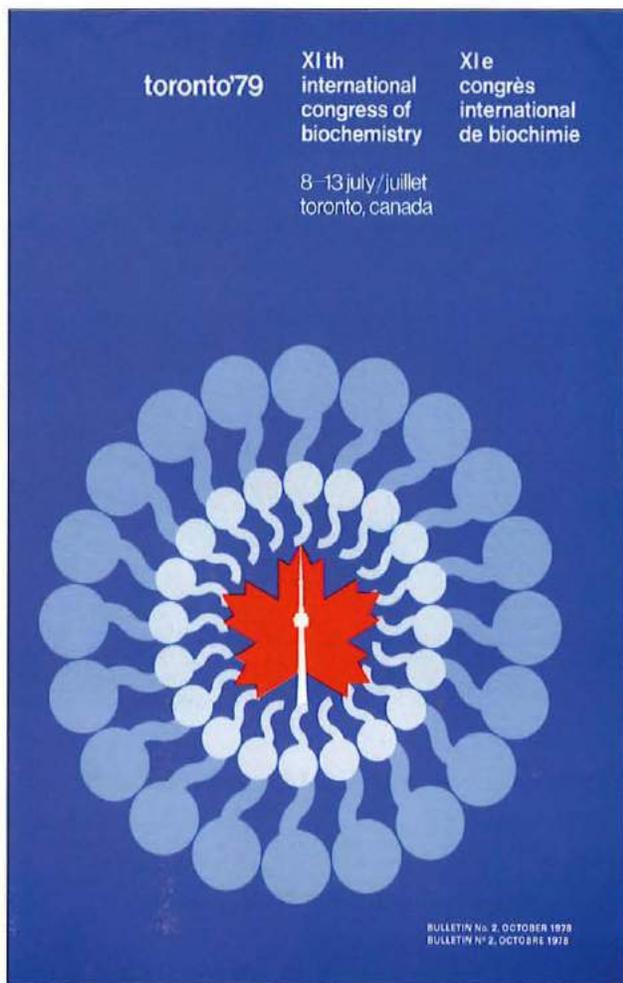
the Department of Biochemistry, Professor Dorrington was appointed Vice-Provost for Health Sciences, and in 1978 he became Associate Dean, Basic Sciences of the Faculty of Medicine. Although he was appointed to the chairmanship of the Department of Biochemistry for a second term, he resigned to become director of the Connaught Research Institute and vice-president of Research and Technology. However, he maintained his laboratory in the Department of Biochemistry for a number of years. In 1989, he severed his relationship with the university to take up the position of Managing Director, Wellcome Biotechnology Ltd. in the U.K, but eventually returned to Canada to become Senior Vice President of MDS Capital Corp. In 2000 he was diagnosed as suffering from hereditary hemochromatosis that led to his death in 2002.

While Professor Dorrington was chairman of the department, funds were lost for the partial salaries of the last two technical staff who had originally been entirely supported by the departmental budget, and the staff in the departmental office was reduced. However, as a result of Professor G.R. Williams' move to Scarborough College and Professor Schachter's move to the Research Institute of the Hospital for Sick Children, three appointments to the core professorial staff were possible, although one of these was on "soft" money and one was a joint appointment with Medical Genetics. The expectations of the contributions of cross-appointed and status-only staff members to the teaching responsibilities of the department were more clearly defined.

In 1977, an attractive brochure describing the research programs in the department, with a cover picturing an Island ferry with the CN Tower in the background, was produced through the efforts of Professor Byron Lane and the Departmental Business Officer, Patricia Staton. The "rule of two" restricting the number of graduate



Byron G. Lane



Program, 1979 International Union of Biochemistry & Molecular Biology

students supervised by a professor in the department was rescinded in December of 1977. Internal reviews of grant applications were initiated in the spring of 1978.

The XIth International Congress of Biochemistry was held in Toronto in July of 1979, although planning had begun four years earlier when the Canadian Biochemical Society created an Executive Committee for the Congress, headed by George Connell. The General Planning Committee was chaired by Professor R.H. Painter, ably assisted by many members of the department and other biochemists in Canada, with the administrative support of Patricia Staton and her office staff. The attendance was 7,500, and because Toronto did not have a large convention centre at that time, sessions were held at

the Harbour Castle Hotel, the Royal York Hotel, the Sheraton Hotel, the Holiday Inn, and the Hotel Toronto.

In 1979, the development of the interdisciplinary Molecular and Cell Biology Program was under discussion, and in 1981-82,



Robert H. Painter

the Institute of Immunology (founded in 1972) gave rise to the Department of Immunology. Several members of the Department of Biochemistry (Professors Painter, Dorrington, and Isenman) were cross-appointed to Immunology.

In April, 1981, a two-day "Retreat" of the core staff of the department was held at Our Lady of the Apostles Retreat House in Mississauga to consider research, graduate education, undergraduate education in Arts and Science and in Health Sciences, and departmental administration.

During these years, the department acquired its first word processor – a Wang – that was installed in the office of the chairman's secretary.

In connection with the end of Professor Dorrington's first term as chairman, there was an external review of the department in March of 1982 by Prof. B.D. Sanwal of the University of Western Ontario and Prof. E.C. Cox of Princeton University. Their report led to the formation of the Senior Advisory Committee, comprising the chairman, the associate chairman, 2 members of the core staff elected by the core staff, and 2 members of the core staff appointed by the chairman. This committee was to meet once each month during the academic year and its recommendations that would involve changes in departmental policy were to be referred to the core professorial staff prior to implementation. The activities of the committee were to be reported at the final meeting of the Departmental Council each year.

The first professorial salary anomaly was resolved, others were recognized, and steps were begun to address this problem.



Patricia Staton

In April of 1982, Patricia Staton resigned after 15 years as the business officer of the department to take up an appointment as Registrar of the Faculty of Library Science. Carol Avola (now Carol Justice) took the position until August, but her resignation left the department very short-staffed at a time of a hiring freeze throughout the University. Professor Dorrington also announced in August that that he was resigning from the chairmanship on Dec. 31<sup>st</sup>, 1982.



Kathy Hutton, Rose Ann Martino, Marsha Eines, Carol Justice, Pat Staton, Sandra Warwick



Marian A. Packham

**Professor Marian Aitchison Packham  
F.R.S.C. (1927-**

Professor Packham was Acting Chair of the Department of Biochemistry throughout 1983 while a search for a new chairman was underway.

She had received her B.A. and Ph.D. in biochemistry at the University of Toronto in 1949 and 1954, with Prof. Gordon Butler as her supervisor. She worked part time in the department as Senior Fellow until 1963, then as a research associate at the Ontario Veterinary College in Guelph and at the Blood and Cardiovascular Disease Research Unit in the Department of Medicine in Toronto. She returned to the Department as a Lecturer in 1966. By the time she became Acting Chair, she was a full professor in the department and had been Coordinator of Graduate Studies from 1976-1981. She established a strong collaborative research program with colleagues in the Pathology Department at McMaster University (where she was a part time visiting professor for many years). In 1988, she shared the J. Allyn Taylor International Award in Medicine, in 1989 she was appointed a University Professor, and in 1991 she became a Fellow of the

Royal Society of Canada. She served on the editorial boards of a number of journals and on grants committees of MRC, the Heart and Stroke Foundation, NIH, and the Canadian Red Cross. Her research interests involved the biochemistry and physiology of blood platelets.



Isobel McKone

Despite the hiring freeze in 1983, the department was allowed to hire Isobel McKone as the Business Officer, but budget problems continued and no merit increases were awarded at the University in 1983.

The department also faced the problem of too many students in the laboratory courses, BCH 370H, BCH 371H, and BCH 471Y and it became evident that it would be necessary to restrict the number of students admitted to our specialist program. In some cases, the project course, BCH473Y had to be substituted for BCH 471Y to enable all the biochemistry specialist students to complete their program.

In January of 1983 a Research Day was held with posters presented by the graduate students and two guest lecturers.

In March, there was a LCME (Liaison Committee on Medical Education) review of the department. In the fall, an OCGS (Ontario Council on Graduate Studies) review was carried out by W.F. Harrington (Professor of Biology at the McCollum Pratt Institute of Johns Hopkins University), E.G. Krebs (Professor and Chairman, Department of Pharmacology, Washington University, Seattle) and Prof. Neil B. Madsen (Department of Biochemistry, University of Alberta). They noted the small number of post-doctoral fellows in the department as a weakness that required attention, indicated that they perceived a lack of communication between the departmental members at the Hospital for Sick Children and those in the core department, and questioned the lack of course requirements in the M.Sc. program. However, in general, the reviewers were very impressed with the high standards of our educational program.

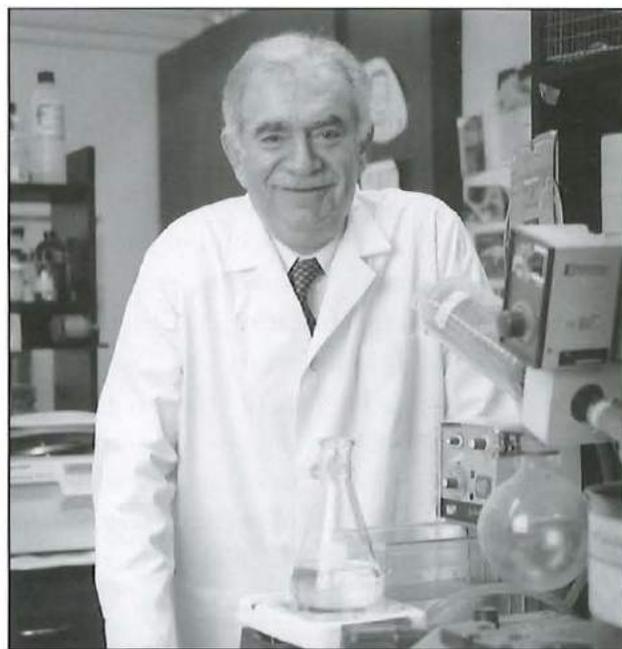
Investigations by Professor Hofmann and David Kells about suitable word processors for each professor's office led to the purchase (on the research grants) of the Morrow computers that served us well for many years.

In 1983, Biochemistry became one of the founding members of the Molecular Genetics and Molecular Biology Specialist Program, in collaboration with Botany, Microbiology, Zoology and Medical Genetics.

A visiting speakers program was reintroduced in 1983 after a hiatus of many years. There was no departmental budget for it and Prof. Theo Hofmann was active in obtaining money for it.

The department celebrated its 75<sup>th</sup> anniversary in October 13-14 with a Symposium, an Open House hosted by the graduate students, and a banquet in Hart House at which Dr. Thomas Jukes (a distinguished alumnus - Ph.D. with Prof. H.D. Kay in 1933) was the keynote speaker. The 320 registrants came from universities from across the country (literally, from Victoria to Halifax), and the invited speakers represented a cross-section of Canadian biochemists.

### Professor Harry Schachter F.R.S.C. (1933-



Harry Schachter

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Professor Harry Schachter became the departmental Chair for a five year term, beginning January 1, 1984.

He was born in Vienna, emigrated at an early age to Trinidad, and moved to Canada in 1951. At the University of Toronto, he obtained his B.A. in Physiology and Biochemistry (1955), his M.D. (1959, winning the Cody Medal) and his Ph.D. (1964, winning the Starr Medal). Dr. Gordon Dixon supervised his Ph.D. studies on chymotrypsin. He joined the Department of Biochemistry as an assistant professor immediately after completion of his Ph.D. A leave of absence in 1966-68 at Johns Hopkins University, Baltimore, Maryland with Dr. Saul Roseman, working on the biosynthesis of glycoproteins, changed the direction of his research interests. He was promoted to professor in 1972, and moved his laboratory from the Medical Sciences Building to the Hospital for Sick Children in 1976 when he became Head of the Division of Biochemistry Research there, until 1989. His internationally recognized research has focussed on the biochemistry of glycoproteins and other glycoconjugates and led to the award of a number of medals and prizes, including the Boehringer-Mannheim Prize in Biochemistry (1985) and Karl Meyer Award of the Society of Glycobiology (1998). He was elected as a Fellow of the Royal Society of Canada in 1995. During his career, Professor Schachter served on a number of scientific advisory boards, review committees and editorial boards, including the Medical Research Council Grants Committee on Metabolism, the Ontario Cancer Treatment and Research Foundation, the Journal of Biological Chemistry, the Canadian Journal of Biochemistry and Cell Biology, and the Glycoconjugate Journal. He was president of the International Glycoconjugate Organization in 1991-93, and Chief Editor of its Journal, beginning in 1994. He was president of the Canadian Society of Biochemistry and Molecular Biology in 1993-94. Professor Schachter's enthusiasm, and his lucid and compelling style of lecturing, as well as his superb grasp of his subject, made him a favourite as a teacher

and led to many invitations to speak at international meetings and several visiting professorships. All who have watched him in action admire his ability to zero in on the key point in any discussion.

Prof. Schachter had been lecturing on biochemistry to the first year medical students since 1969, but laboratory teaching of biochemistry to medical students had to be discontinued in 1984 because of continuing budget cuts, resulting in the loss of 10 teaching assistant positions. Funds for post-doctoral positions that had been obtained by Professor Schachter upon his appointment had to be diverted to pay marker-graders of examinations in the overflowing biochemistry lecture courses. In 1986, it was necessary to limit the enrolment in the Biochemistry Specialist Program because only 40 students could be accommodated in the fourth year Advance Laboratory Course, BCH471Y. The problems resulting from 17 years of budget cuts and ever-increasing numbers of Arts and Science students came to a head in September of 1987 with the development of the Department of Biochemistry's "White Paper". To reduce the numbers in the fourth year biochemistry lecture courses, BCH 321Y (the lecture course for biochemistry specialist students) was to become a prerequisite for them. The "White Paper" also suggested eliminating, from 1990-91 on, the BCH 370H laboratory course for non-specialist students that had been limping along with yearly handouts begged from the Dean's Office. This step would have restricted our laboratory courses to our biochemistry specialist students, and affected the programs of our sister departments. After much negotiation, some budgetary relief was obtained and BCH 370H was not abolished.

At the time of the "White Paper", although 19 professors were listed as being in the core department, 4 had major administrative roles elsewhere (Prof. Connell as President of the University, Prof. G.R. Williams as Principal of Scarborough College, Prof. Painter as Provost and Vice Chancellor of Trinity College, and Prof. Bennick as Chairman of the Graduate Department

of Dentistry). In addition, three members of the professorial staff had serious illnesses that restricted their activities. (A copy of the "White Paper" is included in the departmental archives.)

In 1984, R. Suzanne D'Alvise became the Business Officer of the department, with an office staff of 5, including the chairman's secretary.

In the early 1980s, the department had been criticized for not having established a protein X-ray crystallography group, because this technique had become essential for the advancement of the understanding of protein structure and function. In 1985, Prof. Friesen, then chair of the Department of Medical Genetics, set up a committee to apply to NSERC for funds for an NSERC Industrial Research Chair in Protein X-Ray Crystallography. Prof. Theo Hofmann represented the Department of Biochemistry on this committee. An application was submitted to NSERC, but their site visitors in February 1986 did not recommend approval of the application. A new application was submitted in early 1987. This time there was a commitment by Allelix and Connaught-Merieux to help substantially with funding the chair and the application was successful. A formal search was started in January 1988 by a committee under



Emil F. Pai

the chairmanship of Prof. Jeremy Carver. One of the conditions set by NSERC required that the successful candidate would have to be of a high international calibre. The committee reviewed applications from some 20 crystallographers, but had difficulty finding a suitable candidate. Meanwhile, Prof. Carver resigned as the chair of the committee and Prof. Theo Hofmann became chair of it in 1990, leading eventually to the appointment of Prof. Emil Pai in 1991 to the NSERC University-Industry Chair in Protein Crystallography.

Everyone in the department was saddened in 1986 by the death of Prof. Jeanne Manery Fisher who had continued her research program for 10 years after her formal retirement. Her service to the department had extended over 47 years, and Prof. Connell spoke



Jeanne Manery Fisher

movingly about her at her memorial service. (The eulogy is included in the departmental archives.)

Minutes of departmental meetings in 1986 noted that "smoking was to be limited to designated areas" and that the topic of "computers to assist in teaching" was in the planning stages. It was recognized at this time that the biggest gap in the area of macromolecular structure was the absence of high resolution X-ray crystallography.

In 1987, the salary anomaly problem was finally resolved with retroactive increases back to 1981 for seven members of the professorial staff in the core department.

The Labs and Tabs Lottery of the Materials Distribution Centre was won by the department in 1988, and the money (\$19,949) was used for teaching assistant salaries. The department acquired its first FAX machine.

In February of 1988, a Carbohydrate Research Centre was officially opened and a one-day symposium was held, highlighting the importance of complex carbohydrates in cellular processes. The Centre had a 300 MHz and a 500 MHz NMR spectrometer and a high resolution mass spectrometer, acquired with funds from MRC and the provincial government of Ontario. The Centre supports projects on the structures of complex carbohydrates, including essential parts of Professor Schachter's research.

The Biochemistry Undergraduate Student Society (BUSS) was formed as a result of the discontent of students in the large BCH 320Y class for whom grading



Christmas Party, Hart House, 1985



Christmas Party, 1987 Lynda Lacis, Moira Glerum, Donna Jakowec, Margaret Rand, David Williams, Inka Brockhausen, Harry Schachter, ?



Christmas Party, Jeff Wrana & Lil Attisano



Christmas Party, Trinity College, 1986, Harry Schachter, Lois Dove, Bob Painter



Morris Dancing, Louise Love

had to be done by multiple-choice examinations. BUSS now represents the academic concerns of the Biochemistry Specialist students in all years.

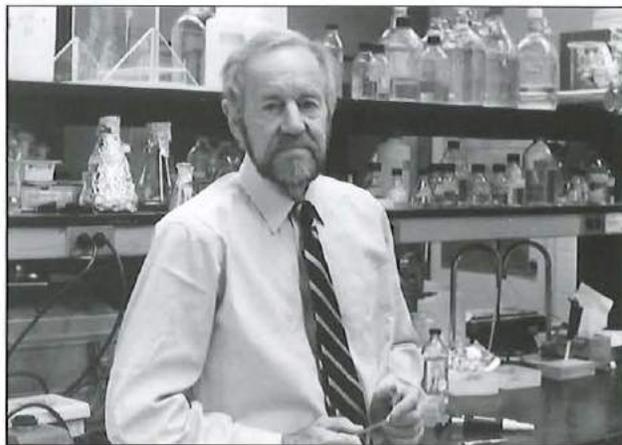
In the last year (1988-89) of Professor Schachter's chairmanship, an external review of the department was conducted in April by Dr. Gene Brown of MIT and Dr. Cyril Kay of the University of Alberta. They pointed out that the department had not had a new tenure stream appointment in 8 years, although there had been two appointments on "soft" money (MRC and Heart and Stroke), a contractually limited teaching appointment (CLTA), and a number of status-only appointments of scientists in the research institutes. Again, the reviewers commented on the scarcity of postdoctoral fellows in the core department, and they urged the allocation of additional resources to the department to strengthen teaching and "increase the minimal support staff". The morale of the core faculty was judged to be low, in part because of the budget reductions, the declining proportion of graduate students in the core department, "neglect by the Administration", and a very meagre infrastructure to handle its secretarial and administrative roles. On the subject of the next chairman, the reviewers called for "a strong, dynamic and tactful leader, a good administrator, as well as excellent in research". Fortunately, their pessimistic prediction that "it seems unlikely that an internal candidate will emerge" proved to be wrong, although three years elapsed before the suitable "internal candidate" (Prof. Peter Lewis) emerged.

The first Departmental Poster Day was held in the spring of 1988, featuring posters prepared by M.Sc. and Ph.D. graduate students. Money for the prizes is partly derived from funds established upon the retirements of Prof. Hanes (1968), and Prof. Crocker (1970), combined with a fund established in honour of Prof. Jeanne Manery Fisher. Beginning in 1990, the Annual Theo Hofmann Biochemistry Lecture, established in 1989 upon his retirement, became part of Poster Day activities. The names of the invited speakers are on a

plaque in the hall outside the seminar room.

Throughout Professor Schachter's chairmanship, lively Christmas parties continued, usually in the Great Hall of Hart House. Graduate students and staff continued the tradition of writing and presenting musical skits, and entertaining the audience with their abilities as pianists and players of other instruments. At one party there was an energetic demonstration of Morris dancing. A highlight of the festivities always featured the chairman's strong and true voice leading the traditional singing.

### **Professor William Thompson (1933-2004)**



William Thompson

Professor Thompson was Acting Chair of the department from 1989 to June 30, 1991 while search committees were repeatedly unsuccessful in attracting a Chair from outside the University of Toronto.

Prof. Thompson had obtained a B.Sc. in 1955 at the University of Glasgow and a Ph.D. at the University of Western Ontario in 1960. Following postdoctoral training at Cambridge (1961-1963), he joined the Banting and Best Department of Medical Research at the University of Toronto as an Assistant Professor, and in 1965 he transferred to the Department of Biochemistry. Rising through the ranks, he was Associate Chair of the Department from 1984 until he became Acting Chair; he again served as Associate Chair and as Undergraduate Secretary from 1991 to December 31, 1996, at which

time he took early retirement. Beginning in 1972, he had held a number of positions in the School of Graduate Studies and was Associate Dean, Division IV of the School from 1975 to 1978. His research interests centred around phospholipids, particularly phosphoinositides. In 1978, polycystic kidney disease led to several unsuccessful kidney transplants and he underwent twice-weekly hemodialysis for more than 25 years. Faced with imminent loss of independence due to increasing frailty, in the spring of 2004 he took the personal decision to end dialysis. His obituary was written by Professors Anders Bennick and Robert Murray and published in the 2003 Bulletin of the CSBMCB. They pointed out that "He was a man of enormous intellect and his dry wit and sense of humour were legendary. Those who regularly had lunch with him at what he called the 'Biochemistry Academy' table at the cafeteria, knew that Bill could be counted on for in depth knowledge and analysis on matters ranging from university politics, to world politics, to fine arts, to the intricacies of the more bizarre instruments of the financial markets." Copies of the clever poems he composed about science and about events in the department and the Faculty of Medicine are included in our archives.

Beginning in 1988-89, Prof. David Williams initiated and organized the monthly FIBS (Frontiers in Biochemical Science) seminars by and for faculty in the

core department; these seminars were later extended to post doctoral students and the entire faculty. By 2005, nearly all the members of the department had described their research to their colleagues and these 4 to 6 p.m. sessions were discontinued.

The spring of 1989 brought the sad news of the sudden death of one of our Senior Tutors, Lois Dove, and her husband during an accident on a safari in Africa. She had been capably supervising our large BCH 370H laboratory class since 1965. In 2007 the Department of Teaching Laboratories set up an annual Undergraduate Student Award in her name.

In 1989, Jack Riordan, a status-only member of our department who was based at the Hospital for Sick Children was one of the leaders of the group that succeeded in isolating and sequencing the cystic fibrosis gene. Jack obtained his Ph.D. in our department in 1970 with Professor Jeanne Manery Fisher.

In February, 1990, an LCME review recommended curriculum renewal for the medical students.

In 1990, the Protein Engineering Network of Centres of Excellence (PENCE) was set up as part of the nation-wide program of Networks of Centres of Excellence. Toronto became one of the four major academic centres participating in PENCE, with Prof. Pai and Prof. Schachter as co-leaders and a total of nine professors in biochemistry

#### SIDNEY AND THE SAGE

Sidney the worm felt very put down  
 As the object of study by a sage of renown;  
 Poked and prodded, his innards exposed,  
 He suffered in silence when with chemicals dosed.  
 'This invasion of privacy is an outrage,' thought Sidney,  
 'I like not the work of this sage,  
 For what he proposes surely ill bodes  
 For me and all other nematodes.  
 If I could break free I would seek asylum  
 And pass dire warnings of him to my phylum'.  
 But try as he might he could never escape,  
 Imprisoned was he for science's sake.  
 Said the sage to Sidney, 'My vermiform friend,  
 I've learned all about you from front to end.  
 Every cell has its place and provenance, too,  
 I have found where they come from and all that they do.  
 You are to me like an open book  
 For with insight and genius I knew how to look.  
 Now by control of genetic transcription,  
 I can mould you according to my prescription.  
 Such power no man has had before -  
 God-like, they called it in days of yore'.  
 Asked Sidney, 'Am I merely the sum of my genes;  
 Religion and culture the constructs of memes?'  
 'Am I defined without subjective-self -  
 A molecular object plucked from the shelf?  
 Are collective unconscious and Freudian dreams  
 Just chemical fluxes in neuronal streams?  
 If all is the outcome of chance mutation  
 How then life's meaning is Art's creation?

Despite exegés and reductionist charts  
 The whole is still greater than the sum of the parts.  
 Molecular accounts of life  
 leave no room  
 In their equations for Cogito Ergo Sum,  
 Yet past, present and future - all, so they say,  
 Is the dominion of snippets of DNA,  
 Whose enthronement, it is plain to see,  
 is the stuff of a new doxology.  
 It seems', said Sidney, 'this dogma biological  
 is a short remove from credo theological.'

But the sage was certain that his work would unveil  
 The secrets of life - the sought holy grail.  
 Said he, 'I have triumphed, it will be no surprise  
 To receive the call for the Nobel prize.'  
 But when hubris will out the great are cast down,  
 And such was the fate of this sage of renown,  
 For the sage one day stumbled and fell on his head,  
 So Sidney and friends gathered and ate him instead.

Sidney & the Sage - Poem by William Thompson

participating. This Network was renewed three times.

In August of 1990, the Department of Biochemistry was again the winner of the Labs and Tabs Lottery (\$28,385).

An Observance in honour of the memory of Prof. Charles Hanes who had died in July was held on November 7, 1990 at the George Ignatieff Theatre, Trinity College. In tributes by members of the department and from his graduate students, he was remembered as a distinguished scientist, humanist, colleague, mentor, teacher and friend.

During the fall of 1990, the very existence of the Department of Biochemistry was threatened because of the problems created by falling budgets. The future of the Basic Sciences Sector of the Faculty of Medicine was heatedly discussed at two large meetings of the Basic Science Assembly in response to the restructuring suggestions of the Dean's Advisory Committee that would have merged eight departments into five along interdisciplinary and programmatic lines. It was proposed that these departments would deal with research and graduate education, and that a sixth department would be responsible for undergraduate education. At one point during the controversy surrounding these suggestions, the proposal to have a BIG (Biochemistry, Immunology, Genetics) department seemed to be gaining approval, and Professor Thompson, with his usual wit, held a "last supper" (actually a lunch) for the professorial staff. Eventually, as a result of strong objections, and the well-reasoned arguments of Professors Tinker and Schimmer, the status quo prevailed.

As a result of Prof. Hofmann's efforts in the 1980s, a protein crystallography centre was established in 1991 under the direction of Professor Emil Pai who was appointed to the NSERC University-Industry Chair in Protein Crystallography. The industrial partners were Connaught-Merieux Research Laboratories and Allelix Biopharmaceuticals, Inc. Professor Pai is jointly appointed in Biochemistry and Molecular Genetics. In 1992, Professors James Rini and Lynne Howell joined



James M. Rini



P. Lynne Howell

this centre. Prof. Rini graduated in Biochemistry at the University of Toronto and later (1986) completed his Ph.D. in Toronto. Prof. Lynne Howell is based at the Hospital for Sick Children. The crystallography group is making a valuable contribution to the resources of the department. Prof. Howell is now Head of the program on Molecular Structure and Function at SickKids.

In 1991-92, a number of the research grants were crippled by the unintended consequences of pay equity increases for technicians. Apparently without considering the effect on research grants, the University administration had responded to the new Ontario Government Regulations by mandating increases of 9.4% for Technicians II, 16.6% for Technicians III, and 23.3% for Technicians IV.

A reception in honour of Prof. Thompson was held on June 17, 1991 in the Alumni Lounge of the MSB, in recognition of his distinguished service as Acting Chair of the department.

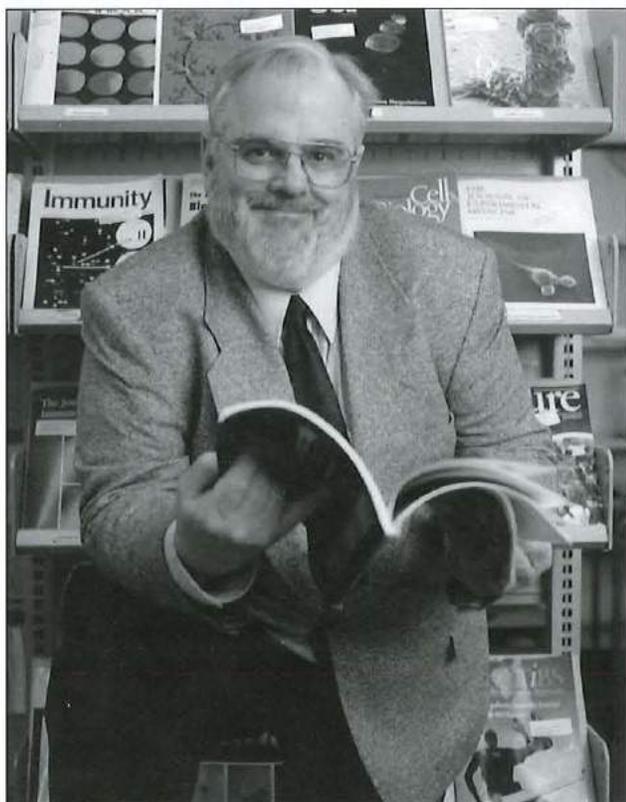


The Terrence Donnelly Centre for Cellular and Biomedical Research 2005

## CHAPTER 5

### Into the New Millennium 1991-2008

#### Professor Peter Noel Lewis (1946-



Peter N. Lewis

**P**rofessor Lewis was Chair of the Department from July 1991 to 1996, when he took a year of administrative leave and then returned for a second term as Chair, until December 31, 2001. This was the longest chairmanship of the department in 40 years.

Prof. Lewis was born in Cairo, Egypt while his father was there as a member of the British Army. The family returned to England in 1947 and after a series of military postings they emigrated to Canada in 1958. He graduated from the Honours Chemistry course at the University of Calgary in 1968, having spent three summers in Sarnia in the research laboratories of Polymer Corporation and Imperial Oil. He completed

a Ph.D. in Physical Chemistry in 1972 in Prof. Harold Scheraga's laboratory at Cornell University. His thesis dealt with how proteins fold into their native structure and he was introduced to computing, a skill that he has continued to hone and one that has been useful in all his endeavours. His post-doctoral studies (1972-74), supported by an NRC NATO fellowship, were with Morton Bradbury, then at Portsmouth Polytechnic. There he studied the conformation of histone H4 in solution by NMR methods. He became an Assistant Professor in the Department of Biochemistry in 1974, in competition with several hundred applicants for the position. Upon promotion to the rank of Full Professor in 1986, he took a sabbatical year at the University of California at Davis where Morton Bradbury had moved. His research interests have been focussed on chromatin assembly and remodelling as well as on histone acetylation and deacetylation as they pertain to gene expression. During 1996-97, he was a Visiting Scientist at the NCBI in Bethesda where he learned the "ins and outs" of motif based sequence alignments.

Prof. Lewis has been active on MRC committees and in 1999-2000 was President of the Canadian Society of Biochemistry, Molecular & Cellular Biology. He was the chair of the Organizing Committee for the meeting of the International Congress of Biochemistry and Molecular Biology that was to be held in Toronto in July of 2003, but was cancelled in May because of the fear of SARS (Severe Acute Respiratory Syndrome) that caused a number of scheduled speakers to withdraw.

During the decade of Prof. Lewis' chairmanship, the department changed in many ways.

In October of 1991, the first George Connell Biochemistry Lecture was given by Professor Gordon H. Dixon on "Sperm protein genes – evolution and expression". This choice was particularly appropriate since George Connell and Gordon Dixon had been graduate students together in Prof. Hanes laboratory.



Faculty Retreat, 1993

The lectureship is supported by the interest on funds donated in 1990 when Professor Connell finished his term as President of the University of Toronto

Nov. 13, 1991 was 'Black Wednesday' – 81 support staff in the Medical Sciences Building were fired without prior notice to implement reductions in the Service Divisions of the Faculty; this process was recommended by the consultants, Deloitte & Touche, hired by the Dean. Some of the proposed cuts would have been extremely detrimental to the effective operation of the departments and to the research programs. These cuts were made without consultation with chairs or professorial staff, and the ensuing uproar resulted in the resignation of the Dean of Medicine.

1991-92 appears to be the last year in which the department taught biochemistry to nursing students.

A new medical undergraduate curriculum was introduced in 1992, involving an integrated, multi-disciplinary approach. Members of the Department of Biochemistry contribute to the lectures, seminars, tutorials and problem-based learning (PBL) sessions.

A new protein structure group was formed in August

of 1992, involving the University of Toronto, The Hospital for Sick Children, and the Ontario Cancer Institute/Princess Margaret Hospital. This structural biology initiative held its first meeting in June of 1993, with the theme "Frontiers in Macromolecular Structure and Function".

A faculty retreat was held at the Vaughan Estates in 1993 to discuss the department's direction in research and teaching.

The department increased its involvement in the computer age in 1993 with the installation of a network that linked almost all the faculty and our printers and resulted in E-mail access for most of the members of the department.

A new 600MHZ NMR instrument was installed in the Medical Sciences Building with one of our status only professors, Julie Forman-Kay (Biochemistry Research, The Hospital for Sick Children),



Julie D. Forman-Kay



Alan Davidson

as a principal user. It was felt that this event was particularly significant because it reflected strong ties and co-operation between the University and The Hospital for Sick Children.

As a result of the University and Faculty strategic planning process, emphasizing “goal-

oriented” planning, a complement plan for the department was drawn up in 1994, with staff agreement that there should be a thematic approach to new appointments. Since it was projected that the core department would experience a 50% reduction in its faculty (20 to 10 FTEs) by the year 2000, it was essential to position the department



William Trimble

to be eligible for appointments through the Academic Priorities Fund (APF) set up in 1994 by the Provost in association with uniform 2% budget cuts for the next 6 years. Peter Lewis had outstanding success in obtaining support for new faculty through the APF. Three of the new appointments were Alan Davidson, William S. Trimble and Christopher Yip.

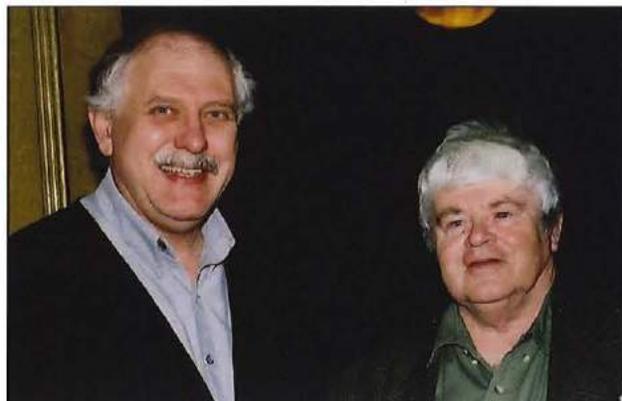
In 1994, Room 5337 was converted to a comfortable reading room with current journals, a photocopier, and computer terminals.

In 1995, it was noted that

“Laurence Moran’s and Gray Scrimgeour’s textbook *Biochemistry* (Neil Patterson/Prentice Hall) went into its second edition and is fast becoming a standard across North America”. Robert Murray continued to be a co-editor of *Harper’s Biochemistry*.



Christopher Yip



Larry Moran & Bob Murray

There was an external review of the department in May, 1995 in anticipation of Professor Lewis completing his first term as Chair on June 30, 1996. The reviewers were Prof. Bishnu Sanwal of the University of Western Ontario and Prof. Dagmar Ringe of Brandeis University. Their enthusiastic report contrasted sharply with the previous review in 1988. They noted that morale was very high, and the chairman, Prof. Lewis, was viewed as effective and providing vision and direction for the department. Although the small number of post doctoral students was commented on again, the reviewers found the interdisciplinary courses and programs for undergraduates to be exciting, major strength in the graduate program, and

an excellent summer program for undergraduates. The achievements in the very broad range of areas of research were judged to compare favourably with the major biochemical centres in North America. The major new program in Structural Biology was ranked as outstanding.



David O. Tinker at his retirement party

Thanks to the efforts of Professor Tinker, a World Wide Web site for the department was established in 1995. Also in this year, the University introduced a new, computerized Financial Information system (F.I.S.) that initially caused many headaches and required some time before it operated smoothly.



Hue Sun Chan



John R. Glover



Craig A. Smibert



Grant W. Brown



Walid A. Houry

Evidence of a revitalized department was the announcement at the beginning of Professor Lewis' second term of five tenure-track positions to be filled (Hue-Sun Chan, John Glover, Craig Smibert, Grant Brown, and Walid Houry). A luncheon was held in the seminar room to celebrate the promotions of David Williams, Jacqueline Segall, and Margaret Rand.

The Biochemistry and Chemistry undergraduate program ended in 1995-96 as a result of the introduction by the Chemistry Department of a Biological Chemistry program in 1993-94.

The BCH 370H laboratory course for non-specialist students was revamped in 1996, combining it with Physiology and Pharmacology and reducing the hours devoted to biochemistry.

In 1996, a new multidisciplinary collaborative graduate program (Ph.D. only) was formulated and approved in principle, entitled Biomolecular Structure. It involves a joint effort of the Departments of Biochemistry, Chemistry, Medical Biophysics and Molecular Genetics.

In January of 1997, Professor William Thompson was feted at a gathering marking his retirement. His many contributions to the administration of the department and of the university were highly praised, and he responded with his usual erudition and wit.

In May of 1997, Professor Peter Lewis organized a symposium at the University of Toronto on Bioinformatics, attended by over 500 participants. In June, the retirements of Senior Tutor Dorothy Painter and Prof. David Tinker were celebrated at a party in the Seminar room.

In 1997-98, the biochemistry lecture course for the large, non-specialist class was reduced to a half course, BCH 310H.

The department underwent its regular 7-year appraisal by the Ontario Council on Graduate Studies in 1997, with three days of site visits by external consultants. The department received the top rating offered by OCGS.

In 1998, Professor Peter Lewis became the director of a new multidisciplinary program in Proteomics and Bioinformatics (P&B). This program was designated as



Promotion Celebration David Williams & Jacqueline Segall



Promotion Celebration in the Seminar Room



Bob & Dorothy Painter at her Retirement Party

an Extra Departmental Unit. A number of individuals appointed through this program hold appointments in the Department of Biochemistry. The Biochemistry complement plan was updated, announcing a search for 3 APF faculty, replacement of 2 retiring faculty and development of a new APF application in the area of Bioinformatics.

In February of 1998, the Biochemistry Undergraduate

Student Society (BUSS) organized the first annual B.I.G. Jeopardy night and party. B.I.G. stands for Biochemistry, Immunology and Molecular Genetics. Teams of students and professors from each discipline are challenged to answer questions in both scientific and non-scientific areas. The competition is stiff and the spectators encourage their teams with enthusiastic cheering.

The department held a one day retreat in May of 1998 at the Vaughan Estate near Sunnybrook Hospital. It was decided that the department should augment its strengths in either signalling or regulation of gene expression.

In June of 1999, a Professor Emeritus Celebration was held at the Faculty Club to honour six professors who had retired in the preceding few years – Professors Anwar, Lane, Murray, Packham, Painter, and Ron Williams. A large group of present and former students and colleagues attended. During the reception and after dinner there were tributes to each retiree by both a faculty member and a former trainee, and appropriate



Faculty Retreat, 1998

## Professor Emeritus Celebration, June 1999



Rashid A. Anwar



Byron G. Lane



George Connell & Les Pinteric



Robert K. Murray



Marian A. Packham



Lewis Kay, Jim Rini & Dave Pulleyblank



G. Ronald Williams



Margaret Rand



Choy Hew & Theo Hofmann



Bob Painter, Michael Paull & Rashid Anwar



Anders Bennick & Shelagh Ferguson-Miller

presentations. It was “a wonderful event with lots of cheer and goodwill”.

The year 1999 saw the end of the participation of the Biochemistry Department in the administration of the Molecular Genetics and Molecular Biology Program, although several members of the Biochemistry Department continue to teach in the program. The involvement of members of the department in teaching dental students also came to a close in 1999-2000.

Planning began for a new Centre for Cellular and Biomolecular Research (CCBR) in a twelve story tower to be built on Taddle Creek Road, south of the MSB, originally with a projected completion date of 2004, but not officially opened until November of 2005.

An optional rotation system in the graduate program of the department was introduced in 1999 that allowed incoming students to work in two labs before deciding on a supervisor. The optional rotation system was not however very effective as most students preferred to decide on a supervisor once they were accepted and to start their research in September.

In 1999 and 2000, support for research was increased by the Premier's Research Excellence Awards and the funding of Canada Research Chairs. A number of members of the department are benefiting from these awards. By 2007, the Department had 17 Canada Research Chairs in partnership with SickKids (Table 2).

**Table 2**  
**Canada Research Chairs,**  
**Department of Biochemistry**

NAME	RESEARCH DISCIPLINE
Stephane Angers	Molecular Biology
Liliana Attisano	Biochemistry
David P. Bazett-Jones	Cell Biology
Hue Sun Chan	Biochemistry
David M. Clarke	Biochemistry
P. Lynne Howell	Biochemistry
Lewis E. Kay	Biochemistry
Amira Klip	Biochemistry
Emil F. Pai	Biochemistry
Régis Pomès	Physical Chemistry
Brian H. Robinson	Metabolism and Nutrition
Daniela Rotin	Biochemistry
Simon Sharpe	Biochemistry
William S. Trimble	Cell Biology
Allen Volchuk	Cell Biology
Shoshana Wodek	Molecular Biology
Christopher Yip	Chemical Engineering

In the summer of 2000, the possibility was explored of a merger between the Department of Biochemistry and the Division of Cell Biology (8 faculty members) of the Department of Anatomy and Cell Biology. Although this was initially approved in a departmental meeting, the proposed merger did not take place. However, when the Division of Cell Biology closed in 2002, three of its professors became members of our core department.

Beginning in 2001, introductory biochemistry lectures were offered to Arts and Science generalists and our specialist students in their second year (BCH 210H and BCH 242Y). Although the department had attempted to arrange this change on several earlier occasions (first in 1973 and again in 1988), it could not be made until the Chemistry Department was persuaded to offer Organic Chemistry in the first undergraduate year.



George Connell, Peter Lewis & Theo Hoffman

Prof. Emeritus Hofmann created a pictorial history of Department Chairs. The photo gallery was unveiled at the annual Poster Day in May of 2001 and lines the hallway outside the departmental office.

There was an external review of the department in June of 2001 in anticipation of Professor Lewis completing his second term as Chair on December 31, 2001. The reviewers were Prof. Brian Sykes of the University of Alberta and Prof. Zena Werb of UCSE. At the time of the review, there were 22 core faculty on the base budget, 13 primary status-only faculty, 18 cross-appointed faculty and 10 emeritus faculty. Although 25 were based in the Medical Sciences Building, others were in other locations: the Research Institute of the Hospital for Sick Children (16), the Banting and Best Department of Medical Research (5), the Scarborough and Mississauga campuses, and several other sites. Some core and hospital-based faculty were members of the Toronto node of the Protein Engineering Network of Centres of Excellence (PENCE, director Prof. Emil Pai). The teaching staff participated in the education of over 1000 students each year (many of them in several courses), including 76 graduate students and 45 post doctoral students. The exceptional teaching abilities of the biochemistry faculty were recognized by seven Aikins Awards between 1994 and 1999 (awarded to Professors Murray, Deber, Isenman, Camerman, and Baker and Lecturers Dorothy Painter and Patricia Bronskill). Portraits of these individuals and their citations are displayed on a wall near the main office of the department.

The non-academic staff complement was comprised of a Business Officer, Administrative Assistants for Graduate Studies and Finance, two secretaries, and a Purchasing Officer (shared among four departments). The reviewers noted that morale in the department was high and commended Prof. Lewis for his “style of consensus management,

wide consultation, democratic actions and personal leadership that has allowed him to create a true city-wide department”. They stated that the “departmental vision has expanded beyond the traditional focus to include Structural Biology and Proteomics and Bioinformatics”, the former being “in the very top of North American programs”.

During the chairmanship of Prof. Peter Lewis, almost every new faculty appointment to the core department (Professors Grant Brown, Hue Sun Chan, John Glover, Walid Houry and Craig Smibert) obtained a CIHR New Investigator or NCIC Investigator Award.

In November of 2001, a special celebration was held in the Alumni Hall of Victoria College to honour and thank Peter Lewis for his ten years of dedicated and visionary leadership of the department. With Prof. Roy Baker as Master of Ceremonies, the nine speakers emphasized the faculty renewal that Prof. Lewis had managed. Although during his time as chair there had been 13 retirements (9 of these from the core), the new appointments he acquired through the Academic Priorities Fund had revitalized and reinvigorated the department. The speakers also noted Peter’s collegial mode of operation, his inclusion of staff



Thank You Celebration for Peter Lewis



Roy Baker, Master of Ceremonies



John Glover

outside the core in decision making, his leadership in new initiatives, and his expertise in solving problems that office staff and faculty encountered with computers. A rousing "Ode to PNL" was composed and sung by Prof. David Williams with Prof. John Glover on guitar and the office staff

providing the chorus.

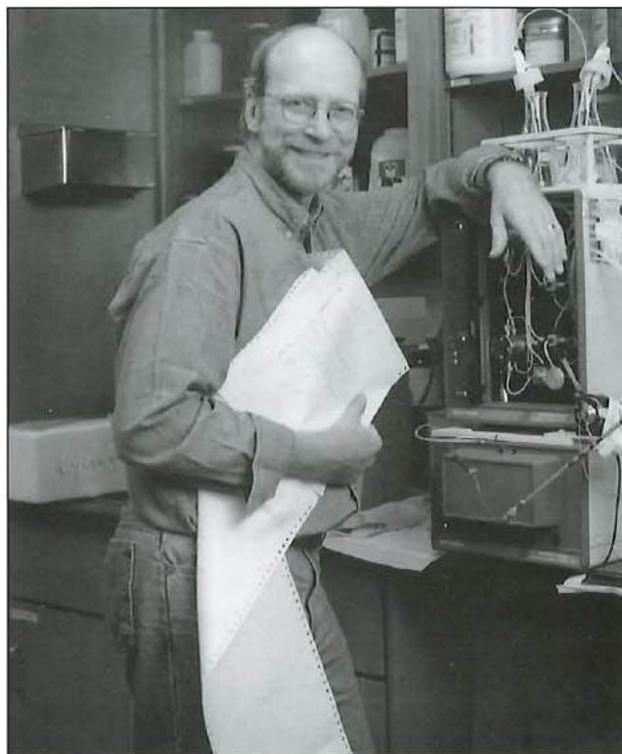
In July of 2002, following a visiting professorship at the National University of Singapore and a position as a visiting scientist at the Institute for Systems Biology in Seattle, Prof. Lewis returned to Toronto to become Vice-Dean, Research and International Relations, in the Faculty of Medicine for a five-year term. This appointment was renewed in 2007 for an additional five years, attesting to Peter Lewis' talents as an administrator.



David Williams



Brenda Bradshaw, Carrie Harber, Suzanne D'Alvise & Carol Justice



David B. Williams

### **Professor David Bruce Williams (1952-**

Prof. David Williams served as Acting Chair of the department from July 1, 1996 to June 30, 1997.

He was born in Winnipeg and graduated with an Honours B.Sc. degree in Chemistry from the University of Manitoba. His graduate training (M.Sc. 1975, Ph.D. 1981) was in the Department of Biochemistry at the University of Toronto with Prof. Harry Schachter, focussing on oligosaccharides and glycoproteins. Prof. Williams' postdoctoral training was at Johns Hopkins University in Baltimore, Maryland, in 1981-84, with Dr. William Lennarz and then with Dr. Gerald Hart where he began his interest in the intracellular transport of membrane glycoproteins. In 1984, he was appointed as an Assistant Professor in the Department of Biochemistry at the University of Toronto. His research interests have centred on characterizing molecular chaperones of the endoplasmic reticulum (ER) and investigating the mechanisms underlying quality control. The discovery of the molecular chaperone



First Open House 2003 Reinhart Reithmeier & Jacqueline Segall

calnexin, and elucidation of its functions by studying its interactions with proteins that pass through the ER, such as class I histocompatibility molecules, led to the award in 1994 of the Merck Frosst Prize of the Canadian Society of Biochemistry & Molecular Biology, and in 2000 the Dales Award in Medical Research, honouring a “Toronto investigator of outstanding calibre, whose research has had a substantive impact in the areas of basic or clinical sciences or community health”. He has served on a number of national and international scientific committees.

In 1988-89, Prof. Williams initiated the monthly FIBS (Frontiers in Biochemical Science) seminars for faculty in the Biochemistry department, and continued to organize these late afternoon beer and pizza sessions until 2005. From 2001 to 2005 he was the Graduate Student Coordinator for the Department. During



Graduate Student Party for David Williams, Sian Patterson, Chris Tsang, Guillaume Thibault, Susan Bustos, David Williams, Costin Antonescu, Lellean JeBailey, Eden Fussner; Dana Patterson

this time he helped to initiate a vigorous recruitment campaign that included a modern web-site, an Open House, a rapid turnaround of applications, and a welcoming atmosphere, promoted by Graduate Assistant Carrie Harber. The graduate students held a party in his honour when he finished his four year term as a popular Graduate Student Coordinator. When the Biochemistry Website was revamped in 2002, he took the responsibility for producing the popular News and Events page.



David E. Isenman

### **Professor David Elliot Isenman (1949-**

Professor Isenman was Acting Chair of the Department of Biochemistry from January 1, 2002 to June 30, 2002.

He graduated from the Biochemistry Specialist Program of the University of Toronto in 1972 and received his Ph.D. there in 1976 with Prof. Painter; his thesis title was “Structure and function of immunoglobulin domains: the interaction between immunoglobulin G and the first component of complement”. He carried out



David Isenman & Dorothy Painter  
Joint Recipients of the 1996 W.T.Aikins Award

post-doctoral work in 1977 at the Weizmann Institute of Science in Rehovot, Israel, and in 1978 at the Research Institute of the Scripps Clinic in La Jolla, California. In December of 1978 he joined the Department of Biochemistry, supported by an MRC Scholarship and rose through the ranks to full professorship. Prof. Isenman was also cross appointed to the Department of Immunology. His research involves the structure-function relations in proteins of the complement system. He served the department as Graduate Coordinator from 1991 to 1993.

In 1996, he shared an Aikins Award with Senior Tutor Dorothy Painter for Development and Coordination of the Advanced Biochemistry Laboratory Course, BCH 471Y, for which they had been responsible since 1983. In 2006 he was the inaugural recipient of an Excellence in Undergraduate Teaching in Life Sciences Award that honours outstanding and sustained contributions by faculty members of the Basic Science Departments of the Faculty of Medicine to Arts and Science teaching.

## Professor Reinhart Reithmeier (1950-



Reinhart Reithmeier

Professor Reithmeier became Chair of the Department of Biochemistry on July 1, 2002.

He grew up in the countryside on the outskirts of Ottawa with parental encouragement of his interest in biology. A scholarship from a local golf course where he worked in the summers took him to Carleton University where he graduated with a B.Sc. in 1972 as one of five students in the first biochemistry class. Work as a summer student at the NRC laboratories in Ottawa led to a keen interest in protein structure. The award of a MRC Studentship took him to the University of British Columbia to work with Phillip Bragg on bacterial membrane proteins and obtain his Ph.D. From 1976-78 he was a post-doctoral student at Harvard University with Guido Guidotti, working on the red cell anion transporter. During a second post-doctoral period with Prof. David MacLennan in Toronto, he studied muscle membrane proteins from 1978-80. Supported by a

MRC Scholarship, he was recruited by Prof. John Colter to the Department of Biochemistry at the University of Alberta in 1980 where he established himself as a principal investigator.

In 1986, he moved back to the University of Toronto to join a new MRC Group in Membrane Biology organized by Prof. Mel Silverman in the Department of Medicine. In that year he was also cross-appointed to the Department of Biochemistry. A sabbatical year in 1992-93 with Jacques Poussegur at the Universite de Nice in France introduced Prof. Reithmeier to molecular biology and shifted the focus of his research from structural studies to molecular biological and cell biological approaches. From 1993 to 1995 he was the graduate coordinator in the Department of Biochemistry and he had also been the graduate coordinator of the Institute of Medical Sciences. He has served on grants panels and editorial boards, and became a Councillor of the Canadian Society of Biochemistry, Molecular & Cellular Biology in 2000 and one of the editors of its *Bulletin* in 2002. As Vice President of the Society he chaired the Organizing Committee for the CSBMCB meeting in 2006. He became President of the Society in 2007. Upon being appointed Chair of the Department of Biochemistry in 2002, Prof. Reithmeier transferred his primary appointment to the Department of Biochemistry and moved his laboratory and office to the fifth floor of the Medical Sciences Building. In 2007 he was the recipient of the W.T. Aikins Faculty Teaching Award for Individual Teaching Performance (Large Group).

Because Prof. Reithmeier knew that the consultation process is very much a part of how decisions are made in the Department, one of his first actions was to set up a Task Force to review the always difficult subject of space. Integration of the three new staff members (Prof. Attisano, Jorgensen and Kalnins) that he had welcomed from the now defunct Division of Cell Biology was viewed as an immediate requirement. The physical arrangements in the Departmental Office were improved and the computer equipment was updated. Renovated office space was created for some faculty members who no longer had active research programs

and their laboratories were reassigned to Professors Walid Houry and Dave Williams whose research programs were expanding. A Biophysics Centre was established that houses spectroscopic (CD, uv/vis, fluorimeter) equipment. The \$200,000 available for new multi-user equipment was well spent; one of the purchases was an analytical ultracentrifuge. Another consideration was finding space for a common meeting place for graduate students, post doctoral students, and staff so that we could dispense with the many little corridor cafes that



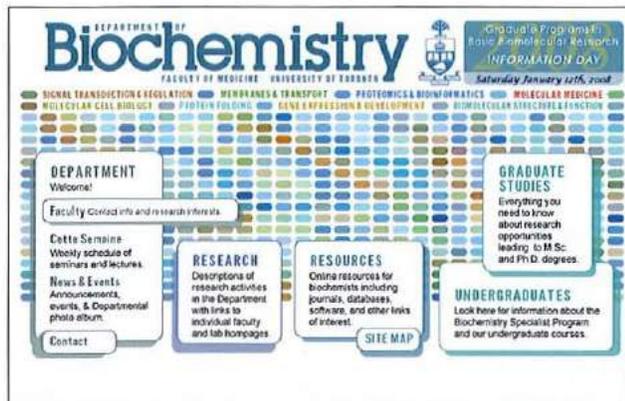
David H. MacLennan

were in the halls outside the laboratories, in violation of fire regulations. The Biochemistry Bistro that was set up in 2005 provides a room where faculty, other staff, and students can interact, eat lunch or have a cup of coffee. Because the Seminar Room bookings could not handle increasing demands for seminars, meetings and examinations, a smaller room that had served as a reading room and library for current journals was converted to a second meeting room.

On October 3 & 4 of 2002, Prof. Reithmeier helped to organize a symposium on "Molecular Dissection of Membrane Function and Dysfunction" in honour of Prof. David H. MacLennan on the occasion of his 65<sup>th</sup> birthday. Among the scientists who presented papers were 11 individuals who had been post doctoral students or visiting professors in the MacLennan laboratory. Prof. MacLennan has been the recipient many prestigious awards (see Chapter 7) for his contributions to the understanding of the mechanism of ion transport,



Dorothy McLean Johnson

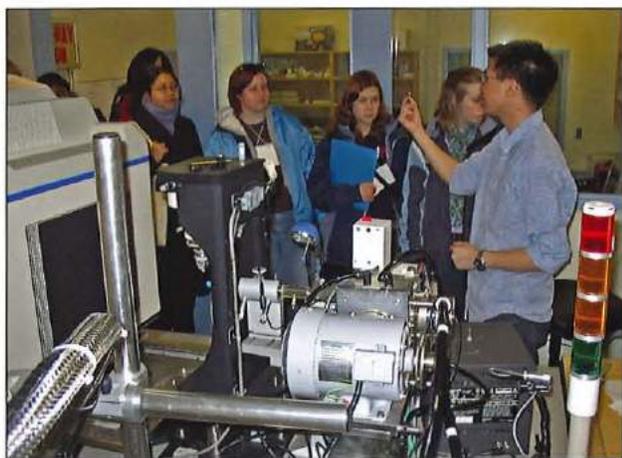


Departmental Website

the proteins of the sarcoplasmic reticulum and its calcium ion pump, and the genetic basis of malignant hyperthermia, central core disease, and Brody disease. He received the Order of Canada in 2002.

Many members of the Department attended the memorial service for Dorothy (Dorrie) McLean Johnson in November of 2002. She had been a lecturer in the Department from 1963 to 1976 with responsibilities in the Advanced Laboratory course (BCH 471Y). After part-time teaching at York University, she joined Prof. Keeley's laboratory at the Hospital for Sick Children and between 1983 and 1995 she made noteworthy contributions to his research projects.

The Biochemistry Website was completely overhauled in December following the recommendations of a Task Force comprised of Professors Boris Steipe, Larry Moran, David Williams and Grant Brown. A private company



Open House in 2005

was engaged to build the site. The new Website is a source of information about courses, research, faculty profiles, graduate student recruitment, seminars, and current events in its News and Events page.

In January of 2003 the first annual Open House for prospective graduate students was organized by the Graduate Coordinator, David Williams, with outstanding assistance from the office staff and members of the Biochemistry Graduate Students Union (BGSU). There were short talks by the Chair and the Graduate Coordinator; poster presentations were set up; a movie on our research themes was shown; a pizza lunch was provided for the 60 attendees; and there were guided tours of the campus-based research facilities and those at the Hospital for Sick Children. The Open House continued each January and in 2007 it became a combined event of the Departments of Biochemistry and of Molecular Genetics.

From late March to late May of 2003 there were many disruptions of our academic life as a result of SARS (severe acute respiratory syndrome) in Toronto. Access to laboratories in the Ontario Cancer Institute and in Mount Sinai Hospital was restricted for nearly two weeks. Throughout the crisis, entry to all hospitals was delayed by as much as 30 minutes due to SARS screening. Many seminars and student committee meetings were cancelled. SARS also caused the cancellation of the XIX International Congress of Biochemistry and Molecular Biology that had been scheduled to take place in Toronto in July. All the preparatory work of the local committee, head by Prof. Peter Lewis, came to naught.

The graduate programs underwent a major review by the Ontario Council on Graduate Studies. Although the report had been prepared in 2002/03 and submitted in July, it was not until April of 2004 that the site visit took place. The reviewers were Patrick Chow (Manitoba), Janet Wood (Guelph) and Jonathan Lytton (Calgary). The Department received the highest possible rating. The Collaborative Program in Biomolecular Structure was reviewed by OCGS in 2003/04 and received approval to continue.



Roy Baker

In 2003, Prof. Roy Baker was the recipient of the Harry Whittaker Memorial Teaching Award. Upon the retirement of Prof. Murray in 1998, Prof. Baker had assumed the responsibility of organizing the contributions of the department to the teaching of first year medical

students, and it is evident that they appreciate his lively style of lecturing. He also teaches the large undergraduate biochemistry courses for non-specialist students (currently in Convocation Hall), and in 2003 he became the Undergraduate Coordinator for the department.

The Department was successful in the first round of funding in 2003 for two CIHR Strategic Training Programs. Professors Charles Deber and Reinhart



Charles M. Deber

Reithmeier spearheaded the creation of the Training Program in the Structural Biology of Membrane Proteins Linked to Disease. Professors Julie Forman-Kay and Walid Houry led the application for the Training Program in Protein Folding: Principles and Diseases.

Each program provides \$1.8 million over 6 years to support the training of graduate students and post-doctoral fellows. Charles Deber organized the first CIHR Strategic Program International Symposium on Proteins: Structure, Folding and Disease in Toronto in June of 2004 that attracted 300 participants and featured talks by international scientists, local training program mentors, post-doctoral students and graduate students. The second International Symposium was organized by Prof. John Glover and held in May of 2006.



Chi-Hung Siu & Paul Yip

Paul Yip, a graduate student in Prof. Siu's laboratory, received the National Volunteer Award. He was chosen from among nearly 500 volunteers for outstanding achievements in the promotion of science in his community.

During 2003, several celebrations were held in the seminar room or at other locations. These included birthday parties for Emeritus Professors Packham, Hofmann and Thompson, and a party to welcome Professor Reithmeier's group to the 5<sup>th</sup> floor.

Wall plaques were prepared and mounted in the hallways of the core Department listing the recipients of the numerous awards that the Department gives each year to undergraduate and graduate students. A



Theo Hofmann Cuts his Birthday Cake

new award, the Dorothy Sterling Dow Walsh/Ontario Graduate Scholarship in Biochemistry was established in 2003 based on a generous donation from Marguerite Ruth Dow, a Professor Emeritus at the University of Western Ontario. The award is named in honour of her sister, a renowned biochemist who worked for many years in the Canada Department of Agriculture. This scholarship is to be given annually to the top ranked graduate student who has received an OGS award.

In 2004 a new undergraduate award was initiated, originally named the "Advanced Biochemistry Coordinators Award" for excellence shown within the fourth year biochemistry laboratory (BCH 471Y). In 2007 it was renamed "The Patricia Bronskill, Dorothy Painter, Dorothy Johnson Award". Similar awards were set up for BCH 371H (The Jacqueline Giles, Edith Anderson Award) and for BCH 370H (The Lois Dove Award). These awards are named for the Tutors, Senior Tutors and Lecturers who supervised these laboratories.

As part of the celebration by the University of Toronto of the 120<sup>th</sup> anniversary of the official admission of women to the University, members of the Department met in March of 2004 to discuss the history of women in biochemistry as well as the recent Brenda Maddox book, "Rosalind Franklin: The Dark Lady of DNA". Prof. Marian Packham provided some recollections about women in the Department of Biochemistry, and Prof. David Pulleyblank described the state of knowledge about DNA before the appearance of Watson and



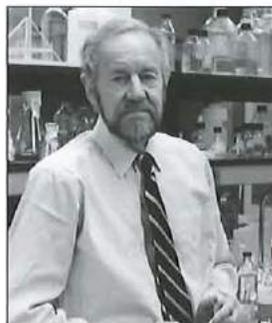
Lloyd Porter & Pat Bronskill



Department of Biochemistry Research Day Old Mill Inn, Toronto May 2004

Crick's famous paper in Nature in 1953.

At the end of term in 2004, the biochemistry undergraduate students threw a surprise party for Lloyd Porter who was retiring after 30 years of service as a technician in the Department and in the Department of Teaching Laboratories. Students from the BCH 371H laboratory course, Teaching Assistants from the present and past, and old friends from the Department gathered to celebrate. In her tribute to him, Senior Lecturer Patricia Bronskill described Lloyd's ever-helpful, cheerful and unflappable nature.



William Thompson

In May of 2004 the annual Poster Day was moved to the Old Mill Inn and renamed the Departmental Research Day/Retreat with the usual judging of posters and the Theo Hofmann Lectureship. For the first time, post doctoral students as well as graduate students were asked to prepare posters, and talks by faculty and students were featured. The Old Mill Inn continued to be the venue for two more years until budget restraint forced the Annual Poster Day back to the main campus where the lectures were given in the MacLeod Auditorium and a BBQ lunch was served at Knox College.

On June 1<sup>st</sup> of 2004 the Department arranged a memorial service in Seeley Hall of Trinity College for

Professor Emeritus William Thompson who had died in April in the palliative care unit of St. Michael's Hospital. A number of speakers celebrated his life by sharing their remembrances.

Throughout 2003/04 the Department went through an extensive planning exercise to prepare a strategic plan for "Stepping Up". Extensive work by various committees, consultation with all sectors of the Department, two draft documents that were widely circulated, and a special Departmental meeting led to a Stepping Up Strategic Plan, written by Prof. Reithmeier and submitted to the Dean and Provost at the end of June, 2004. This plan contained the blueprint for many of the initiatives taken by the Department in the following years. One of these was the introduction in 2004/05 of tutorial sessions run by graduate students to provide help for students in BCH 210H, Introductory Biochemistry.



Walid Houry, Reinhart Reithmeier & David Williams

The annual Gairdner lectures in October featured molecular chaperones. As a consequence, the awardees were hosted by three of our faculty members with strong research interests in this topic, Professors Walid Houry, Reinhart Reithmeier and David Williams.

Celebrations held during the year of 2004 included an 80<sup>th</sup> birthday party for Prof. Emeritus Theo Hofmann and a luncheon and presentation in July to mark the retirement of Prof. Norman Camerman after many years of exemplary teaching. The retirement of Prof. Bibudhendra (Amu) Sarkar was marked by a reception and banquet at Hart House.

The Protein Engineering Network of Centres of Excellence (PENCE) completed its final year in 2005 after 15 years of strong performance in research, training, and the commercialization of protein related technologies. The final seminar was given by Professor Harry



Reinhart Reithmeier & Norman Camerman



Bibudhendra (Amu) Sarkar

Schachter, one of the founding members of PENCE.

The inaugural Benjamin Schachter Memorial Lecture was given in April of 2005 by Dr. Matthew Moyle (Ph.D. 1988). This lectureship was set up by Dr. Schachter's family after his death. He had been a graduate student in our Department, obtaining his Ph.D. in 1939 with Prof. Guy Marrian as his supervisor. For this lecture, the BGSU and the graduate students select a speaker who is a graduate from our Department to describe his or her subsequent career.

Excellence in our Teaching Assistants is now recognized with an "Outstanding Teaching Assistant



Matthew Moyle & the Schachter Family

Award". This award was proposed by the undergraduate students in 2005. BUSS (Biochemistry Undergraduate Student Society) provides funding that is matched by the Department.

A new Major Program in Biochemistry was introduced in 2005/06 and the 50 places were immediately filled. It was so popular with over 500 applications that it had expanded to 100 students by 2007/08.

At the annual Departmental meeting in June, Prof. Reithmeier outlined the devastating consequences of a forecast 5% budget cut and the end of mandatory retirement at 65. He pointed out that the Department had been not filling retirement positions as the main way of taking budget cuts that had been occurring each year.

On October the 14<sup>th</sup> 2005 at 3 a.m. there was a serious fire caused by an overheated drying oven in the room containing autoclaves, water purification equipment and the glassware washing facility. After the clean up, the Faculty invested in new equipment for this room, including a second functional autoclave.

The Terrence Donnelly Centre for Cellular and Biomolecular Research (CCBR) was formally opened on November 3, 2005. It is intended to house 40 key researchers and their teams, totalling up to 400 researchers from medicine, pharmacy, applied science and engineering, and arts and science. The goal is to foster collaborative and interdisciplinary biomedical research. Four members of our professorial staff moved into the CCBR, Liliana Attisano, Grant Brown, Igor Stagljar, and Christopher Yip.

One of the celebrations in 2005 marked the granting of tenure to four of our faculty members, Professors Grant Brown, John Glover, Craig Smibert and Boris Steipe. Prof. Reithmeier noted the marked success of departmental members in obtaining Canada Research Chair Awards, 15 between 2002 and the end of 2005. When Prof. David Williams completed his extended four year term as Graduate Coordinator, the graduate students surprised him with a wine and cheese reception and a signed group photo.



John Glover, Craig Smibert, Grant Brown & Boris Steipe

In December the Department bid a fond farewell to Suzanne D'Alvise who had done an admirable job as our Business Officer for 21 years. Suzanne had accepted a position as Business Officer/Professional Manager in the Department of Medical Imaging. We also welcomed Carol Justice as our new Business Officer. Carol is no stranger to the Department since she started her career with us in 1966 and had risen through the administrative ranks to the position of Administrative Assistant-Finance. This position was filled the following spring by the appointment of Mike Folinas.

In 2006, Parks Canada recognized Archibald Macallum on the anniversary of his birthday (April 7, 1858) as the "Father of Canadian Biochemistry" in their "This Week in History" series.



Suzanne D'Alvise & Carol Justice

In May of 2006, the members of the Department were delighted to learn that Jeff Lee, a graduate student in Prof. Lynne Howell's laboratory, had received the Governor General's Gold Medal for the most outstanding graduate student. During his graduate studies, Jeff authored nine research papers and was a three time winner of our annual poster competition on Research Day.



Jeff Lee, Recipient of the Governor General's Gold Medal

In June of 2006 the Department met to pay tribute to Patricia Bronskill on the occasion of her retirement. This event followed two surprise parties for her given by the BCH 471 and BCH 371 students and a third gathering of TAs past and present that she had so effectively mentored.



Patricia Bronskill

Pat obtained her M.Sc. degree in biochemistry in 1968 and spent most of the following 40 years in our Department, first as a research assistant and then for 17 years as a Tech IV in Jeffrey Wong's laboratory. In 1989 she became a Senior Lecturer and at various times during the following years

had responsibilities for all our laboratory courses, and as the administrator for BCH 320 with its 800 students. Pat was admired, respected and much loved by the students. Her excellence in teaching had been recognized by the W.T. Aikins Award in 1999.

During Prof. Reithmeier's chairmanship, the annual pot-luck Christmas Party that had been held in the seminar room moved to the Alumni Lounge of the Medical Sciences Building to accommodate the increased number of graduate students. It was catered, renamed "The Year End Party" and combined with a Toy and Food Drive. In 2006 the venue was changed to the Music Room of Hart House. The highlights included a Biochemistry



Dave Isenman, Lil Attisano & Reinhart Reithmeier

Video Contest, a Biochemistry quiz, entertaining songs about graduate and research life, and a slide show of Departmental photographs over the past three decades.

Prof. Reithmeier became the CIHR Delegate for the University of Toronto in January of 2007. In this capacity he began lobbying for an increase in the CIHR base budget to try to increase the low success rate in the open grants competition. He has been successful in publishing opinion pieces and Letters to the Editor in the Toronto Star about funding problems.

A new Research Committee was set up to oversee common equipment and space and to consult widely with the faculty to identify priorities for future recruitment.



Staff at the Year End Party

Nancy Bueler; Brenda Bradshaw, Carol Justice, Carrie Harber; Reinhart Reithmeier; Kelly Homen, Rob Reedijk, Victoria Ilgacs & Suzanne D'Alvise



David P. Bazett-Jones



John Parkinson



Shoshana Wodek



Gergeley L. Lukacs



Khosrow Adeli



Allen Volchuk



Simon Sharpe



John Rubinstein



Angus McQuibban



Igor Stagljär



Shana O. Kelley



Stephane Angers

At the end of Prof. Reithmeier's first term as Chair, the Department was reviewed by Prof. George A. Mackie of the Department of Biochemistry and Molecular Biology at the University of British Columbia and Prof. Gerry Wright of the Department of Biochemistry and Biomedical Sciences at McMaster University. They had "no reservations in enthusiastically recommending re-appointment of Prof. Reithmeier for another term". They commented that, "The Chair, despite having to manage yearly budgetary constraints, possesses tremendous energy and a positive outlook. His leadership is universally appreciated and his efforts to be collegial,

inclusive, and communicative emerged as a common thread in all our discussions."

During Prof. Reithmeier's first term as Chair, the professorial staff was considerably increased by new appointments. David Bazett-Jones, an electron microscopist at The Hospital for Sick Children was given a primary appointment in 2001. Professors John Parkinson and Khosrow Adeli joined the Department in 2004. Five new members were added in 2005, Professors Allen Volchuk, Angus McQuibban, Igor Stagljär, Shoshana Wodak and Gergeley Lukacs. The three new faculty members in 2006 were Simon Sharpe and John Rubinstein at the Research



Stavroula Andreopoulos

Institute of the Hospital for Sick Children and Shana Kelley who was jointly appointed with Pharmacy. A new lecturer, Ahlia Khan, a recent graduate from our Biochemistry Program, took over the responsibilities for the biochemistry laboratory courses. In 2007 Stephane Angers was cross-

appointed from the Faculty of Pharmacy.

By November of 2007, the Department had 58 faculty members, including two lecturers (Stavroula Andreopoulos and Ahlia Khan). Of these, 21 were base budget faculty (including 6 with joint appointments). There were also 16 Professors Emeritus, some of whom were continuing to publish. The 142 graduate students were divided almost equally between the M.Sc. and Ph.D. programs. Female graduate students are now in the majority. Each year we teach 200-220



Ahlia Khan

medical students and over 1800 Arts and Science students. Introductory Biochemistry (BCH 210H) is taught to over 1200 students in Convocation Hall by professors Charles Deber, Roy Baker and Reinhart Reithmeier, all W.T. Aikins Teaching Award winners.

Prof. Reithmeier has pointed out that the original mandate of biochemistry has evolved. The scope of the discipline now includes structural, molecular and cellular biology and even computational biology and bioinformatics. Indeed, biochemistry is considered *the* fundamental discipline in life sciences. The Department of Biochemistry remains a tower of strength within the Faculty of Medicine and the University of Toronto. We are entering our second century stronger than ever.

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## CHAPTER 6

### Charting the Growth in Biochemistry

When the Department of Biochemistry was established, Professor Macallum was the only professor in the core department, although Clara C. Benson is also named in our calendar list as an Associate Professor of Physiological Chemistry in the Faculty of Household Science; she continued to be listed in this position until 1928.

In 1920, there were only 2 professors (Hunter and Wasteneys) in the department; from 1930 to 1950 the number increased to 3 and then to 4, but even in 1960 there were only 6 professors. By 1967 the number in the core department had increased to 17 and at that time the “Haist Rules” on academic appointments and tenure (resulting from the report of a president’s committee in 1966) took effect. Up until 1966, the professors in the Department of Biochemistry were all located in the old Medical Building that was demolished in 1968 to make way for the auditorium attached to the present Medical Sciences Building. Between 1966 and 1968, three newly appointed professors (E.R.M. Kay, K.G. Scrimgeour and W.A. Green) occupied renovated laboratories in the Spadina Division of Connaught Laboratories. Professors Kay and Scrimgeour joined their colleagues in the new building when it was completed. Originally, all the professors were paid by the University. The University also supplied stipends for part-time lecturers, fellows, and demonstrators and supported technical help, not only for the undergraduate teaching laboratories, but also for the research laboratories of the professors.

In 1965, Prof. Arnis Kuksis who was a member of the Banting and Best Department of Medical Research (BDDMR) was cross-appointed to the department, beginning an expansion that includes individuals with primary appointments in other departments. Many further cross-appointments and status only appointments have been made; in the 1960s they were described as “Honorary Appointments”. Status only appointees,

such as those based at the Hospital for Sick Children, do not derive their financial support from the university and they do not have tenure. They have dual reporting arrangements – to the Chair of the Department and to the Director of the research department or institute in which they are based. The gradual increase in the number of departmental members who are not in the core has spread the faculty over many sites, including other departments, the Erindale (Mississauga) and Scarborough campuses, research institutes such as BDDMR, and several hospital research institutes, particularly the Hospital for Sick Children. The cross appointees and status only members participate in the undergraduate and graduate teaching programs of the department; some of them take administrative responsibilities; and a number of them engage in collaborative research programs.

Some professors, regardless of where their laboratories are located, derive their salary support from outside agencies such as CIHR (previously MRC), HSF, NCIC etc. Recently, a number of Canadian Research Chairs have been awarded on a competitive basis. In response to continuing budget cuts, further changes in the staff began in 1980 when the department began to hire individuals jointly with other departments, such as the Department of Medical Genetics and Microbiology, now the Department of Molecular Genetics. Such joint appointments have been made with increasing frequency.

With the development of collaborative graduate programs in which the Department of Biochemistry participates, the professors who take part in these programs also report to the program directors. In 2007 there were five such programs: (1) Biomolecular Structure (2) Biomedical Engineering (3) Developmental Biology, (4) Proteomics and Bioinformatics and (5) Neuroscience. There were also two CIHR Strategic Training Programs: Protein Folding, Principles and

Diseases and Structural Biology of Membrane Proteins Linked to Disease. A number of members of the department had also been cross-appointed to PENCE (Protein Engineering National Centres of Excellence) during its 15 years of operation from 1990 to 2005.

The hiring frenzy of the 1960's inevitably resulted in a large number of retirements in the 1990's, but most of these retirement positions were lost to budget cuts. Fortunately, the department managed to renew its faculty through the Academic Priorities Fund (APF) by packaging its faculty needs in a way that fulfilled the "exciting new initiative" criterion of APF guidelines, usually in co-operation with other

departments. However, there was some concern related to the current dependence of building the department around fashion-of-the-day focus groups, because the loyalties and time commitments of faculty participating in multidisciplinary collaborative programs are not directed to the department. These concerns have become less prominent as the department expands its mandate to include the incredible diversity of topics that make up biochemistry today, combined with the more collaborative nature of research in the new millennium. Table 3 provides a list of all faculty members in the Department of Biochemistry since 1907/08.

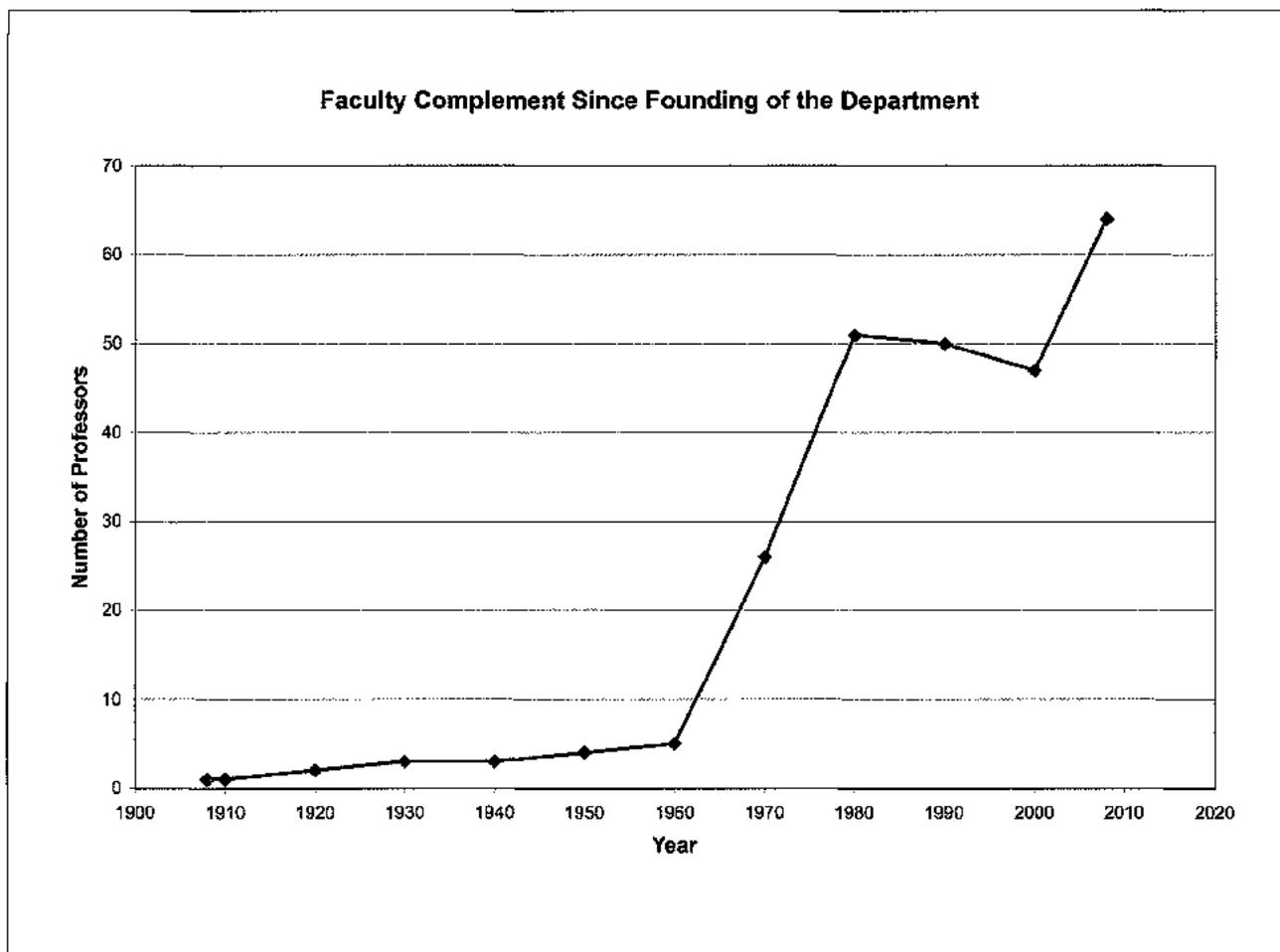


Table 3

**Professors in the Departments of  
Biochemistry and Zymology**

Archibald Byron Macallum	1907-17	Robert Hilton Painter	1968-98
Clara Cynthia Benson	1907-28	Irving B. Fritz	1968-92
Andrew Hunter	1917-29	Mario Anthony Moscarello	1969-95
Thornburn Brailsford Robertson	1918-19	Byron G. Lane	1969-98
Hardolph Wasteneys	1918-51	Norman Camerman	1969-04
Horace Bradbury Speakman	1919-29	Murray H. Freedman	1969-75
Arthur Marshall Wynne	1929-60	J. Bunting	1969-70
Herbert D. Kay	1929-32	Keith John Dorrington	1970-89
Guy Frederick Marrian	1933-38	Anders Bennick	1972-01
Leslie Young	1939-47	Les Pinteric	1973-84
Bruce Fenton Crocker	1946-70	Jaroslav Sodek	1974-07
Gordon Cecil Butler	1947-59	Francis Rolleston	1974-75
Jeanne Forest Manery Fisher	1948-76	Peter Noel Lewis	1974-
Charles Samuel Hanes	1951-68	Hugh G. Lawford	1974-02
George Edward Connell	1957-77	James W. Gurd	1974-
Gordon Henry Dixon	1960-63	Janet F. Forstner	1974-03
Robert Kincaid Murray	1961-98	Brian H. Robinson	1975-
George Ronald Williams	1961-93	Juta K. Reed	1975-01
Rashid A. Anwar	1964-96	John W. Callahan	1975-
Theo Hofmann	1964-89	Charles M. Deber	1976-
Harry Schachter	1964-99	Edward H. Eylar	1976-82
William Thompson	1965-96	Emmanuel H. Farber	1976-88
Jeffrey Tse-Fei Wong	1965-03	Glenville Jones	1976-83
W.A. Green	1965-67	Frederick W. Keeley	1976-
Amis Kuksis	1965-96	Chi-Hung Siu	1976-
Ernest R.M. Kay	1966-85	C. James Ingles	1976-
David O. Tinker	1966-97	Robert Roy Baker	1977-
K. Gray Scrimgeour	1966-93	Alexander Marks	1977-
John Bryan Jones	1966-75	David E. Pulleyblank	1977-
Andrew Sass-Kortsak	1966-69	David Elliot Isenman	1977-
John Alexander Lowden	1966-69	Trudy C. McNabb	1978-80
R.C. Burgess	1966-71	Laurence A. Moran	1978-
Marian Aitchison Packham	1967-93	John R. Riordan	1979-95
Bibudhendra (Amu) Sarkar	1967-02	Elizabeth J. Harfenist	1979-88
P. Sastry	1967-68	Donald S. Layne	1980-94
I. Menon	1967-69	Jen-Chang (Carleton) Hsia	1980-88
V.K. Murthy	1968-69	David H. MacLennan	1980-
		Jacqueline M. Segall	1980-
		Clement Yeung	1980-87
		Sergio Grinstein	1984-
		Amira Klip	1984-

Choy L. Hew	1984-99	Victor Kalnins	2002-03
Michel Klein	1984-98	John Parkinson	2004-
Clifford A. Lingwood	1984-	Khosrow Adeli	2004-
David Bruce Williams	1984-	Allen Voichuk	2005-
George Edward Connell	1984-90	Igor Stagljar	2005-
Graeme Hunter	1986-87	Shoshana Wodek	2005-
Margaret L. Rand	1986-	Gergely L. Lukacs	2005-
Marek Michalak	1986-87	Angus McQuibban	2005-
Reinhart Reithmeier	1986-	Simon Sharpe	2006-
Philip W. Connelly	1987-02	John Rubinstein	2006-
P. Robert C. Harvey	1989-93	Shana O. Kelley	2006-
Emil F. Pai	1991-	Stephane Angers	2007-
Inka Brockhausen	1991-99		
Carmay Lim	1992-94		
P. Lynne Howell	1992-		
Julie D. Forman-Kay	1992-		
Lewis E. Kay	1992-		
David M. Clarke	1992-		
James M. Rini	1992-		
Jeremy Carver	1992-97		
Morris Manolson	1994-		
John Fraser Wright	1994-99		
Alan R. Davidson	1995-		
William S. Trimble	1995-		
Daniela Rotin	1995-		
Christopher W.V. Hogue	1997-07		
Hue Sun Chan	1998-		
Christopher Yip	1998-		
John R. Glover	1998-		
Craig A. Smibert	1999-		
Grant W. Brown	1999-		
Walid A. Houry	2000-		
Régis Pomès	2000-		
Christine E. Bear	2001-		
Liliana Attisano	2001-		
Russell Bishop	2001-05		
Boris Steipe	2001-		
David P. Bazett-Jones	2001-		
Avi Chakrabartty	2001-		
Gil Privé	2001-		
Annelise Jorgensen	2002-		

## CHAPTER 7

### Professors in the Departments of Biochemistry and Zymology

*Following is a brief biographical sketch of all Professors in the Department of Biochemistry since 1907/08. An asterisk (\*) indicates undergraduate or graduate student in the Department.*

#### 1907-1917

**Archibald Byron Macallum (1858-1934) F.R.S., F.R.S.C.**  
B.A. (1880) in Natural Sciences, U. of T. Lectureship in Biology (1883), U. of T. Ph.D. (1888) Johns Hopkins. M.B. (1889) U. of T. Chairman of Physiology (1891-08). Chairman of the Department of Biochemistry (1907-1917). Fellow of the Royal Society of Canada (1901) and president of its fourth section (1908-09). Fellow of the Royal Society of London (1906). LL.D., Aberdeen in 1906, D.Sc. Yale University in 1907, D.Sc. Dublin in 1908 and also LL.D. McGill. During his career he was President of the Canadian Institute, Chairman of the Research Council of Canada, and President of the Society of Biological Chemistry. He left Toronto when he was appointed by the government to become the first chairman of the Advisory Council of the body that later became the National Research Council of Canada. In 1920, he became a professor at McGill. In 1930, he was the Flavelle medallist of the Royal Society of Canada.

#### 1928-1928

**Clara Cynthia Benson (1875-1964)**  
B.A. (1899) and Ph.D. (1903) in Physical Chemistry at U. of T. One of the first two women at U. of T. to receive a doctorate. Associate Professor of Physiological Chemistry (Biochemistry) in the Faculty of Household Science. She became Professor of Food Chemistry in 1920, retired in 1940, and taught for 5 more years.

#### 1929-1929

**Andrew Hunter (1876-1969) C.B.E., F.R.S.C., F.R.S.E.**  
M.A. (1895), B.Sc. (1899), M.B., Ch.B. (1899) in Edinburgh. He held positions in the Department of Physiology at

Edinburgh, the Friedrich-Wilhelm University in Berlin, the University of Heidelberg, and Cornell University before becoming Prof. of Pathological Chemistry, U. of T. (1915-19). He was Acting Chairman of the Department of Biochemistry (1917-1918) and Chairman (1919-1929). He was elected a Fellow of the Royal Society of Canada in 1916 and was president of Section V in 1924-25. He was also a Fellow of the Royal Society of Edinburgh (1932). The Companion of the British Empire was conferred on him in 1946 for his services in the standing Committee on Nutrition. In 1929 he left Toronto to become Professor of Physiological Chemistry at the University of Glasgow and Dean of the Faculty of Medicine. In 1935, he returned to Toronto as Professor of Pathological Chemistry and later Dean of Graduate Studies. His graduate students included James Dauphinee and Hugh Branion. After retirement in 1947, he continued research at the Hospital for Sick Children until 1966.

#### 1919-1919

**Thornburn Brailsford Robertson (1884-1930)**  
Chairman of the Department (1918-1919). He left to become Professor of Physiology at the University of Adelaide.

#### 1951-1951

**Hardolph Wasteney (1881-1965) F.R.S.C.**  
Ph.D. (1916) Columbia University, New York. Chairman of the Department for 22 years (1929-1951). He was elected a Fellow of the Royal Society of Canada in 1930 and served as President of Section V in 1940-41. His graduate students included Henry Borsook, H. Bruce Collier, Bruce F. Crocker and Vladimir (Jim) Ignatieff. Professor Emeritus.

#### 1919-1929

**Horace Bradbury Speakman (1893-1975)**  
B.Sc. (1914), M.Sc. (1916) at Manchester University, UK. Chairman of the Department of Zymology which

merged with the Department of Biochemistry in 1929. Arthur Wynne was one of his graduate students. He left to become Director of Research at the Ontario Research Foundation.

#### **1960-1960**

**Arthur Marshall Wynne\*** (1891-1972) F.R.S.C.

B.A. and M.A. at Queen's University, Kingston. Ph.D. (1925) U. of T. Research Associate in Zymology (1919-1929). Chairman of the Department (1951-1960). First President of the Canadian Biochemical Society (1957-58). Among his graduate students were L. Bradley Pett, Jules Tuba, Joseph F. Morgan, Gordon S. Stewart, William Holmes, C. Gordon Stewart, Harold Stewart and Tadeusz Bojarski.

Professor Emeritus.

#### **1929-1932**

**Herbert D. Kay**

He left to become Director of the National Institute for Research in Dairying, Reading, England. In Toronto, his research was focussed on phosphoric esters and phosphatases. His graduate students included William Graham, Hugh Branion, and Thomas Jukes.

#### **1933-1938**

**Guy Frederick Marrian** (1904-1981) F.R.S.C.

Came to Toronto from University College, London, England. He left to become Professor of Medicinal Chemistry, University of Edinburgh. While he was in Toronto, he and his graduate students made important contributions regarding the isolation and structural determinations of estrogens and other steroids. Among his graduate students were Desmond Beall, Saul Cohen, Gordon Butler, Arthur Odell, Edith Batho Anderson, William Fishman, and Benjamin Schachter.

#### **1939-1947**

**Leslie Young**

He left to take a position at University College, London, UK, and later became Professor of Biochemistry at

St. Thomas Hospital Medical School. In Toronto, he investigated the mechanisms of detoxification, and antidotes to mustard gas poisoning. His graduate students included Sidney Zbarsky, J. Alexander McCarter and Max Berenbom.

#### **1946-1970**

**Bruce Fenton Crocker\*** (1907-1985)

B.A. (1930) and Ph.D. (1940) in Dept. of Biochemistry, U. of T.

He became a full time demonstrator in the Department in 1930, served in the Royal Canadian Air Force in World War II, and was then appointed as an Assistant Professor. Among his graduate students were Jack Porter, Leo Koppel, Rose Sheinin and Diana Michener.

Retired as Professor Emeritus.

#### **1947-1959**

**Gordon Cecil Butler\*** (1913-1994) F.R.S.C.

B.A. (1935) and Ph.D. (1938) in Dept. of Biochemistry, U. of T.

Post doctoral fellow at University College, London, England. Research Chemist for the Charles E. Frosst Co. in Montreal (1940-42). Canadian Army, research on chemical warfare (1942-45). Retired with rank of Major. Atomic Energy Project, Chalk River, Ont. (1945-47).

Left the department to become Director of the Division of Biology and Health Physics, Atomic Energy of Canada, Chalk River, and in 1965, Director, Division of Radiation Biology, National Research Council of Canada. When this merged with the Division of Biological Science in 1968, he became the Director until 1983. At that time he was also President of IFS (International Foundation for Science), Stockholm, Sweden (1982-87). He was president of the Canadian Biochemical Society (1961-62) and Chair of the Canadian Federation of Biological Societies (1967-69). In Toronto, his research was mainly focussed on the structure of nucleic acids. His graduate students included Alexander Moore, J. Alexander Little, David Smith, Robert Hurst, Arthur Marco, Leonard

Cohen, Marian Packham, Ian Walker, Lawrence Smillie, Christopher Helleiner, James Neelin, Karl Freeman, Byron Lane, and Renata Diringer (Maas).

#### **1948-1976**

**Jeanne Forest Manery Fisher\* (1908-1986)**

B.A. (1932) Biological and Medical Sciences, and Ph.D. (1935) Physiology at U. of T. Post doctoral fellow at the University of Rochester, NY, and Harvard University, Boston. Came into the Dept. of Biochemistry in 1940 as a Demonstrator and was appointed as an Assistant Professor in 1948. In 1950-51 she served as a Senior Scientist in the Defence Research Northern Laboratory at Fort Churchill, Manitoba. She was awarded the Queen's Silver Jubilee Medal (1977), and a D.Sc. from Memorial University (1982). She took an active role in the Royal Canadian Institute. Her outstanding career and her role in developing and chairing the Equal Opportunities Committee of the Canadian Biochemical Society led to the establishment in 1987 of the Jeanne Manery Fisher Memorial Lectureship of the Society. Her research interests included the plasma membrane, electrolytes, and nucleotide-converting ectoenzymes. Her graduate students included Jack Barlow, Pauline Blake (Stewart), Lawrence Smillie, Hyman Husdan, Yousef Ma'Tuk, William Meakin, Ian French, Ronald Boegman, John Riordan, Tiiu Ambus, Yin-Tak Woo, Janet Forstner, Colleen Dunkley and Blaine Moore. Post-doctoral students included Hugh Middleton, Rajendra Sharma, and Irshad Chaudry. She continued research as Prof. Emeritus until her death.

#### **1951-1968**

**Charles Samuel Hanes (1903-1990) FR.S., FR.S.C., Sc.D.**  
B.A. (1925) Biology and Chemistry, U. of T. Ph.D. (1929) Cambridge, UK. Chairman of Department (1960-1965). Elected as a Fellow of the Royal Society of London in 1942 and of the Royal Society of Canada in 1956. He received a Sc.D. degree from Cambridge University in 1953. His graduate students included

George Connell, Gordon Dixon, Alastair Matheson, Clifford Harris, Kenneth Walsh, Thomas Webb, Mario Moscarello, Jeffrey Wong and Ross Donovan. Professor Emeritus.

#### **1957-1977**

**George Edward Connell\* (1930- ) O.C., LL.D., F.C.I.C., FR.S.C.**

B.A. (1951) and Ph.D. (1955) in the Dept. of Biochemistry, U. of T.

Post doctoral fellow at NRC Laboratories in Ottawa and in Prof. Ochoa's laboratory in New York. Chairman of the Department (1965-70), Sabbatical leave working in the laboratory of Rodney Porter at Oxford (1970-71). Associate Dean of Medicine (1972-74), and the University's Vice President of Research and Planning (1974-77). He was elected a Fellow of the Royal Society of Canada in 1975. President of the Canadian Biochemical Society (1973-74). He was a Fellow of the Chemical Institute of Canada and the recipient of a number of honorary degrees. Among his graduate students were Robert Murray, Murray Freedman, Asha Ozge-Anwar, Frederick Oforu, Eileen Adamson, Anders Bennick, Franklyn Lewis, Barbara Buchwald and Maire Percy. He left U. of T. to become President of the University of Western Ontario (1977-84). In 1981-83 he was President of the Council of Ontario Universities (COU).

#### **1984-1990**

Prof. Connell returned to U. of T. in 1984 as President of the University. He is an Officer of the Order of Canada. The "George Connell Biochemistry Lectureship" is supported by contributions made upon his retirement in 1990.

Prof. Emeritus.

#### **1960-1963**

**Gordon Henry Dixon\* (1930- ) O.C., FR.S., FR.S.C.**  
Ph.D. (1956) Dept. of Biochemistry, U. of T. Post doctoral fellow with Hans Neurath in Seattle and at the

M.R.C. Laboratory for Research in Cell Metabolism at the University of Oxford with Hans Krebs and Hans Kornberg. Returned to a position in Toronto at Connaught Laboratories. Moved to the University of British Columbia (1963). Received the Ayerst Award and the Steacie Prize in 1966. Elected to the Royal Society of Canada in 1970 and received its Flavelle Medal in 1980. Professor and Head of the Biochemistry Group at the University of Sussex, UK (1972-74), and from 1974-91 he was at the University of Calgary. Elected to the Royal Society of London in 1978. President of the Canadian Biochemical Society (1982-83). One of his first graduate students in Toronto was Harry Schachter.

#### **1961-1998**

##### **Robert Kincaid Murray\* (1932- )**

M.B., Ch.B. (1956) University of Glasgow; interned at London, Ont. M.S. (1958) in Physiology at University of Michigan. Ph.D. (1961) Dept. of Biochemistry, U. of T. In 1965-68 he was on leave at the McArdle Laboratory for Cancer Research at the University of Wisconsin. He began teaching biochemistry to first year medical students in 1961 and from 1975 to 1998 he was the Course Co-ordinator for the Biochemistry Course for medical students. He was the recipient of 5 teaching awards in the Faculty of Medicine, including the E. Mary Hollington Award of the Medical Alumni in 1987 and 1998, an Aikins Award in 1994, and the Harry Whittaker Memorial Teaching Award in 1998. Co-author of the 21<sup>st</sup> to 27<sup>th</sup> editions of Harper's Biochemistry (1988-2006) and co-author of PDQ Biochemistry (2001). His graduate students included Ganesa Yogeeswaran, Subroto Chatterjee, Denis Bailey, Monique Behar-Bannelier, Mark Levine, Virginia Chow, Harigesan Sambasivam, and Mohammad Rassouli-Rashti.

Prof. Emeritus.

#### **1961-1993**

##### **George Ronald Williams (1928- ) F.R.S.C.**

B.Sc. (1949), Ph.D. (1951) and D.Sc. (1969) University of Liverpool. He came to the BBDMR in Toronto

in 1952-53 and then spent two years with Britton Chance at the University of Pennsylvania. After a year (1955-56) at the University of Oxford, he returned to the BBDMR in 1956 and in 1961 he transferred to the Dept. of Biochemistry. He was chairman of the Department (1970-77) and then spent a year at the Lamont Geological Observatory, Columbia University. Chairman of Life Sciences Division, Scarborough College (1978-84), Principal of Scarborough College (1984-89). He was elected a Fellow of the Royal Society of Canada in 1978. President of the Canadian Biochemical Society (1971-72). Chair of the Canadian Federation of Biological Societies (1974-75). His graduate students included Kenneth Davis, Shelagh Ferguson, Mary K. Hartman, Gloria Perry, Kirsten Skov, Hugh Lawford, Michael Asselin and Allison McGeer. Post doctoral fellows in his laboratory were Jack Kornblatt, Frances McElroy, Marlene Phillips, Brian Robinson and Italo Zamudio.

Prof. Emeritus.

#### **1996-1996**

##### **Rashid A. Anwar (1930- )**

B.Sc. (1951), M.Sc. (1952) at Punjab University, Pakistan. Ph.D. (1957) Michigan State University. Instructor, Dept. of Chemistry, Michigan State (1957-60). Post doctoral fellow in Division of Applied Biology, National Research Council of Canada (1960-62). Associate Editor of the Canadian Journal of Biochemistry and Cell Biology (1985-92). His graduate students included Kapugama Gunetilleke, Norman Davis, Akio Taku, Gerhard Gerber, Ronald Zemell, Stephen Krawetz, Kaliannan Raju and Advaitanand Manohar.

Prof. Emeritus.

#### **1964-1989**

##### **Theo Hofmann (1924- )**

Diploma, Chemistry (1947) Swiss Federal Inst. of Technology. Dr. Sc. Tech. (1950) Pharmacy, Zurich. Research Assoc., Biochemistry, Univ. of Aberdeen

(1950-52). Scientific Officer, Hannah Dairy Research Inst., Ayr, UK (1952-56). Lecturer, Biochemistry, Univ. of Sheffield (1956-64). On leave, (1962-63) Biochemistry, University of Washington. Cross-appointed to the Department of Chemistry, U. of T. (1969-89). President, Biochemical and Biophysical Society of Toronto (1967-68). Associate Editor, Canadian Journal of Biochemistry (1969-71). Member of MRC Biochemistry Grants Committee (1970-74). Member and treasurer of the Council of the Toronto Faculty Association (1973-77). Chair, search committee for NSERC Professor in Crystallography (1989-91). Member, Research Programme Management Board, Connaught Laboratories (1989-94). Among his graduate students were Joan Dixon (Parkes), Alexander Kurosky, Geoffrey Mains, Jaro Sodek, Safia Wasi, Letitia Rao, Peter Dalziel and Joseph O'Neil.

Continued research as Prof. Emeritus after retirement.

#### **1964-1999**

**Harry Schachter\* (1933- ) F.R.S.C.**

B.A. (1955) in P. & B. at U. of T. M.D. (1959) U. of T. and recipient of the Cody Medal. Ph.D. (1964) U. of T. with the award of the Starr Medal of the University of Toronto Graduate School. On leave at the Dept. of Biology, John Hopkins University, Baltimore (1966-68). In 1976, he transferred to The Hospital for Sick Children, becoming Head of the Division of Biochemistry Research, Department of Biochemistry, until 1989. Chair of the Dept. of Biochemistry, U. of T. (1984-89). Boehringer-Mannheim Prize of the Canadian Biochemistry Society (1985). Visiting Professor, Donders Chair, University of Utrecht, the Netherlands (1989).

In 1991-93 he was President of the International Glycoconjugate Organization and in 1994 became the Chief Editor of the Glycoconjugate Journal. President of the Canadian Society of Biochemistry, Molecular & Cellular Biology (1993-94). He was elected as a Fellow of the Royal Society of Canada in 1995. Visiting Professor,

Universitat der Bodenkultur, Vienna, Austria (1989-92) where he was awarded an honorary Doctorate in 1998. He served on the committees of numerous research societies and on the editorial boards of several journals. He received the Karl Meyer Award of the Society for Glycobiology in 1998 and was elected to the Society of Scholars of Johns Hopkins University in 2000. Among his graduate students were George Lawford, Raymond Yuen, Roger Hudgin, Ngozi Nwokoro, John Munro, David Williams, Inka Brockhausen, Stephen Allen and Eric Hull.

Upon retirement, he continued research as Prof. Emeritus.

#### **1965-1996**

**William Thompson (1933-2004)**

B.Sc. (1955) Univ. of Glasgow. Ph.D. (1960) Univ. of Western Ontario. Post doctoral training in Cambridge (1960-63). Two years at BBDMR before transferring to the Dept. of Biochemistry in 1965. Associate Dean, Division IV of the School of Graduate Studies (1975-78). Acting Chair of the Department of Biochemistry (1989-91). Among his graduate students were Kevin Keough, Joel Parkes and Roy Baker.

Prof. Emeritus.

#### **1965-2003**

**Jeffrey Tse-Fei Wong\* (1937- )**

B.A. (1959) P.& B., U. of T. Ph.D. (1962) Biochemistry, U. of T.

On leave 1990-93 at the Technical University of Hong Kong, and remained there. His graduate students included Patricia Bronskill, Ross Nazar, Patria Gurr, Louis Lau, Alexander Milne, William Mak, Michael Tam and Louise Love.

#### **1965-1967**

**W.A. Green**

Resigned to join the Fisheries Research Board in Halifax.

### 1965-1997

Arnis Kuksis (1927- ) F.R.S.C., D.Sc.

B.Sc. (1951), M.Sc. (1953) in Agronomy at Iowa State College. Ph.D. (1956) in Biochemistry at Queen's University. Post doctoral fellow at Royal Military College, Kingston (1956-58). Research Associate and then Assistant Professor at Queen's University (1958-65). Joined the University of Toronto professorial staff in 1965. Career Investigator, Medical Research Council of Canada (1960-97). Visiting Professorships at the Japanese Society for the Promotion of Science, Kansai Medical University, Osaka in 1981 and at the Université de Bourgogne, ENSBANA, Dijon, France in 1992. Editorial positions on numerous scholarly journals. Author of more than 300 articles in refereed journals and 7 books. He became a Fellow of the Royal Society of Canada in 1988 and was awarded an honorary doctorate at the University of Turku, Finland, in 2000. Among his graduate students were Carl Breckenridge, Bruce Holub, Douglas Gornall, Mandapanda Subbiah, Patrick O'Doherty, Peter Child, Philip Connelly, Fortunato Manganaro, Steven Pind, Lu-Ying Yang and Richard Lehner.

Cross appointed, BBDMR. Prof. Emeritus.

### 1966-1985

Ernest R.M. Kay

B.A. (1947) and M.A. (1949) at McMaster University. Ph.D. (1953) University of Rochester. Appointments at the University of Glasgow (1953-55), Acadia University (1955-56), Rockefeller Institute for Medical Research (1956), Dalhousie University (1956-58), University of Rochester (1959-66). In 1980, his research paper on the preparation of sodium desoxyribonucleate (published in 1952 with N.S. Simmons and A.L. Dounce) was recognized as a "Citation Classic" by ISI and cited in Current Contents.

Early retirement.

### 1966-1997

David O. Tinker\* (1940- )

B.A. (1961) P.& B., U. of T. Ph.D. (1965) Univ. of Washington, Seattle. University of London, U.K. School of Pharmacy (1965-66). Visiting Scientist, Division of Computer Research, Physical Sciences Laboratory, NIH (1976-77). Associate Editor, Canadian Journal of Biochemistry (1974-82). Chairman, Sub-Committee on Computer-Assisted Instruction (1986). Member of Academic Board, U. of T. Governing Council (1988). Upon early retirement he became the editor for five years of the Bulletin of the Canadian Society of Biochemistry and Molecular & Cellular Biology. His graduate students included David Purdon and Richard Bozzato.

Prof. Emeritus.

### 1966-1993

K. Gray Scrimgeour (1934- )

B.A. (1956) and M.Sc. (1957) University of British Columbia. Ph.D. (1961) University of Washington. Scripps Clinic & Research Foundation in La Jolla (1962-67). Author of "*The Chemistry and Control of Enzyme Reactions*" (1977, Academic Press) and co-author of "*Biochemistry*" 2<sup>nd</sup> ed. (1994, Neil Patterson Publishers, Prentice-Hall. Editor of *Biochemistry and Cell Biology* (1984-93). His graduate students included Michael Archer, Tai-Wing Wu, Surinder Cheema, Mutsufumi Kawai and Philip Vickers.

Early retirement. Prof. Emeritus.

### 1966-1975

John Bryan Jones F.R.S.C., F.C.I.C.

Ph.D. Univ. College, Cardiff, D.Phil. Oxford. Fellow of the Royal Society of Canada (1985) and of the Chemical Institute of Canada.

Cross appointed, Chemistry. University Prof. Emeritus.

### 1966-1969

Andrew Sass-Kortsak (1916-1986)

Cross appointed, Paediatrics and Pathology.

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**1966-1969**

John Alexander Lowden

Status only, Hospital for Sick Children.

**1966-1971**

R.C. Burgess

Cross appointed, Dentistry.

**1967-1993**

Marian Campbell Aitchison Packham\* (1927- )

FR.S.C., D.Sc.

B.A. (1949) P. & B., Ph.D. (1954) Biochemistry, U. of T. Acting Chair of Department (1983). Senior Fellow and then Lecturer, Department of Biochemistry, U. of T. (1955-63). Research Associate, Dept. of Physiological Sciences, Ontario Veterinary College, Guelph (1963-65) and the Blood and Vascular Research Unit, U. of T. (1965-66). Lecturer, Dept. of Biochemistry, U. of T. (1966). Visiting Professor (part time) Department of Pathology, McMaster University (1967-2002). In 1982, designated by ISI as one of the 27 most cited women scientists and one of the 1000 most cited scientists between 1965 and 1978. A 1970 review article with J.F. Mustard became a Citation Classic in Current Contents in 1984. Co-recipient of the J. Allyn Taylor International Award in Medicine (1988). University Professor (1989). Fellow of the Royal Society of Canada (1991). D.Sc. Ryerson University (1997). Member of grants committees of MRC, Heart and Stroke Foundation, NIH and Canadian Red Cross. Member of editorial boards of several journals. Her graduate students included Maria Guccione, John Greenberg, Margaret Rand and Stephen Lam. Continued teaching and research until 1998 and then wrote the History of the Department of Biochemistry at U. of T. University Professor Emeritus.

**1967-2002**

Bibudhendra (Amu) Sarkar (1937- ) F.C.I.C.

B. Pharm. (1956) and M. Pharm. (1957) Banares University. Ph. D. (1964) University of Southern California, Los Angeles. Joined The Research Institute,

The Hospital for Sick Children in 1964 and remained there, retiring as Senior Scientist. He was the Head of Biochemistry Research, in the Research Institute of the hospital from 1990-97, Head of Structural Biology and Biochemistry at the hospital in 1998-02, and Director of the Advanced Protein Technology Centre there in 1999-02. In 1977 he received the Nuffield Foundation Award (U.K.). In 1986 he was elected a Fellow of the Chemical Institute of Canada. His many honours included Visiting Professorships at the Institute de Biologie Physico-Chimique, Université de Paris, France (1976), the Université Paris-Nord, France (1984), the University of Manitoba (1996), the University of Delhi, India (1998), Fudan University, Shanghai, China (1999), and the University of Ioannina, Greece (2000). In 2003 he received the Citizen of the Year Award from the Research Institute of the Hospital for Sick Children, in 2005 the R.C. Mehrotra Award in New Delhi, India and in 2006, the Priyadarajan Ray Memorial Award of the Indian Chemical Society. Editor of five books on metals and metal-related diseases, and author of approximately 200 scientific publications. His discovery of the drug treatment of Menkes disease, a fatal neurodegenerative disease of genetic origin, is saving children around the world. In 1998, Prof. Sarkar's research expertise in metal-related diseases received national attention when he was featured on a Discovery Channel's program about the health crisis in Bangladesh and India caused by arsenic in ground water. His graduate students included David Appleton, Helen Lakusta, Paul Predki, Catherine Harford and Michael DiDonato .

Status only, The Hospital for Sick Children. Prof. Emeritus.

**1967-1968**

P. Sastry

Cross appointed, Psychiatry.

**1967-1969**

I.A. Menon

Status only.

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**1968-1969**

V.K. Murthy

Status only.

**1968-1998**

Robert Hilton Painter (1932- ) FRSC (U.K.), CChem (U.K.)

B.Sc. (1953) and Ph.D. (1956) in Biochemistry, Univ. of Liverpool, UK. Biochemist, Lister Institute, London, U.K. 1956-57. Research Associate with Connaught Medical Research Laboratories, U. of T. (1957-68). In 1968, he was appointed jointly in the Dept. of Biochemistry and the Division of Teaching Laboratories, Faculty of Medicine at U. of T. He was a founding member of the Institute of Immunology and cross-appointed to the Department of Immunology in 1972. He was Assistant Dean, SGS 1975-79 and Acting Dean in 1978. In 1979 he chaired the General Planning Committee of the XIth International Congress of Biochemistry in Toronto. In 1980 he was an MRC-INSERM Exchange Scientist at Centre D'Etudes Nucleaire, Grenoble, France. Associate Editor, Canadian Journal of Biochemistry (1982-86). In 1983 he (and his wife, Dorothy, a Senior Tutor in the Department of Biochemistry) taught at the Sichuan Medical College, Chengdu, West China Medical University. Chairman (1985-92) of the Research and Development Advisory Subcommittee of the Canadian Blood Transfusion Service. President of the Clinical Research Society of Toronto (1985-86). Member of many scientific advisory committees in Canada and the U.S., and of academic committees at U. of T. Provost and Vice Chancellor of University of Trinity College (1986-96). In 1991 he became a Member of the Order of the Red Cross and in 1993 he was awarded a Commemorative Medal for the 125<sup>th</sup> Anniversary of Canadian Confederation by the Governor General. He was recognized by MRC on its 40<sup>th</sup> anniversary for "32 years of continuous support by MRC". His graduate students included Joe Odura Minta, Dilruba Yasmeen, Seth Assimeh, David Isenman, Fraser Wright, and Frieda Chen. His

post-doctoral students were T.Y. Koh, V. Dininno, S. Spycher, B. Taylor, and Shirley Furesz.

Prof. Emeritus.

**1968-1992**

Irving B. Fritz (1928-1996) F.R.S.C.

D.D.S. (1948) Medical College of Virginia. Ph.D. (1951) Physiology, University of Chicago. Post doctoral fellow at University of Copenhagen (1953-55). Michael Reese Hospital, Chicago (1955-56). University of Michigan (1956-68). Came to U. of T. in 1968 to be chair of BDDMR for 10 years. Gairdner Award (1980). University Professor (1984). His graduate students included Martial Lacroix and Orst Blaschuk. Early retirement to the Cambridge UK area, working at the AFRC Laboratories in Babraham as a Visiting Senior Research Fellow.

Cross appointed, BDDMR.

**1968-1998**

Byron G. Lane\* (1933- )

B.Sc. (1956) P&B and Ph.D. (1959) Biochemistry, U. of T. Post doctoral studies at the University of California Medical Center, San Francisco, and the Rockefeller University. On the professorial staff of the Dept. of Biochemistry, Univ. of Alberta (1961-1968). Recipient of an Ayerst Award of the Canadian Biochemical Society (1971). His graduate students included Ahmed Azad, Tai Chiu, and Raymond Lau.

Prof. Emeritus.

**1969-1995**

Mario Anthony Moscarello\* (1929- )

B.A. (1951), M.D. (1955), Ph.D. (1962) U. of T. At the Ontario Cancer Institute 1961-63. Investigator, Assistant Scientist, and then Senior Scientist at The Research Institute, The Hospital for Sick Children 1964-95. Head of the Biochemistry Department, The Hospital for Sick Children 1989-92. His research interests that were centred on myelin basic protein have resulted in more than 270 publications. Among his graduate students were Jean Gagnon, Michel Pâquet,

Sela Cheiferz, Ileana Kahan, Christine Tilley, Thomas Tompkins, Nigel Girgrah and Chris Boulias.

Status only, The Hospital for Sick Children. Prof. Emeritus.

#### **1969-2004**

**Norman Camerman (1939- )**

B.Sc. (1961) and Ph.D. (1964) Univ. British Columbia. Post doctoral fellow at the Royal Institute of Great Britain, London (1964-66). Recipient of a W.T. Aikins Award (1998). Member of the Academic Board, University of Toronto (2001-2004). Prof. Emeritus.

#### **1969-1975**

**Murray H. Freedman\***

Ph. D. (1964) Biochemistry, U. of T.  
Cross appointed, Pharmacy.

#### **1969-1970**

**J. Bunting**

Cross appointed, Chemistry.

#### **1970-1989**

**Keith John Dorrington (1939-2002)**

B.Sc. (1961), Ph.D. (1964) in Biochemical Pharmacology at the University of Sheffield, UK. Work at Duke Univ., Sheffield and MRC Molecular Pharmacology Unit at Cambridge before joining the faculty at the University of Toronto. Ayerst Award (1977). Chair of Department (1977-82). In 1976 he was appointed Vice Provost for Health Sciences, and in 1978 became Associate Dean, Basic Sciences of the Faculty of Medicine. His graduate students included James Ellerson, Peggy Minter, Susan Loube, James Down and Paul Hamel.

He left the university in 1982 to become Vice President, Research and Technology and Director of the Research Institute at Connaught Laboratories, but maintained his research laboratory at U. of T. until 1989 when he became Managing Director of the

Wellcome Biotechnology Division in London, UK. In 1996 he was with MDS Health Ventures and on the board of the Canadian Medical Discoveries Fund.

#### **1972-2001**

**Anders Bennick\* (1935- )**

Cand. Odont. Copenhagen, Denmark (1959), Diploma in Periodontics (1964), M.Sc.D. (1965) and Ph.D. (1970) U. of T. Post doctoral studies at University of Oxford, Department of Biochemistry (1970-72). Joint appointment in the Department of Biochemistry and the Faculty of Dentistry. Chairman, Graduate Department of Dentistry and Director of Postgraduate Dental Education (1984-1989). Active on the editorial boards of the Journal of Periodontal Research (1972-80), and the Journal of Dental Research (1980 and 1994-99). Member of grants committees of MRC (1975-79, 1981-84, and 1994-95) and numerous NIH grants review panels (1984-01). Spitton Award ("Salivary researcher of the year") from the Salivary Research Group of the International Association for Dental Research (1985). Visiting Professor, University of Sao Paulo, Brazil in 1988 and the Catholic University of Rome, Italy in 2007. President of the Clinical Research Society of Toronto (1989). Visiting Scientist Award, MRC (1990). Recipient of a Distinguished Scientist Award from the International Association of Dental Research (2003). Prof. Emeritus.

#### **1973-1984**

**Ladislav (Les) Pinteric**

Joined the Dept. in 1966 as a Research Associate in electron microscopy.

#### **1974-**

**Jaroslav Sodek\* ( -2007)**

B.Sc. (1964) University of Sheffield. Ph.D. (1970) Biochemistry, U. of T. Post doctoral studies University of Alberta (1970-73). Member of MRC Group in Periodontal Physiology (1973) and a principal investigator in the CIHR Group in Matrix Dynamics (2000).

In 1989 he received an Award for Basic Research in Periodontal Disease from the International Association for Dental Research. His graduate students included Hardy Limback and Jeffrey Wrana.

Cross appointed, Dentistry.

#### **1974-1975**

**Francis Rolleston**

Cross appointed, Physiology. Went to the Medical Research Council.

#### **1974-**

**Peter Noel Lewis (1946- )**

B.Sc. (1968) Univ. of Calgary. Ph.D. (1972) Cornell. Post doctoral fellow Portsmouth Polytechnic (1972-74). Chair of Department (1991-96), (1997-01). Director of the Program in Proteomics and Bioinformatics (1998-2003). President of the Canadian Society of Biochemistry, Molecular & Cellular Biology (1999-00). Vice Dean, Research and International Relations, in the Faculty of Medicine (2002- ). Among his graduate students were Dae Chung, Guy Guillemette, Liliana Attisano and Angus McQuibban.

#### **1974-2002**

**Hugh G. Lawford\* (1945- )**

B.Sc. (1967) P.&B. (1967) and Ph.D. (1971) Biochemistry, U. of T. Post doctoral studies at the University of Dundee (1971-73). Founded BIOSYSTech Consulting, Inc. and Fermtech R&D, Inc. in 1983. Holder of a number of U.S. patents for ethanol production.

Early retirement.

#### **1974-**

**James W. Gurd**

B.A. (1964) Mount Allison University. Ph.D. (1969) McGill. National Institute for Medical Research, Mill Hill (1969-72). Indiana University (1972-74). Chair, Division of Life Sciences, Scarborough Campus (1989-94).

Scarborough College.

#### **1974-2003**

**Janet F. Forstner\* (1936- ) LL.D.**

B.A. (1958) U. of T. M.D. (1962) Univ. of British Columbia. Resident, Pediatrics, University of Illinois, Research and Education Hospital (1963-64), Research Fellow, Biochemistry, Boston University (1964-66). Ph.D. (1971) Biochemistry, U. of T. Research Associate and Associate, Department of Medicine, Toronto Western Hospital (1971-73). Assistant and then Associate Professor, Medicine (1973-83), and Scientist to Professor, Biochemistry, The Research Institute, The Hospital for Sick Children (1974-03). Member of numerous Institute, University, National and International committees and a frequent invited lecturer. Volunteer Service Award, Canadian Cystic Fibrosis Foundation (1990). Government of Canada 125<sup>th</sup> Anniversary of Canadian Federation Commemorative Medal awarded by the Governor General to individuals for their "significant contributions to Canada, to their community or to their fellow Canadians" (1993). Honorary Doctor of Laws, Wilfred Laurier University (1994).

Status only, The Hospital for Sick Children.

Professor Emeritus.

#### **1975-**

**Brian H. Robinson (1944- )**

B.Sc. (1965) and Ph.D. (1968) University of Bristol. Post doctoral studies at University of Toronto (1968-70) and University of Sheffield (1970-73). Canada Research Chair, Tier I (2000), renewed (2007).

Status only, The Hospital for Sick Children.

#### **1975-2001**

**Juta K. Reed (1942-)**

B.A. (1966) Queen's University. M.Sc. (1967) University of Western Ontario. Ph.D. (1972) Wisconsin. Post doctoral studies at California Institute of Technology (1973-75).

Cross appointed, Chemistry at Erindale (Mississauga) Campus.

Early retirement.

**1975-**

John W. Callahan

B.Sc. (1965) and M.Sc. (1966), University of Windsor.  
Ph.D. (1970) McGill. Post doctoral studies at University  
of California, Los Angeles (1970-72).

Cross appointed, The Hospital for Sick Children.

**1976-**

Charles M. Deber (1942- ) F.R.S.C.

B.Sc. (1962) Polytechnic Institute of Brooklyn. Ph.D.  
(1967) M.I.T. Post-doctoral fellow and Research  
Associate, Harvard University (1968-74). Research  
Associate, Enzyme Institute, Univ. of Wisconsin  
(1975). In 1976 he joined the Research Institute of  
The Hospital for Sick Children and the professorial  
staff of the Department of Biochemistry. Professor of  
Biochemistry and Senior Scientist, Research Institute,  
Division of Molecular Structure & Function, The  
Hospital for Sick Children (1985- ). President of the  
American Peptide Society (1991-93). Recipient of W.T.  
Aikins Award (1996) for outstanding teaching and the  
American Peptide Society Vincent du-Vigaud Award  
for career-long excellence (2000). Elected a Fellow of  
the Royal Society of Canada in 2001.

Status only, The Hospital for Sick Children.

**1976-1982**

Edward H. Eylar

Playfair Neurosciences.

**1976-1988**

Emmanuel H. Farber F.R.S.C.

M.D. (1942) U. of T. Ph.D. (1949) University of  
California. Tulane University (1950-61). University of  
Pittsburgh (1961-70). Temple University (1970-75).  
Elected Fellow of the Royal Society of Canada (1980).  
Left to join the Dept. of Pathology, Anatomy and Cell  
Biology at Jefferson Medical College, Philadelphia  
and later moved to the University of South Carolina,  
Columbia, SC.

Cross appointed, Pathology.

**1976-1983**

Glenville Jones

Status only, Hospital for Sick Children. Moved to  
Queen's Univ., Depts. of Medicine and Biochemistry.

**1976-**

Frederick W. Keeley (1944- )

B.Sc. (1965) and Ph.D. (1970) University of Manitoba.  
Agricultural Research Council, Bristol (1970-72).

In 2003, the Heart and Stroke Foundation of Ontario  
Robert M. Freedom Chair in Cardiovascular Sciences at  
The Hospital for Sick Children.

Status only, The Hospital for Sick Children.

**1976-**

Chi-Hung Siu

B.A. (1969) International Christian University, Tokyo.  
Ph.D. (1974) Chicago. Scripps Research Institute, La  
Jolla (1974-76). Playfair Neurosciences.

Cross appointed BBDMR (1977).

**1976-**

C. James Ingles\*

B.Sc. (1964) U. of T. Ph.D. (1968) Univ. of British  
Columbia. Beatson Institute for Cancer Research, UK  
(1968-69). Univ. of California at San Francisco (1970-71).  
Cross appointed, BBDMR.

**1977-**

Robert Roy Baker\*

B.Sc. (1969) P. & B. and Ph.D. (1973) Biochemistry,  
U. of T.

Max Planck Institute for Biophysical Chemistry (Gottingen)  
(1973-75). Montreal Neurological Institute (McGill  
University) (1976). Cross appointed to Biochemistry from  
the Department of Medicine until 1998 when he transferred  
to Biochemistry. W.T. Aikins Award (1998). Staff Advisor  
Award, Golden Key International Honour Society (2000).  
Teaching Award (PBL), Fitzgerald Academy, Preclerckship  
(2002). Harry Whitaker Memorial Outstanding Teaching  
Award (2003).

**1977-**

Alexander Marks

M.D. (1962) Toronto. Ph.D. (1969) McGill. Institut de Biologie Moleculaire, Paris (1969). College de France, Paris (1978).

Cross appointed, BBDMR.

**1977-**

David E. Pulleyblank (1948- )

B.Sc. (1970) Univ. of British Columbia. Ph.D. (1974) Univ. of Alberta. California Institute of Technology (1974-76).

**1977-**

David Elliot Isenman\* (1949- )

B.Sc. (1972) Biochemistry and Ph.D. (1976) U. of T. Post doctoral fellow, Weizmann Institute of Science, Rhovot, Israel (1977) and Research Institute of Scripps Clinic, La Jolla, California (1978). Medical Research Council of Canada Scholarship (1979-84). Cross appointed to Dept. of Immunology (1983). Graduate Coordinator of the Department of Biochemistry (1991-93). Aikins Award for Course Development and Coordination (1996). Acting Chair (2002). Award for Excellence in Undergraduate Teaching in Life Sciences in the category of Undergraduate Laboratory Teaching (2006) in recognition of coordination of BCH 471Y for many years.

**1978-1980**

Trudy C. McNabb (1950- )

**1978-**

Laurence A. Moran (1946- )

B.Sc. (1968) Carleton University. Ph.D. (1974) Princeton. Post doctoral work in the Dept. of Molecular Biology, University of Geneva (1974-78). Co-author with Prof. K.G. Scrimgeour of the textbook *Biochemistry* (2<sup>nd</sup> edition 1994). Co-author *Principles of Biochemistry* (Horton et al.) now in its 4<sup>th</sup> edition. Author of one of the leading science blogs. (sandwalk.blogspot.com).

**1979-1995**

John R. Riordan\* (1943-) O.C.

B.Sc. (1966) and Ph.D. (1970) at U. of T. Max-Planck Institute for Biophysics, Frankfurt (1970-72). In 1989 he was one of the leaders at The Hospital for Sick Children of the group that isolated and sequenced the cystic fibrosis gene. In 1990 he was a recipient of a Gairdner Award. Boehringer-Mannheim Award winner (1991). Fourth Doris T. Tulcin Cystic Fibrosis Research Award (1991). He was appointed an Officer of the Order of Canada in 1991. He left Toronto to take up a research position at a Mayo Clinic in Arizona.

Status only, The Hospital for Sick Children.

**1979-1989**

Elizabeth Joyce Harfenist (1924- )

B.A. (1946) Chemistry at U. of T., Ph.D. (1949) University of Illinois. Dept. of Biochemistry, Rockefeller University (1961-70), Dept. of Biochemistry, Mount Sinai School of Medicine, NY (1970-72), Dept. of Medicine, Columbia University (1972-76). Research Associate of Heart and Stroke Foundation of Ontario (1976-88).

Early retirement.

**1980-1994**

Donald S. Layne (1931- ) FR.S.C.

B.Sc. (Agr.), M.Sc., Ph.D. Elected Fellow of the Royal Society of Canada (1975).

Status only. Director, Medical Research, Toronto General Hospital.

**1980-1988**

Jen-Chang (Carleton) Hsia (1938- )

B.Sc. (1962) National Taiwan University. Ph.D. (1968) Dept. of Biochemistry and Biophysics, Univ. of Hawaii.

Status only, Defence Research Board DCIEM.

**1980-**

David H. MacLennan (1937- ) O.C., F.R.S.C., F.R.S., D.Sc.

B.S.A. (1959) Univ. of Manitoba. M.S. and Ph.D. (1963) Purdue University. Post doctoral work and Assistant Professorship at the Institute for Enzyme Research at the University of Wisconsin (1962-68). Recipient of an Ayerst Award (1974) and a Gairdner Foundation International Award (1991). Fellow of the Royal Society of Canada (1985) and of the Royal Society of London U.K. (1994). J.W. Biles Professor of Medical Research (1987). University Professor (1993). In 1997 he received the Izaak Walton Killam Memorial Prize for Health Sciences; in 1998, the Dr. Jonas Salk Award of the Ontario March of Dimes; and in 2000, the Royal Society Glaxo-Wellcome Prize and Gold Medal for original contributions to medical and veterinary sciences. In 2001 he received a D.Sc. from the University of Manitoba; was elected a Foreign Associate of the National Academy of Sciences USA; and was appointed an Officer of the Order of Canada. In 2002, a symposium on "Molecular Dissection of Membrane Function and Dysfunction" was held in his honour at the University of Toronto. In 2004, he was appointed an Honorary Member of the Japanese Biochemical Society.

Primary appointment, BBDMR; cross appointment to Biochemistry.

**1980-**

Jacqueline M. Segall (1952- )

B.Sc. (1972) McGill University. Ph.D. (1977) Harvard University. Post doctoral studies at Washington University, St. Louis (1977-80). MRC (Canada) Scholar (1982-87). Graduate Coordinator of the Department of Biochemistry 1999-01. Jointly appointed with the Department of Molecular Genetics.

**1980-1987**

Clement Yeung

B.Sc. (1971) University of Wisconsin. M.Sc. (1972)

Univ. of California, San Francisco. Ph.D. (1976) Univ. of California, Berkeley.

Playfair Neurosciences. Left to enter medical school.

**1984-**

Sergio Grinstein (1950- ) F.R.S.C.

B.Sc. (1971) Biology (1971), Ph.D. (1976) Physiology and Biophysics at the Center for Research and Advanced Studies of the National Polytechnical Institute, Mexico. Post doctoral work with Ascr Rothstein at The Hospital for Sick Children in Toronto and work at the Federal Institute of Technology in Zurich. Returned to the hospital in 1979 with an appointment in Medical Biophysics, later changed to the Department of Biochemistry. Recipient of the Merck-Frosst Award of CSBMCB (1987). He became a Howard Hughes Medical Institute International Research Scholar in 1991, renewed in 1997, and was recognized as a MRC Distinguished Scientist (1997). In 1998 he became the holder of the Inaugural Pitblado Chair in Cell Biology. In 2000 he was elected a Fellow of the Royal Society of Canada, in 2001 he received the Malcolm Brown Award of the Canadian Society for Clinical Investigation, in 2002 the McLaughlin Medal of the Royal Society of Canada, and in 2004 the Michael Smith Prize in Health Research.

Status only, The Hospital for Sick Children.

**1984-**

Amira Klip F.R.S.C.

M.Sc. (1974) and Ph.D. (1976) Polytechnical Institute, Mexico City. Post doctoral studies at BBDMR (1976-78) and at Eidgenosische Technische Hochschule in Zurich (1978-79). Recipient of the Young Scientist Award of the Canadian Diabetes Society (1990); the CSBMCB Merck-Frosst Award (1992); the Canadian Biochemical Society Pharmacia Award (1992); CSBMCB Jeanne Manery Fisher Memorial Lectureship (2000); Fellow of the Royal Society of Canada (2000); the U. of T. Dales Award for Medical Research (2002); Canada Research Chair, Tier I, 2004; Berson Award,

American Physiological Society (2005). Editor-in-Chief, American Journal of Physiology, 2006.  
Status only, The Hospital for Sick Children.

#### **1984-1999**

**Choy L. Hew**

B.Sc. Nanyang University, Singapore (1963), M.Sc. Simon Fraser University (1966), Ph.D. (1970) University of British Columbia. Post doctoral studies (1970-72) Yale University and 1973-74 at U. of T. Memorial University (1974-83). Left Toronto to become Head of the Department of Biological Sciences at the National University of Singapore and Deputy Director of the Tropical Marine Research Institute.  
Cross appointed, Clinical Biochemistry.

#### **1984-1998**

**Michel Klein**

M.D. (1969) and Ph.D. (1969) University of Paris. Charge de Recherche INSERM, Univ. of Paris (1974-77). In 1989 he became Vice President for Biotechnology Research at the Connaught Laboratories and in 1993, Assistant Director Corporate Research Pasteur-Merieux-Connaught.  
Cross appointed, Immunology.

#### **1984-**

**Clifford A. Lingwood**

B.Sc. (1971) Univ. of Hull, U.K. Ph.D. (1975) University of London, U.K. Univ. of Washington (1975) Hutchinson Cancer Center, Seattle (1976-77).  
Cross appointed, Clinical Biochemistry.

#### **1984-**

**David Bruce Williams\* (1952- )**

B.Sc. (1973) Univ. of Manitoba. M.Sc. (1975) and Ph.D. (1981) U. of T. Post doctoral studies in the Dept. of Biological Chemistry at Johns Hopkins University (1981-84). Cross appointed to Dept. of Immunology (1994). Recipient of the CSBMCB Merck-Frosst Award (1994) and the U. of T. Dales Award in Medical Research (2001). Introduced and organized the FIBS

Faculty Research forum (1990-2005). Acting Chair of the Department (1996-97). Graduate Coordinator of the Department (2001-2005). Research area: Glycoprotein folding in the endoplasmic reticulum. Antigen presentation by MHC class I molecules. Discovered the calnexin chaperone system.

#### **1986-1987**

**Graeme Hunter**

Cross appointed, Pathology

#### **1986-**

**Margaret Lucille Rand\* (1954- )**

B.Sc. (1977) Chemistry and Biochemistry and Ph.D. (1982) Biochemistry U. of T. Post doctoral studies at the State University of Limburg, Maastricht, The Netherlands (1983-85) and Dept. of Pathology, McMaster University (1985-86). In 1996, transferred to the Division of Hematology/Oncology at The Research Institute of The Hospital for Sick Children. In 2001 she changed her primary appointment from Biochemistry to Laboratory Medicine and Pathobiology.  
Cross appointed, Department of Laboratory Medicine and Pathobiology.

#### **1986-1987**

**Marek Michalak**

Status only, Paediatrics.

#### **1986-**

**Reinhart Reithmeier (1950- )**

B.Sc. (1972) Carleton Univ., Ph.D. (1977) Univ. of British Columbia. Post doctoral studies at Harvard University (1976-78) and U. of T. (1978-80). Professorial staff at Univ. of Alberta (1980-86). Chair of the Department of Biochemistry at U. of T. (2002- ). Elected Fellow of St. Michael's College (2003). Recipient of the W.T. Aikins Faculty Teaching Award for Individual Teaching Performance (Large Group) in 2007.  
Originally, cross appointed, Medicine. Transferred to Biochemistry in 2002.

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**1987-2002**

Philip W. Connelly\*

B.A. (1975) St. Mary's College. Ph.D. (1983) Biochemistry, U. of T.

Post doctoral studies at Dalhousie Univ. (1983) and Univ. of Graz (1984).

Director, Core Laboratory, Lipid Research Clinic (1984-89), Director, J. Alick Little Lipid Research Laboratory (1989-).

Cross appointed, Medicine. St. Michael's Hospital.

**1989-1993**

P. Robert C. Harvey

B.Sc., M.D., Ph.D.

Cross appointed, Surgery

**1991-**

Emil F. Pai (1950- )

Dr. rer. nat. Heidelberg (1978). Max-Planck Institute for Medical Research, Heidelberg (1976-1982). University of California at Santa Barbara (1982/83). Max-Planck Institute for Medical Research, Heidelberg (1983-1991). Appointed to the NSERC University-Industry Chair in Protein Crystallography at the University of Toronto in 1991. Cross appointed to the Department of Medical Biophysics (1996). Head of the Division of Molecular and Structural Biology at the Ontario Cancer Institute (1996-2005). Premier's Research Excellence Award (1999). Canada Research Chair in Structural Biology, Tier I, 2002. President of the Canadian Institute for Synchrotron Radiation (2005).

Joint appointment with Molecular Genetics until 1996; then his primary appointment became biochemistry with cross appointments to the Departments of Molecular Genetics and Medical Biophysics.

**1991-1999**

Inka Brockhausen\*

B.Sc. (1980) and Ph.D. (1985) Biochemistry, U. of T.

Status only, The Hospital for Sick Children. Went to Queen's University.

**1991-**

James M. Rini\* (1958- )

B.Sc. (1981) Chemistry and Biochemistry, U. of T. and Ph.D. (1986) Medical Genetics/Medical Biophysics, U. of T. Post doctoral fellow, Research Institute of Scripps Clinic, La Jolla, CA, USA (1986-91). Appointed jointly with the Department of Molecular Genetics.

**1992-1994**

Carmay Lim

B.Sc. (1979) Chemistry, Royal Holloway College, London University

Ph.D. (1984) University of Minnesota. At AT&T Bell Laboratories 1984-86 and Harvard University 1986-90.

Cross appointed, Molecular Genetics. Went to the National Institute of Taiwan.

**1992-**

P. Lynne Howell

B.Sc. (1983) University of Leeds, U.K. Ph.D. (1986) London, UK. Massachusetts Institute of Technology (1986-89). Commissariat L'Energie Atomique, Paris, France (1989-1990). Institut Pasteur, Paris, France (1990-1991). CIHR Investigator Award (2001) and Canada Research Chair (2006). In 2003 she was appointed Head of the Program in Structural Biology and Biochemistry. With the reorganization of The Hospital for Sick Children's Research Institute in 2006, she was appointed Head of the Program in Molecular Structure and Function.

Status only, The Hospital for Sick Children.

**1992-**

Julie D. Forman-Kay (1963- )

B.Sc. Massachusetts Institute of Technology, Cambridge, MA (1985). Ph.D. (1990) Yale University, New Haven, CT. Laboratory of Chemical Physics, National Institutes of Health, Bethesda, MD (1988-92).

Status only, The Hospital for Sick Children.

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**1992-**

**Lewis E. Kay (1961- ) F.R.S.C.**

Ph.D. (1988) Yale. Laboratory of Chemical Physics, NIH (1988-92). Alfred P. Sloan Research Fellow in 1996. Recipient of CSBMCB Merck-Frosst Award (1996). In 1997 he was named a Howard Hughes International Research Scholar. Recipient of the U. of T. McLean Award for outstanding research (1998); Canada's top 40 under 40 Award (1998); National Steacie Award for outstanding research (1999); Premier's Research Excellence Award (1999); MRC Scientist Award (1999); Scholar in Residence, North York Correctional Facility (2000); Canada Research Chair, Tier I (2000, renewed 2007); the Flavelle Medal of the Royal Society of Canada (2002); the Founders Medal from the International Society of Magnetic Resonance; the Günther Prize for Innovative Contributions to NMR (2004); the Wilbur Cross Medal from Yale University's Graduate School Alumni Association (2006); and the University of Toronto Dales Award in basic health research (2006). Elected to the Royal Society of Canada (2006).

Appointed jointly with Molecular Genetics.

**1992-**

**David M. Clarke (1955- )**

B.Sc. in Biochemistry, Univ. of Windsor, M.Sc. McMaster University, Ph.D. (1984) Univ. of British Columbia. Post doctoral studies at UBC and with Prof. David MacLennan at BBDMR. Recipient of CSBMCB Merck-Frosst Award (1998). Canada Research Chair in Membrane Biology, Tier I (2002).

Cross appointed, Medicine.

**1992-1997**

**Jeremy Carver (1939- )**

Ph.D. (1966) Harvard University

Cross appointed, Molecular Genetics.

**1994-**

**Morris Manolson (1959- )**

Ph.D. (1988) McGill.

Status only The Hospital for Sick Children. Relocated to Dentistry in 1999.

**1994-1999**

**John Fraser Wright \* (1958- )**

Ph.D. (1989) Biochemistry, U. of T. Left to become Director of Development, Avigen (gene therapy).

Cross appointed, Medicine, at St. Michael's Hospital.

**1995-**

**Alan R. Davidson (1962- )**

Ph.D. Department of Molecular and Medical Genetics (1991) U. of T. Post doctoral fellow, Department of Biology, Massachusetts Institute of Technology (1991-95).

Appointed jointly with the Department of Molecular Genetics.

**1995-**

**William S. Trimble F.R.S.C.**

Ph.D. (1987) U. of T. Primary, status-only appointee in Physiology (1990-95), changed to Biochemistry in 1995, maintaining Physiology as a cross-appointment. CIHR Scientist (2000). Canada Research Chair (2005). Fellow of the Royal Society of Canada (2006).

**1995-**

**Daniela Rotin**

Ph.D. (1988) U. of T. MRC Scholarship (1993); CIHR Investigator (1999); Premier's Research Excellence Award (1999); Canadian Foundation for Innovation Award (2002); Canada Research Chair, Tier I, (2004). Senior Scientist, Program in Cell Biology.

Cross appointed, Paediatrics, The Hospital for Sick Children.

**1997-**

**Christopher W.V. Hogue (1965- )**

Ph.D. (1994) Univ. of Ottawa. Globe and Mail's top 40 under 40 list (2002). As Head of the Blueprint Research Program, in 2003 received Genome Canada's \$39 million in government and private funding to enter 80,000 molecular interaction records into the Biomolecular Interaction Network Database. Moved to the National University of Singapore (2007).

Status only, Samuel Lunenfeld Research Institute.

**1998-**

**Hue Sun Chan**

Ph.D. (1987) Univ. of California at Berkeley. Premier's Research Excellence Award (2000), Canada Research Chair, Tier II, (2000 and 2005).

**1998-**

**Christopher Yip**

Ph.D. (1996) Univ. of Minnesota. Canada Research Chair, Tier II, (2000 and 2005), Premier's Research Excellence Award (2000).

Cross appointed, Institute for Biomedical Engineering.

**1998-**

**John R. Glover**

M.Sc. (1987) Department of Botany, University of Guelph, Ph.D. (1994) McMaster University. Post doctoral appointment (1994-98) Howard Hughes Medical Institute and Department of Molecular Genetics and Cell Biology, University of Chicago. MRC (Canada) (CIHR) Scholarship 1999-04. Human Frontier Science Program 10<sup>th</sup> Anniversary Award (1999), Premier's Research Excellence Award (2000).

**1999-**

**Craig A. Smibert (1963- )**

Ph.D. Biology (1994) McMaster University. Post doctoral fellow, Biological Sciences, Stanford University, Stanford, CA, USA (1994-99). MRC (Canada) Research Scholarship (2000-05). Premier's Research Excellence

Award (2001-06). Excellence in Arts and Science Undergraduate Teaching Award (2007).

**1999-**

**Grant W. Brown**

B.Sc. Honours Biochemistry (1987) University of British Columbia, Ph.D. Molecular Biology (1993) Univ. of California, Los Angeles. Recipient of a NCIC Research Scientist Award (2001-07) and the Elsie Winifred Crann Memorial Trust Award in Medical Research, University of Toronto (2003).

**2000-**

**Walid A. Houry**

B.S. Chemistry, American University of Beirut, Lebanon (1990). M.S. Chemistry, 1991 and Ph.D. Chemistry (1996) Cornell University. Post doctoral fellow, Howard Hughes Medical Institute at Sloan-Kettering Institute, New York City (1996-1997) and post doctoral fellow of the Max-Planck-Institute for Biochemistry, Martinsried, Germany (1997-2000). Recipient of a CIHR New Investigator's Award (2001) and the Premier's Research Excellence Award (2001).

Director of the Proteomics and Mass Spectrometry Centre, Faculty of Medicine. Co-Director of the CIHR Training Program in Protein Folding: Principles and Diseases.

**2000-**

**Régis Pomès**

Ph.D. (1993) Houston. Canada Research Chair, Tier II, (2000 and 2005). Senior Scientist in Molecular Structure and Function Program (2007).

Status only, The Hospital for Sick Children Research Institute, Structural Biology and Biochemistry Programme.

**2001-**

**Christine E. Bear**

B.Sc. (1978) and Ph.D. (1984) U. of T. University of Calgary 1984-87. University of Liverpool, UK Visiting

Fellowship, 1986.

Cross appointed, Physiology, The Hospital for Sick Children, Cell Biology Division.

**2001-**

**Liliana Attisano\***

B.Sc. (1984) and Ph.D. (1990) Biochemistry U. of T. Post doctoral fellow Memorial Sloan Kettering Cancer Center, NYC, NY (1991-1995). Appointed in 1996 to the Department of Anatomy and Cell Biology, U. of T. and cross-appointed to Biochemistry in 2001. Premier's Research Excellence Award (2000-03). Recipient 2001-04 of CIHR Investigator Award. In 2002, one of the 100 most-cited researchers in the field of Molecular Biology and Genetics for the last decade (ISI Essential Science Indicators). Canada Research Chair, Tier I, 2004. In 2002, her primary appointment was changed to Biochemistry.

**2001-2005**

**Russell Bishop**

Ph.D. (1997) Univ. of Alberta. Recipient of the 2004 Nowotny Award to a "young investigator who has shown excellence in research, made a significant contribution to the study of endotoxins and shows potential for further scientific development". Moved to Dept. of Biochemistry and Biomedical Sciences, McMaster University in 2005. Cross appointed, Laboratory Medicine and Pathobiology.

**2001-**

**Boris Steipe (1959- )**

M.D. (1985) University of Munich, Germany, Ph.D. (1990) Ludwig-Maximilians-Universität, Munich. Post-doctoral fellow Dept. of Structural Biology, Max-Planck Institute for Biochemistry, Martinsried, Germany (1990-1994). Research Fellow of the Gene Centre of the University of Munich (1995-2001).

Appointed jointly with Molecular Genetics in the Proteomics and Bioinformatics Program.

**2001-**

**David P. Bazett-Jones**

B.Sc. Waterloo. Ph.D. (1981) U. of T. Adjunct professor, Dept. of Biochemistry & Molecular Biology, University of Calgary. Senior Scientist, The Hospital for Sick Children. Canada Research Chair, Tier I, (2002). Status only, The Hospital for Sick Children, Cell Biology Program.

**2001-**

**Avi Chakrabartty**

Ph.D. (1990) U. of T.

Cross appointed, Medical Biophysics, OCl.

**2001-**

**Gil Privé**

Ph.D. (1988) Univ. of California, Los Angeles.

Recipient in 2002 of the Premier's Research Excellence Award

Cross appointed, Medical Biophysics, OCl.

**2002-**

**Annelise Jorgensen (1942- )**

M.Sc. (1968) University of Copenhagen, Denmark, Ph.D. (1974) Univ. of Connecticut. Post doctoral fellow Biology Department, York University (1974-1976) and Dept. of Anatomy (1976-78). Became professor (1978-2002) in Dept. of Anatomy and Cell Biology, University of Toronto.

Moved to Dept. of Biochemistry from the Division of Cell Biology when it closed in 2002.

**2002-2003**

**Vitauts (Victor) I. Kalnins**

B.Sc. (1961) McMaster Univ. M.Sc. (1964) and Ph.D. (1967) Queen's Univ. Moved to the Department of Biochemistry from the Division of Cell Biology, Dept. of Anatomy and Cell Biology, University of Toronto when the Division closed in 2002.

**2003-****John Parkinson**

Ph.D. (1995) Univ. of Manchester, UK. CIHR New Investigator Award (2006-11). Ministry of Research and Innovation Early Researcher Award 2007.

Status only, The Hospital for Sick Children.

**2004-****Khosrow Adeli**

M.Sc. (1982) and Ph.D. (1985) Univ. of Ottawa. Post doctoral fellow (1986) National Research Council. Postdoctoral Diploma (1988) U. of T. Recipient in 2006 of the John B. Walter Prize for course design and teaching excellence for his innovative role in the renewal and expansion of the Clinical Chemistry Postdoctoral Residency Program in the Department of Laboratory Medicine and Pathobiology. The 2006 Teaching Award at The Hospital for Sick Children's Annual Department of Paediatric Laboratory Medicine Symposium. National Award in 2006 for outstanding contributions to the Profession of Clinical Chemistry from the Canadian Society of Clinical Chemists. Editor-in-Chief, Clinical Biochemistry Journal (1999-06). Director, Postdoctoral Training Program in Clinical Biochemistry. Division Head, Clinical Biochemistry, Research Institute of The Hospital for Sick Children.

Status only, The Hospital for Sick Children Research Institute.

**2005-****Shoshana Wodak**

License in Chemical Physics, Université Libre de Bruxelles, 1968

Ph.D. (1974), Columbia Univ., Member, EMBO (1992). Canada Research Chair (2005).

Status only, The Hospital for Sick Children Research Institute.

**2005-****Allen Volchuk\***

B.Sc. (1993) and Ph.D. (1998) Dept. of Biochemistry, U. of T. Post doctoral fellow (1998-2004) Sloan-Kettering Institute, New York. Canada Research Chair (2005). Research Scientist, Division of Cellular and Molecular Biology, Toronto General Research Institute, University Health Network.

Status only.

**2005-****Igor Stagljari (1966- )**

M.Sc. (1990) Molecular Biology, Univ. of Zagreb, Croatia. Ph.D. (1994) Swiss Federal School of Technology, Zurich, Switzerland. Post doctoral fellow (1995-1999) Univ. of Zurich. Junior Group Leader and then Assistant Professor, University of Zurich (1999-2005). Winner of the Paper of the year 1999 Award given by the Publisher of Biological Chemistry. Founder and Vice President of the biotech company Dualsystems Biotech Inc. (2000-). New Entrepreneurs in Technology and Science Award (2001), Gebert Rűf Foundation, Switzerland. Stiefel-Zangger Foundation Award (2002) Zurich. EMBO Foundation Young Principal Investigator Award (2003) Zurich.

Appointed jointly with Molecular Genetics in the Proteomics and Bioinformatics Program.

**2005-****Angus McQuibban\***

B.Sc. (1992 and M.Sc. (1995) Dept. of Biochemistry, U. of T. Ph.D. (2001) Univ. of British Columbia. Post doctoral fellow MRC-Laboratory of Molecular Biology, Cambridge, U.K. Marianne Hoyer Award in 2001 for best Ph.D. thesis submitted to Dept. of Biochemistry and Molecular Biology U.B.C. CIHR New Investigator Award 2006-11. Ministry of Research and Innovation Early Researcher Award 2007.

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**2005-2008**

Gergely L. Lukacs

M.D. (1981) and Ph.D. (1988) Semmelweis Medical School, Budapest.

Yale University (1988-89), University of Toronto and The Hospital for Sick Children (1989-94).

Status only, The Hospital for Sick Children Research Institute, Program in Cell and Lung Biology.

**2006-**

John Rubinstein

B.Sc. (1998) Univ. of Guelph. Ph.D. (2002) University of Cambridge (MRC). Post doctoral fellow MRC Laboratory of Molecular Biology, Cambridge U.K. and Post doctoral fellow Banting and Best Dept. of Medical Research, U. of T. CIHR New Investigator Award 2007.

Status only, The Hospital for Sick Children Research Institute.

**2006-**

Simon Sharpe

B.Sc. (1997) Memorial Univ. of Newfoundland. Ph.D. (2002) Univ. of Western Ontario. Post doctoral fellow (2003) Laboratory of Chemical Physics, NIDDK, National Institutes of Health. Canada Research Chair, Tier II, 2006.

Status only, The Hospital for Sick Children Research Institute

**2006-**

Shana O. Kelley

Ph.D. (1999) California Institute of Technology. Post doctoral fellow (1999-2000) Scripps Research Institute. On the professorial staff, Dept. of Biochemistry, Boston College, Merkert Chemistry Center, Chestnut Hill, MA, 2000-2006. Co-Founder of GeneOhm Sciences, a company devoted to developing new clinical diagnostics. Recipient of the 2007 Pittsburgh Conference Achievement Award from the Pittsburgh Conference and the Society for Analytical Chemists.

Appointed jointly with Faculty of Pharmacy.

**2007-**

Stephane Angers

B.Sc. (1997) Dept. of Biochemistry, McGill University.

Ph.D. (2002) Dept. of Biochemistry, Université de Montréal. Post doctoral fellow (2002-06) Howard Hughes Medical Institute and Department of Pharmacology, University of Washington, Seattle. Canada Research Chair in Functional Architecture of Signal Transduction.

Cross appointed from the Faculty of Pharmacy.

## CHAPTER 8

### Fellows, Lecturers and Senior Tutors

**B**iochemistry is an experimental science and the Department has been active in providing “hands-on” laboratory experience to its students for many years. Lecturers play a key role in the development and delivery of this experience. Lecturers have also been involved in the organization and delivery of course material. The contributions of our Lecturers has been recognized by named awards given to top students in Biochemistry lab courses.

Nearly all of these individuals held part-time positions and the titles changed over the years. The early records are incomplete and some dates are approximate because the information in different sources is contradictory. This list does not include the many graduate students who were “Demonstrators”, now designated as “Teaching Assistants”, who taught in the undergraduate laboratories and functioned as marker/ graders.

Table 4

A. Bruce Macallum, Ph.D. (Sessional lecturer)	1913-17
Henry Borsook, Ph.D., M.B. (Research fellow, lecturer)	1927-29
Florence I. Hargreaves (Ignatieff) M.A. (Senior fellow)	1929-37
Bruce F. Crocker, B.A. (Demonstrator; lecturer)	1930-40
Jeanne Manery Fisher, Ph.D. (Demonstrator)	1940-48
Marian A. Packham, Ph.D. (Senior fellow, lecturer)	1955-63
Edith Batho Anderson, Ph.D. (Demonstrator; lecturer)	1961-73
Dorothy McLean Johnson, Ph.D. (Lecturer)	1963-76
Joan Scott (Lecturer)	1964-66
Dorothy Painter, M.Sc. (Lecturer; Senior tutor)	1964-97
Jacqueline Giles, M.Sc. (Lecturer; Senior tutor)	1965-91
Lois Dove, M.Sc. (Lecturer; Senior tutor)	1965-89
Cynthia Luks, M.Sc. (Lecturer)	1968-72
Trudy McNabb, Ph.D. (Lecturer)	1976-81
Joanne Oliver Sodek, M.Sc. (Lecturer)	1978-79
Surinder Cheema-Dhadli, Ph.D. (Lecturer)	1978-79
Mary K. Hartman Winter, M.Sc. (Lecturer)	1980-86
Patricia Horlock Bronskill, M.Sc. (Lecturer/Senior lecturer)	1989-06
Stavroula Andreopoulos, Ph.D. (Lecturer/Senior lecturer)	2001-
Ahlia Khan, Ph.D. (Lecturer)	2006-

## CHAPTER 9

### Research Associates, Research Assistants, and Long Service Technicians in the Core Department

**B**iochemistry is a research-intensive Department. The backbone of many research enterprises is the technical staff who carry out experiments and manage the day-to-day running of labs. Technicians provide continuity and their experience is valuable to the training of summer and graduate students. In the

early days, Biochemistry had a number of Departmental Technicians, but repeated budget cuts have eliminated these positions over the years. Many technical staff have been loyal members of the Department for many years. Following is a list of some of these important people.

Table 5

#### Research Associates, Research Assistants, and Long Service Technicians

Mr. Giddens	
Dorothy Skill	
Lloyd Sloan (made and repaired equipment)	1921-61
Jack McClary (chief technician)	1929-73
Mrs. Lucy Lumbard (cared for animals in old MSB)	1927-58
Bill Clough (assisted Jack McClary)	1934-69
Mrs. E. Wilkie	1935-?
Jean Murphy Forbes (technician with J. Manery Fisher)	1940-54
Helen Gordon (departmental lab assistant, technician)	1950-70
Eleanor Dryden (technician, research assistant with J. Manery Fisher)	1954-81
Miss V. Kask (technician)	1955-61
Franz Drey (departmental technician)	1961-68
Harold (Hal) Boyd (animal room attendant)	1965-69
Robert (Bob) Hawkins (lab assistant)	1965-70
Gordon MacDonald (with W. Thompson and chief technician (1974-80)	1965-81
Dorothy Parr (with Profs. Connell, Dorrington and Hofmann)	1965-83
Monika Schmidt (with T. Hofmann)	1965-68
Linda Gibbs (with T. Hofmann)	1965-69
Brenda Tattrie (with G.E. Connell)	1965-67
Ilona Czermely Godi (with T. Hofmann 1977-83)	1965-83
Jeanne Orr (technician with G.R. Williams and M.A. Packham)	1966-79
Jillian Still (research assistant with J. Manery Fisher)	1966-88
Mrs. Letitia Gomez Rao (research assistant with T. Hofmann)	1966-69
Hiroki Takeda (with R.A. Anwar)	1966-70
Maria Guccione (technician with M.A. Packham)	1967-94

David Duthie (research assistant with T. Hofmann)	1968-70
Puay Lim Chang (technician with M.A. Packham)	1970-71
Annie Cunningham (with T. Hofmann except 1975-77, and after 1995, with E. Pai)	1968-present
Patricia Bronskill (research assistant with B.G. Lane and with J.T.Wong)	1968-70 1972-89
Stephen R. Jones (research assistant with T. Hofmann)	1968-75
George Madapallimattam (with J.M. Fisher/A. Bennick, except 1974-78)	1969-95
Dr. David Kells (research associate with K.J. Dorrington)	1969-81
Barbara Palmer-Porter (with R.K. Murray)	1969-89
Michael Paull (chief technician (part time 1980-93)	1969-93
Theresa Kennedy (with B.G. Lane)	1970-96
Charles Yu (Protein Analytical Service Facility with T. Hofmann)	1970-94
Ann On-Yee Hui (research assistant with T. Hofmann)	1970-73
Dorothy Dangelat (research assistant with T. Hofmann)	1970-73
John Ryularsdaam (research assistant with T. Hofmann)	1970-73
Rajagopalan Narisemhan (with H. Schachter and R.K. Murray)	1971-90
Eileen Borisenko (glasswashing)	1971-00
Sung Hyung Rhee (with T. Hofmann)	1973-86
Lloyd Porter (with J.T.Wong)	1973-89
Marianna Vlaovic (with R.A. Anwar)	1973-86
Anne (De Jong) Evans (research assistant with T. Hofmann)	1973-77
Michiko Kawakami (with T. Hofmann)	1974-80
Barbara Lavers (with D.O.Tinker)	1974-78
Anne Tirpak (with K.G. Scrimgeour)	1974-80
Rajendra Sharma (with R.K. Murray)	1976-87
Cathy Horne (with K.J. Dorrington)	1976-86
Alice Leung (research assistant with T. Hofmann)	1977-80
Dr. Max Blum (research associate with T. Hofmann)	1978-94
Andrew Hempel (with N. Camerman)	1980-06
Martha Bendiner (research assistant with T. Hofmann)	1980-85
Helena Belina (with W.Thompson)	1982-91
Quelminda Homen (glasswashing)	1982-present
Ranga Robinson (with A. Bennick)	1983-91
Joyce Rousseau (with H.G. Lawford)	1984-01
Myrna Cohen-Doyle (with D.B. Williams)	1985-present
Veronica Molony (research assistant with T. Hofmann)	1986-88
Yang Yao (research assistant with T. Hofmann)	1989-94
Cinzia Commisso-Cappelli (technician with P.N. Lewis)	1993-02
Desirée Taylor (technician with M.L. Rand and M.A. Packham)	1993-97

Jing Li (technician with R. Reithmeier)	1996-present
Joseph Nachman (research associate with E.F. Pai)	1996-present
Tara Signorelli (technician with P.N. Lewis)	1998-03
Wanda Gillon (with E.F. Pai)	1999-04
Meryl Nelson (technician with C.A. Smibert)	1999-02
Hailun Tang (research associate with E.F. Pai)	1999-present
Jiong-Wen Ou (technician with G.W. Brown)	2000-present
Heli Vari (technician with C.A. Smibert)	2000-present
Xin Zhao (technician with L. Attisano)	2000-present
Bryan Eger (research associate with E.F. Pai)	2000-present
Elisa Leung (technician with D.E. Isenman)	2003-present
Rongmin Zhao (research associate with W.A. Houry)	2004-present
Joshua Silver (technician with J. Segall)	2004-06
Stuart Rae (technician with S.O. Kelley)	2007-present
Kathleen Nethery-Brokk (technician with I. Stagljar)	2007-present

*These records are incomplete.*

## CHAPTER 10

### Business Officers, Administrative Assistants and Secretaries

**T**he Department of Biochemistry has been fortunate to have a very capable and dedicated office staff over the years. In the early days, the Department was run by Molly Delamere, who was Departmental secretary for 41 years! Carol Justice, our current Business Officer started in the Department in 1966. Today, our office staff provides a very positive and upbeat atmosphere to the Department, while coping with increasing workloads due to enrolment expansion. The service provided by our office staff to our faculty, staff and students is exceptional and is a key to our success.



Miss Molly Delamere

#### Table 6

##### Business Officers

Molly Delamere	1919-61
Patricia June Saul	1961-67
Patricia Staton	1966-82
Carol Avola (Justice)	1982
Isobel McKone	1983-84
R. Suzanne D'Alvise	1984-87
Linda Dann	1987
R. Suzanne D'Alvise	1988-05
Carol Justice	2006-

*\* These records are incomplete, but it is known that until sometime in the 1950s Miss Molly Delamere (1919-1961) was the only person in the departmental office. She was also the librarian and for many years had the only telephone in the department.*

Table 7

**Administrative Assistants and Secretaries**

Catherine Pryal (part time).	1960-61	Heather Ditzend (Chair's secretary)	1984-85
E.T. Pless	1961-63	Nancy Hornell (Pope) (Chair's secretary)	1985-88
Rosemary Harrison (Chair's secretary)	1964-67	Mary Ann De Francis	1986-87
Margaret (Peggy) Sheffield (Chair's secretary)	1966-70	David Roseman	1986-87
Carol Avola (Justice)	1966-68	Margaret MacDonald	1988
JoAnne Propp	1967-69	Mary Lollar (Chair's secretary)	1988-89
Valerie Ann Jack	1969-70	Gayle Bodourian	1988-98
Carol Avola (Justice)	1973-82	Hazel Pollard	1989-94
Pam McNaughton (Chair's secretary)	1972-77	Karma Farah	1989-92
Joan Kreitzer	1975-82	Carol Avola Justice (Administrative Assistant, Research Grants)	1990-95
Liz Miao	1975-76	Anna Vanek (Chair's secretary and Administrative Assistant)	1994-00
Gayle Burt	1976-79	Carol Avola Justice (Administrative Assistant, Research Grants)	1997-06
Rose Ann Martino	1977-85	Carrie Harber (Admin. Assistant, Graduate Affairs and Assistant to the Chair)	1999-
Regina Bendig	1977	Victoria Ilgacs (Departmental Assistant)	1999-
Kathy Hutton (Chair's secretary)	1979-82	Brenda Bradshaw (Admin. Assistant, Undergraduate Affairs)	2000-
Stephanie Amos	1979	Robert Reedijk	2000-
Flora Clark	1981	Justin Theilman (Office Assistant)	2005-06
Ellen Kruger (Chair's secretary)	1982-83	Mike Folinias (Adminstrative Assistant, Research Grants)	2006-
Sandra Warwick	1982-84		
Marsha Eines	1982-83		
Lydia Crump	1983-85		
Carol Avola (Justice)	1984-89		
Maria Cabral	1984		

# CHAPTER II

## Lectureships

### The George Connell Biochemistry Lectureship

The inaugural George Connell Biochemistry Lecture was given by Professor Gordon Dixon on October 17, 1991 in the J.J.R. MacLeod Auditorium. A copy of the program is in the departmental archives (Social Activities); it gives the following information:

“After a distinguished career as an academic scientist, chairman of the Department of Biochemistry and Vice President of Research and Planning at the University of Toronto, George Connell went on to render further great service as President of the University of Western Ontario and then of the University of Toronto. Through the years he has maintained a close interest in, and affection for, his old university department and this is now publicly acknowledged by the creation of an endowment to support ‘The George Connell Biochemistry Lectureship’ which has been made possible by the generous donations of many patrons and friends. The Lectureship will celebrate George’s leadership and outstanding contributions to the University of Toronto. Through this agency the Department of Biochemistry will invite distinguished scientists to deliver public lectures, seminars and consultations on the campus, thereby enhancing the academic programmes and providing stimulation for the scientific endeavour.

“The Department is very pleased to present Professor Gordon Dixon as the inaugural speaker. He is no stranger to this institution having shared a laboratory and collaborated in research with George Connell some thirty years ago. Dr. Dixon is an internationally renowned expert in the field of spermatogenesis and his work has been recognized through numerous awards and honours. He has had a remarkable influence on all those who have worked and studied with him. Many of these individuals are now leaders in their own research areas.”

The George Connell Biochemistry Lectures were originally held two or three times a month during the academic year on Tuesday afternoons, but because of poor attendance at this time they were integrated into the graduate student seminars at 4 p.m. on Wednesdays, and were given on the last Wednesday of the month. They are sometimes referred to as “The George Connell Research Lectures”. By 2007 these lectures had to be moved to another time because of the increase in the number of graduate student seminars that had to be scheduled.

Information about some of the lecturers and a book with a collection of the seminar notices are in the archives.

### Annual Theo Hofmann Biochemistry Lecture



Natalie Strynadka & Theo Hoffman

This lectureship was initiated in 1989 upon the retirement of Professor Theo Hofmann. Since 1992, the lecture has been given on the Annual Poster Day. A plaque in the hall outside the seminar room lists the guest lecturers. Theo Hofmann has been able to attend the lectures and is always pleased to meet the lecturers, many of whom he has known over the years.

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## Table 8

### Theo Hofmann Lecturers

#### 1990

Michael N.G. James (University of Alberta)  
On the mechanism of action of aspartic proteinases.

#### 1991

Emil F. Pai (Max-Planck Institute for Medical Research)  
Three dimensional structure of the detoxification catalyst mercuric ion reductase from *Bacillus* sp. RC607.

#### 1992

Wayne F. Anderson (Vanderbilt University)  
Structural studies of protein-DNA interactions.

#### 1993

Bishmu (Bill) Sanwal (University of Western Ontario)  
Chaperones, collagen biosynthesis and cell differentiation.

#### 1994

Michel Chrétien (Clinical Research Institute of Montreal)  
The new proprotein convertases: a world of excitement.

#### 1995

Peter Davies (Queen's University)  
How do antifreeze proteins work?

#### 1996

Gordon C. Shore (McGill University)  
Life and death according to Bcl-2.

#### 1997

Lecture cancelled.

#### 1998

Frances J. Sharom (University of Guelph)  
Trafficking in drugs: the P-glycoprotein efflux pump.

#### 1999

David W. Andrews (McMaster University)  
If the translocon is required to insert proteins into membranes, then how is this transmembrane transporter assembled in the first place?

#### 2000

Gary Shaw (University of Western Ontario)  
Control of protein-protein interactions and dimerization in the calcium-binding protein S100B.

#### 2001

Lecture cancelled due to illness.

#### 2002

Nahum Sonenberg (McGill University)  
Signaling to the translation machinery.

#### 2003

John Bergeron (McGill University)  
From calnexin to ER proteomics.

#### 2004

Natalie Strynadka (Department of Biochemistry, University of British Columbia)  
Structural biology of the bacterial membrane.

#### 2005

Lila Gierasch (Professor and Head of the Department of Biochemistry & Molecular Biology, University of Massachusetts-Amherst) Navigating a challenging folding landscape: folding and aggregation of a beta-clam protein in vitro and in vivo.

#### 2006

Mark Glover (University of Alberta)  
BRCT domains – conserved phospho-peptide recognition modules in the DNA damage response.

#### 2007

Jennifer Lippincott-Schwartz (Cell Biology and Metabolism Branch NICHD, NIH, Bethesda, MD)  
Emerging fluorescence technologies for the analysis of protein and organelle localization, turnover and topology in living cells.

## **Dr. Benjamin Schachter Memorial Lectureship**

Benjamin Schachter (1914-2001) was born in Fort Francis, grew up and completed his university studies in Brandon, Manitoba. In 1934 he received his B.A. in Science from McMaster University with which Brandon University was affiliated at that time. He completed his Ph.D. in Biochemistry at the University of Toronto under the supervision of Prof. Guy Marrian in 1939; from 1936 to 1939 he was supported as a Banting Research Fellow. His thesis title was "Studies of the conjugated oestrogens and related compounds in mares' pregnancy urine". During this research on female sex hormones he isolated and identified conjugated oestrone sulphate (Premarin). From 1939-1949 he was at Canada Packers where he started the Research and Development Department, researching hormones and vitamins. There he set up and headed a plant for the synthetic production of vitamin D3. From 1949-1950 he was an Associate of Biochemistry at the University of Saskatchewan. From 1951-1972, Dr. Schachter founded and then operated Superior Biochemicals, producing cortisone and other pharmaceutical and industrial chemicals. In 1994 he received an Honorary Doctorate of Laws from the University of Brandon.

Upon his death, his family made a generous donation to the department to establish an annual lectureship in his memory. The graduate students are to select and host the speaker who will be chosen from former graduate students.

## Table 9

### **Benjamin Schachter Lecturers**

#### **2005**

Dr. Matthew Moyle (Ph.D.1988) Vice President Research, Tanox, Inc., Houston, Texas.

"From Asthma to Osteoporosis: the Discovery and Development of New Monoclonal Antibody Therapeutics."

#### **2006**

Dr. Zayna A. Khayat (Ph.D.2001) Boston Consulting Group.

"I Have My Grad Degree: Now What?"

#### **2007**

John Challice (M.Sc.1988) Oxford University Press.

"Leaving the Bench: From Scientist to Scientific Journalist and Publisher!"

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## CHAPTER 12

### Undergraduate Teaching

Over the years, members of the department have provided instruction in biochemistry to undergraduate students in Medicine, Arts and Science, Household Science, Household Economics, Public Health, Dentistry, and Nursing.

#### Medical students

Since its formation in 1907-08, the department has taught biochemistry to first year medical students. Until the end of Prof. Hanes' chairmanship in 1965, the lectures were always given by the head of the department. Weekly 3 hour laboratory classes were also held until 1984 when they were discontinued because of budget cuts, although questions about their relevance to the current needs of medical students had already arisen.

The medical student curriculum has undergone a series of renewals over the years, and as it has evolved, the teaching responsibilities of the members of the Biochemistry Department have also changed. In the 1940s there was a two year premed program that students entered directly from the fifth year of high school, but this was terminated, probably at the time of the introduction of the "new" medical curriculum in 1969-70 that focussed on "systems" teaching. Biochemistry professors Jeanne Manery Fisher and Robert Murray chaired two of these "systems" when they were initiated. This change in the teaching of medical students coincided with the implementation of the MacPherson report in 1969, abolishing the Honours programs in Arts and Science. It was probably at this time that entry into medical school became possible after two years of an Arts and Science program.

In 1973, there were 250 medical students in the first year, although 40 of them were exempt from the biochemistry laboratory part of the program. Prof. G.R. Williams, assisted by Dorothy Painter developed a new laboratory curriculum for the medical class that was

extended to the full class in 1974. In 1976, members of the Biochemistry Department became involved in a seminar program for the medical students that has continued until the present time. During the year, 5 disease-oriented seminars, 1-2 hours each, are given to groups of 15-20 students.

In 1990, a review of teaching to medical students at the University of Toronto by LCME (Liaison Committee on Medical Education) recommended curriculum renewal, resulting in the introduction in 1992 of yet another new medical undergraduate curriculum, this one involving an integrated, multidisciplinary approach. Members of the Biochemistry Department contribute to lectures, seminars, tutorials and PBL (problem-based learning) sessions. Prof. Robert Murray organized the biochemistry contributions to this curriculum and did a large share of the teaching both before and after its introduction. Between 1987 and 1998 he received five teaching awards recognizing his excellence in undergraduate medical education. A grand celebration was staged by the medical students when he retired in 1998; he continued to do some teaching although the responsibility for organizing biochemistry instruction of the medical students was taken over by Prof. Roy Baker.

In the 1980s, an M.D./Ph.D. program was introduced for highly motivated students with superior research and academic potential. This program is offered jointly by the Faculty of Medicine and the School of Graduate Studies and requires seven to eight years for completion.

In 1992-93 there were 252 students accepted into the 4 year undergraduate program, but in 1993, the number was reduced to 177 because of government concern that too many doctors were causing large increases in the cost of the health care system. However, by 2000, the numbers had been allowed to increase to 190 and continued to increase to 226 by 2007.

Until the early 1990s, students were accepted into medicine after two years in the Arts and Science program, but by 1995, entry into the program required at least a three-year degree in Arts and Science. However, many would-be students have obtained a four-year degree, a M.Sc., or a Ph.D. before entering the M.D. program. In the year 2007, more than 3200 applications were received for entry into the undergraduate medical program.

### **William T. Aikins Award**

The William T. Aikins Award is the Faculty of Medicine's most prestigious award for commitment to and excellence in undergraduate education. Winners are selected from nominees in a faculty-wide process that requires extensive support from both faculty and students. All teachers in undergraduate programs taught by members of the Faculty of Medicine (Arts and Science, Dentistry, Medicine, Nursing, Occupational Therapy, Pharmacy, Physical Therapy, Radiation Sciences, and Physical and Health Education) are eligible. The award is named after William Thomas Aikins, the first Dean of the University of Toronto Medical School (1887-1893). It is awarded annually in three categories:

- Individual teaching performance
- Development and use of innovative instructional methods
- Course/program development and coordination.

The Department of Biochemistry has a picture gallery of the members of its staff who have been honoured with this award.

## **Table 10**

### **Recipients of William T. Aikins Award**

1994	Robert Murray Individual Teaching Performance
1996	Charles Deber Individual Teaching Performance
1996	David Isenman & Dorothy Painter Course Development and Coordination
1997	Norman Camerman Special Contribution to Teaching
1998	Roy Baker Individual Teaching Performance
1999	Patricia M. Bronskill Individual Teaching Performance
2007	Reinhart Reithmeier Individual Teaching Performance

### **Arts and Science Students**

Professor Macallum, who had been chairman of the Department of Physiology before he became chairman of the Department of Biochemistry when it was formed in 1907-1908, introduced the Honours course in Physiological and Biochemical Sciences (P&B) for Arts and Science students. P&B is listed in the calendar continuously from 1910-11 until 1970. An Honours Course in Biological and Physical Sciences (B&P) is also listed in 1911-12, with essentially the same courses, but without Physiology in the fourth year. The calendar entry for B&P stops after 1920-21, but resumes in 1938-39 and is listed up to 1948-49. An Honours course in Biological and Medical Sciences (B&M) is listed in the calendar for the first time in 1920-21, and was probably introduced by Prof. Hunter. In 1935-36, both new and old B&M courses are listed, with B&M described as a

'combined course in Arts and Medicine'. From 1946-47 until 1961-62, the B&M course was not available, but it is listed again from 1963-64 until 1970-71. It attracted more students than those who chose P&B. For example, in the last 4 years of the 1960s, an average of 10 students graduated from P&B, and 28 graduated from B&M. Graduates from B&M had an entry into the second year of medicine, although they did need to complete the first year anatomy course.

In 1911-12, students of biochemistry were required to take the following courses: Latin 3 hrs; English 3 hrs; German 2 hrs; French 1 hr; one of Mathematics, Greek & Roman History or Religious Knowledge, 1 hr; and 4 Honours courses: Mechanics 1 hr; Physics 5 hrs; Biology 6 hrs; and Chemistry 6 hrs. Even in 1969, fourth year examinations for P&B students included passages in French and German to be translated into English.

Up until 1970, students who wished to graduate from the Honours course in Biochemistry enrolled initially in Honour Science, a first year program that led to several life sciences programs. In 1945 (and probably much earlier also) there was no choice of the required first year honours courses, comprised of lectures and laboratory classes in Botany, Zoology, Chemistry, and Physics, and a lecture course in Geology. Upon entering second year, students chose to specialize in P&B, B&M, Botany, Zoology, or Food Science although courses in Biochemistry and Physiology were not given until the third undergraduate year. Those in the P&B program chose Biochemistry or Physiology as they entered their fourth year. The students had no choice of the Honours courses in their programs. At that time, the textbook was the twelfth edition of "Practical Physiological Chemistry" by P.B Hawk, B.L. Oser and W.H. Summerson. In 1949, 14 students graduated from P&B. The four year program led to a Honours B.A. until 1965, at which time the degree obtained by students in science courses was changed to B.Sc.

In 1967, it is recorded that the number of Arts and Science students being taught by the Biochemistry Department was still quite small. One lecture course at

the third year undergraduate level was given to some 60 Honours students in P&B, B&M and Food Science, and one laboratory course to the P&B and B&M students. In the fourth year there were two lecture courses and the Advanced Laboratory course for biochemistry students, and an optional "Special Work" research course. No courses were offered to undergraduate students in other Honours programs.

Until his retirement in 1970, Prof. Bruce Crocker had had for many years the responsibility of providing the third year lectures in introductory biochemistry for P&B, B&M, and students in Household Science. Students entering the classroom found the backboards already filled with lecture notes. In 1963, Prof. Crocker published "Lectures in General Biochemistry" in two large binders, summarizing the material he was covering in his lectures. These binders are in our archives.

The changes in Arts and Science programs brought about by the implementation of the "New Program" recommended by the MacPherson report of 1967 ("Undergraduate Instruction in Arts and Science" – Report of the Presidential Advisory Committee), impinged on the Department in 1970-71. The Department's "White Paper" of 1987 summarized some of the changes that occurred:

"At that time (1970) courses in Arts and Science became open to all students who desired and were qualified to take them. The department consciously and enthusiastically accepted this 'open market' model. Thus, in 1970-71, general purpose third year lecture and laboratory courses (BCH 320Y and BCH 370H) were introduced to provide an exposure to biochemistry for non-specialists" as well for the specialist students.

There was a huge increase in the number of students enrolling in these introductory biochemistry courses because the only prerequisite was a passing grade in second year organic chemistry. Biochemistry lectures had to be given in the MSB (Medical Sciences Building) auditorium (which holds 507 students) and examination questions became multiple choice. Students specializing in biochemistry were swamped by the non-specialists,

since the students did not have to declare their intent to be biochemistry specialists until their fourth year. An attempt was made in the early 1970s to have 2 hours per week of lectures for the class of approximately 300 students, and a third hour for the much smaller number of biochemistry specialists, but this arrangement proved to be unsatisfactory. Consequently, in 1973 the department began to offer two separate introductory lecture and laboratory courses for students in their third year – BCH 321Y and BCH 371H for the biochemistry specialists and BCH 320Y and BCH 370H for the non-specialists. Although it was not expected that large numbers of non-specialists would want to take the fourth year biochemistry lecture courses, the numbers of non-specialists in these courses have increased greatly over the years.

During the somewhat chaotic situation in the third year courses in the early 1970s, one helpful occurrence was the publication in 1970 of the text "Biochemistry" by A.L. Lehninger that became the definitive general textbook for many years.

Retrospectively, the authors of the "White Paper" concluded that "The reason for the huge growth in the number of students wishing to take biochemistry courses paralleled the move of the discipline to the centre of all the life sciences, and the remarkable achievements of the science of biochemistry in discovering and manipulating the basic elements of living systems."

BCH 320Y proved to be so popular that by 1974, it was being offered in both the day and evening, and also in a summer evening session in some years.

The summer of 1975 saw the beginning of the non-credit summer research program for students who had completed their third year. Although undergraduate students had worked in the research laboratories in earlier years, they had not been offered a structured program.

In 1981, the Special Work research course, BCH 473, was changed from a half course credit to a full course requiring a written report and an oral examination.

The Kelly Report of 1979 criticized the "New Program" that had been adopted as a result of the MacPherson Report as an "unstructured arrangement". Implementation of the recommendations of the Kelly Report required students, at the beginning of their second year, to register in a specific Major or Specialist program, provided that they had satisfactorily completed the prerequisite courses. A Major degree required completion of 15 courses and a Specialist degree required 20. One fifth of the courses were to be non-specialist electives. These Kelly rules led to overcrowding of the biochemistry specialist program and in the 1980s, the biochemistry specialist program attracted more students than could be accommodated in the fourth year advanced laboratory course, BCH 471Y, which was limited to 40 students. Several adjustments were made to address this problem. For a few years (1986, 1987), some students were allowed to substitute BCH 473Y for BCH 471Y, and a few who were unlikely to continue in research careers were allowed to substitute two fourth year biochemistry half courses for BCH 471Y. These substitutions reduced the number of students in the fourth years laboratory course, BCH 471Y, and it was possible to discontinue them when limited enrolment in the biochemistry specialist program was introduced in 1985; in 1986 a GPA of at least 3.0 after the first year was required for entry into the Specialist program. Although no Major in biochemistry was listed in the calendar, students who completed the first three years of the Specialist program could request the department to allow them to graduate with a Major in biochemistry.

In 1983, the interdepartmental program in Molecular Biology and Molecular Genetics began offering a new course, MGB 310Y, which became MGB 311Y in 1993 and a required course for biochemistry specialists.

The Biochemistry Undergraduate Students Society (BUSS) was formed in 1988 to represent the academic concerns of students enrolled in biochemistry courses. The organizer of this society was Philip Wu who led the objection to multiple-choice examinations in BCH

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320Y as the only method of evaluating students, and requested an addition to the budget to provide for tutorials and market/ graders of written answers to examination questions.

The Biochemistry and Chemistry specialist program (which was first listed in the calendar as Chemistry and Biochemistry in 1971-72) was discontinued in 1995 because of the introduction by the Chemistry Department in 1993 of a program in Biological Chemistry. In 1995, the Department began to take second year students into the Research Opportunity Program, BCH 299Y, involving supervised participation in a faculty member's research project.

In 1996, the BCH 370H laboratory course for non-specialists was revamped, combining it with Physiology and Pharmacology and reducing the number of hours devoted to biochemistry (13 lecture and 39 practical). In 1997, the lecture course for non-specialists, BCH 320Y, was reduced to a half course. However, students in the specialist programs in the Molecular Genetics and Molecular Biology, and Immunology programs had, for some time, been required to take the biochemistry specialist lecture course, BCH 321Y. The BCH 371H laboratory course expanded to include the specialists in Molecular Genetics and Molecular Biology, and in 2000, the specialists in Immunology.

In 2001, the introductory biochemistry courses were moved to the second year – BCH 210H for non-specialists and BCH 242Y for biochemistry specialist students. Because the non-specialist course attracted as many as 1400 students each year, in 2004 tutorial sessions were introduced, coordinated by Lecturer Roula Andreopoulos. These sessions are run by graduate students (Teaching Assistants) and are a very necessary part of the course.

In 2005/06 a new Major Program in biochemistry was introduced, initially with places for 50 students. It proved to be so popular with over 500 applications that the number of places was increased to 100 in 2007/08.

## **Students in the Faculty of Household Science/Food Science**

The earliest (1907-08) calendars listing Biochemistry Department members include members of the Faculty of Household Science. Clara C. Benson, Ph.D. is listed as Associate Professor of Physiological Chemistry in the Faculty of Household Science, and there was an Instructor and a Junior Assistant as well. Prof. Benson remained on the Biochemistry calendar listing until 1927-28. She had become Professor of Food Science in 1920.

Household Science students were taught by members of the Biochemistry Department until the Faculty of Food Science (which the Faculty of Household Science had been renamed in 1962) was closed in the 1970s (enrolment of students ceased in 1973, and 1978 marked the final closure).

## **Students in the Faculty of Dentistry**

In 1925, members of the Department of Biochemistry began instructing students in the newly formed Faculty of Dentistry, and lecture and laboratory classes given by biochemistry faculty continued until 2000. In 1987-88, the yearly budget cut suffered by the Department of Biochemistry was absorbed by eliminating financial support for the Dental Biochemistry Laboratory Course. However, the Faculty of Dentistry provided funds so that this course could be continued. In 1994, the Faculty of Dentistry was providing a 0.67 FTE faculty salary and funds for teaching assistants. For the class of 35 students, there were 61 hours of instruction in lectures, seminars and laboratory.

It is somewhat ironic that a laboratory course in biochemistry continued to be provided for dental students for a number of years after biochemistry laboratory classes for medical students had been discontinued. However, the involvement of members of the department in teaching dental students came to an end in 1999-2000.

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### **Students in the Faculty of Nursing**

From 1973 until the end of the academic year 1991-92, a lecture course for nursing students was provided jointly by the Departments of Chemistry (in the first term) and Biochemistry (in the second term). In some years biochemistry was taught as a 3 hour evening course to students in nursing.

### **Undergraduate Student Activities**

The Biochemistry Undergraduate Students Society (B.U.S.S.) was formed in 1988 as a result of the discontent of students in the large BCH 320Y class in which there were approximately 500 students (in two sections) but no tutorials, and grading was based on two multiple-choice examinations. Student complaints about BCH 320Y were outlined by the first president of B.U.S.S., Philip Wu, in a letter to Dean Dirks dated October 31, 1988. A letter from him in December, 1988, to the Undergraduate Coordinator of the Department (Prof. Packham) makes suggestions concerning the other courses that the department offers to Arts and Science students. (Copies of these letters are in the archives.)

By the year 2000, the BUSS Web site stated that "The executives of the Biochemistry Undergraduate Student Society strongly represent the academic concerns of

second, third and fourth year Biochemistry Specialists as well as all students enrolled in Biochemistry undergraduate courses. As an active student organization, we are aware of the challenges provided in upper year courses and we are prepared to give advice or find help when needed."

BUSS coordinates numerous social and academic events, including a lecture series, a graduate school information night, and career symposia. Fund raising activities include selling test packages and T-shirts.

In 1998, BUSS co-operated with the Immunology Students Association (IMMSA) and the Molecular Biology and Genetics Student Union (MGBSU) in organizing the first B.I.G. Jeopardy night and party. This party has become an annual event in February. The highlight is a Jeopardy-style game show in which teams of students and professors from each discipline are challenged to answer questions in both scientific and non-scientific areas. The competition is stiff and the spectators are rowdy.

In 2005, BUSS proposed that an award be set up for Teaching Assistants for which they would supply funding to be matched by the Department.

# CHAPTER 13

## Undergraduate Student Awards

### Daniel Wilson Scholarship in Science

This scholarship is to be awarded to an outstanding student in Biochemistry and/or Physiology at the end of third year. It was a bequest of the late William Christie, Esq., in honour of Sir Daniel Wilson, Kt., L.L.D., F.R.S. He was appointed to the chair of History and English at the University of Toronto in 1853. In addition to introducing courses in History, English and Anthropology, Prof. Wilson was active in the Canadian Institute, a leading scientific society. He was president of University College (1880-1892) and in 1890 became the first president of the federated University of Toronto. There is a plaque just west of University College describing his contributions to the university. The scholarship was established in 1886 and its terms were revised in 1978. The value is now less than \$100.

The records that could be obtained are incomplete, but a few early recipients are known. Up until 1960, only those who went on to other associations with the department are listed. A number of the recipients went on to obtain graduate degrees in the Department of Biochemistry at Toronto and seven of them joined the professorial staff of the department.

### Table 11

#### Recipients of the Daniel Wilson Scholarship in Science

1902	R.E. Gaby Demonstrator in biochemistry 1910-1915
1931	Jeanne Manery (Fisher) and Paul Bernard Hamilton
1938	C. Gordon Stewart M.A 1949
1948	Marian C. Aitchison (Packham) Ph.D. 1954
1951	Christopher W. Helleiner Ph.D. 1955
1954	Harry Schachter Ph.D. 1964
1955	Byron G. Lane Ph.D. 1959
1958	Jeffrey T. Wong Ph.D. 1962
1960	David O. Tinker
1984	Marcellus Aloisius Behr
1985	James Ronald Perry
1986	Matthew Goldsmith
1987	Kathy Boutis
1988	Paul Mazzoli
1989	Eleanor Katrin Latta M.Sc. 1992
1990	Elizabeth Duarte
1991	Irvinder Bhatia
1992	David Harold Price
1993	Sudeep Gill
1994	Kar Ho Brian Luk
1995	Vamini Kumari Salvanandan
1996	Gerald Wei Hsu
1997	(student in Physiology)
1998	Joanne Chun Yeng Cheung
1999	Peter Chung-Wen Chang
2000	Anisa Mnyusiwalla
2001	Navindra Persaud (Physiology)
2002	Winnie Luong
2004	Michelle Lin
2006	Asad Merchant

### **The Amy Britton Award**

This award is given to the student who has attained the highest marks in biochemistry in the third and fourth years. In 1996 the value was approximately \$450.

Dorothy Amy Britton (1915-1979) graduated with First Class Honours in 1937 with a B.A. in Physiology and Biochemistry (P&B, biochemistry option) from the University of Toronto (Trinity College). She obtained a M.Sc. degree from the University of London in 1939 and then worked for the Ontario Research Council for three years. From 1942-45 she was in the Canadian Medical Army Corps, and after the war she worked for three years as a chemist with Lane and Fink in their cosmetics division (Dorothy Grey cosmetics). From 1949 to 1970 she was at the Banting Institute, doing research on thyroid hormones. She then changed her career focus again, went to Library School to obtain certification as a librarian, and worked in this capacity at the Addiction Research Foundation. She retired to care for her aging mother and died of cancer in 1979. Throughout her life, Amy Britton made a host of friends, including former classmates, co-workers, skiing companions, and square dance enthusiasts. Following her death, one of these friends, Miss Charity Grant (a former Dean of Women at University College), contacted Amy's friends and together they established the "Amy Britton Award".

**Table 12**  
**Recipients of the Amy Britton Award**

1981	Robert Chase
1982	Ms D. Skea
1983	Ms. F. Berkmann
1984	Monica Sauer
1985	Pavla Kollert
1986	David S. Schneider
1987	Catherine Anne Reynolds
1988	Thuy Huong Nguyen Ph.D. 1994
1989	Megan Jenkins
1990	Barbara Newton
1991	Edgar Chong Young
1992	Anne Elizabeth Haywood-Farmer
1993	David Harold Price
1994	Cheryl Chien Ho M.Sc. 1996
1995	David Louis Zechel
1996	Avinash Narain Thadani
1997	Russell Jones
1998	Shirley Yingyu Pang
1999	Joanne Chun Yeng Cheung
2000	Chi Mun Mandy Tam
2001	Kwan Sheung Vincent Poon
2002	Ashleigh Tuite
2003	Winnie Luong
2004	Marta Dziedziura
2005	Michelle Lin
2006	Mathew Estey
2007	Alireza Mansouri

### **Ross S. Lang Scholarship in Life Sciences**

This scholarship now alternates between Biochemistry and Physiology. It is the bequest of the late Dr. Ross S. Lang, a graduate of the University of Toronto who practiced medicine in Chicago, Ill. This scholarship was established in 1965 and revised in 1974 and 1995. Originally, it was to be awarded to the best graduating student who took at least 2 biochemistry and at least 2 physiology courses in the third and fourth years. The value varies between \$300 and \$500. In 1994, no one was eligible. In 1995 the terms were changed because there is now little likelihood of a student fulfilling the original terms of the award. The award is now to go to a student who is either a Biochemistry or Physiology specialist (alternating).

Our records are incomplete.

### Table 13

#### **Recipients of the Ross S. Lang Scholarship**

1981	Simon Ives
1984	Jeffrey Wrana Ph.D. 1992
1985	Xenia Katherine Rose Young
1986	Ravina Simons (Johnson) Ph.D. 1995
1987	Kia Modareszadeh Ramini
1988	Karen Joy Dunstan
1989	Robert James Sargeant Ph.D. 1995
1990	Andrew York Chan
1991	David C. Doisy
1992	Nazin Karsan
1993	Jason Lazarou
1995	Debbie Kanowitz
1997	Stella Yiu
1999	Ahlia Khan Ph.D. 2006
2001	Michael Saginur
2003	Brian Kim
2005	Vikram Mulligan
2007	Shaliny Ramachandran

### **The Emeritus Professor Book Prize**

This prize was established in 1968 when Prof. Charles S. Hanes retired, and it was added to in 1970 upon the retirement of Prof. Bruce F. Crocker. It was awarded for the highest standing in the fourth year of the Biochemistry Specialist Program. The balance of the money was combined with the Jeanne Manery Fisher Fund and the interest on these combined funds now adds to the support for awards on the annual Poster Day.

### Table 14

#### **Recipients of the Emeritus Professor Book Prize**

1969	R. Roy Baker Ph.D. 1973
1971	Andrew Mackay
1972	Christopher Epp
1973	Jeanette R. Pik
1974	Allison McGeer M.Sc. 1976
1975	Eva Cechticky Martin
1976	Sol Stern M.Sc. 1978
1977	Jerry Kar-Chun Wong Ph.D. 1985
1978	Lisa Michelutti
1979	Ann Kirby, Franklin Quan, and Daniel Jay
1980	Patricia Guillet and Carl Clark
1981	Gopa Raychaudhuri M.Sc. 1984
1982	Lorna Macdougall
1983	D. Akkor
1984	Mary Rodgers
1986	David Schneider

(This was the last time the prize was awarded.)

### **The Society of Chemical Industry Merit Award**

In 1961, it is recorded that David O. Tinker (later a professor in the department) was awarded the Chemical Institute of Canada Medal for the best Bachelor's degree in Biochemistry at the University of Toronto. Records for the next decade were not found.

In 1972, the award was a brass key, given to the student with the highest marks in biochemistry courses (later including CHM 447 and MGB 410/420) in fourth year. The names of some of the winners are on a plaque that is on display in room 5227, MSB.

### **Table 15 Recipients of The Society of Chemical Industry Merit Award**

1972	Christopher Epp
1973	Jeanette R. Pik
1977	Jerry Kar-Chun Wong Ph.D. 1985
1978	Lisa Michelutti
1979	Franklin Quan
1980	Patricia Guillet
1981	Michael Wong
1982	Ms. K. Bird
1983	Nicola Huntley
1984	Lindsay Eltis
1985	Robert Di Cecco
1986	Daniel Ek and David Schneider
1987	Benjamin Wang
1988	Diane Lu Ph.D. 1992
1989	Catherine Harford Ph.D. 1995
1990	Arvind Nanda Ph.D. 1996
1991	Edgar Chong Young
1992	Noel Patrick Harrington
1993	Marc John Andrew Johnson
1994	Susmita Acharyya
1995	Ariela Morgan
2001	Niket Shah
2005	Ammy Lin
2006	Michael Yang
2007	Daniel Shilensky

### **Biochemistry Laboratory Awards**

In 2004 an award was established for the top student in the Advanced Biochemistry Laboratory, BCH 471Y. In 2007, it was named "The Patricia Bronskill, Dorothy Painter, Dorothy Johnson Award". Similar awards were set up for BCH 371H (The Jacqueline Giles, Edith Anderson Award) and for BCH 370H (The Lois Dove Award). These awards are named in honour of the Tutors, Senior Tutors and Lecturers who supervised these laboratories.

### **Table 16**

#### **The Patricia Bronskill, Dorothy Painter, Dorothy Johnson BCH 471 Award**

2004	Lia Cardarelli
2005	Kit Man Wong
2006	Mathew Estey
2007	John Laver

### **Table 17**

#### **The Jacqueline Giles, Edith Anderson BCH 371 Award**

2007	Daniel Shilensky
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### **Table 18**

#### **The Lois Dove BCH 370 Award**

2007	Pamela Tsao
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# CHAPTER 14

## Graduate Programs Over The Years

### Ph.D. Program

**T**he first record of a student being granted a Ph.D. by the Department may have been in 1916 when James Bertram Collip is recorded as a student of Prof. A.B. Macallum. In 1924, two students obtained their degrees under the supervision of Prof. Andrew Hunter. While Prof. Macallum was chairman of Physiology in 1900, he supervised the student (Fredrick Hughes Scott) who obtained the first Ph.D. awarded by the University of Toronto. Prof. Macallum was instrumental in establishing the School of Graduate Studies while he was at the University of Toronto.

In earlier years, entry into the Ph.D. program usually required a M.Sc. degree. When M.Sc. students in the Biochemistry Department in Toronto successfully completed their oral examination and course requirements, their examiners indicated whether or not they might enter the Ph.D. program if they chose to do so. Some students with M.Sc. degrees from other universities were required to pass a qualifying examination before entry into the Ph.D. program. Since 1998, all students seeking entry into the Ph.D. program are required to pass a qualifying examination with the exception of students enrolled in a M.Sc. program who have fulfilled the requirements for transfer into a Ph.D. program. For transfer, the student must have the approval of his/her supervisor and supervisory committee, prepare a short written report of research to date, and pass a transfer examination 18-21 months after registration.

At least as long ago as the 1940's, students proceeding to a Ph.D. degree were required by the School of Graduate Studies to complete a major subject and two minor subjects (i.e. two full courses). The main component of the major subject was (and continues to be) the preparation and oral defence of a thesis before a committee appointed by the School of Graduate

Studies (SGS) upon the advice of the department. The SGS requirements for two minor courses continued until 1990 when a change was made requiring only one minor subject, in an attempt to shorten the average time to a Ph.D. (In Biochemistry, it still averaged 5.7 years in 1987-91.) Then in 1997 the School of Graduate Studies transferred the responsibility for determining the appropriate amount of course work to the departments, now termed "graduate units". For Biochemistry, the courses to be completed were: the course credit equivalent of a University of Toronto M.Sc. degree in biochemistry if not already completed; one graduate level half-course in the major subject (biochemistry); and for the minor requirement, two graduate level half-courses, either internal or external (from cognate departments), including at least one session of BCH 2021H, Selected Topics in Biochemistry. Participation in BCH 2022Y, the Doctoral Seminar Course in Biochemistry was also required. The language requirement (proficiency in French and German) for the Ph.D. degree had been dropped in the late 1960's as more of the biochemical literature was being published internationally in English.

Up until 1966, part of the major requirements for a Ph.D. degree was successful completion of a comprehensive oral examination administered by the professors in the Department of Biochemistry. To prepare for this examination, the candidates usually tried to memorize most of the current textbook of biochemistry. Typewritten reports of the performance of the candidates at these examinations in the 1930's, 1940's and early 1950's have survived and are in the Departmental archives. When it was finally concluded that the subject of biochemistry had become so broad that it was unrealistic to expect comprehensive knowledge, the Research Proposal was introduced in 1967. It was to be a 2-5 page written research proposal in any field of biochemistry not directly related to the

candidate's own field of research, and the topic was to be approved by the Chairman. The candidate was to give a 30 minute seminar to the examining professors and defend the proposal. In 1981, the requirements were changed to allow the proposal to be on a topic related to the candidate's own research. In 1984, it was decided that students, if they wished, could have a mentor to guide them in preparing a research proposal and a list of short titles was obtained from faculty members who were willing to act as mentors and provide a series of tutorials for the candidate. At this time the proposal was "not to exceed 10 double spaced pages" and was to be completed in 6-7 weeks. Dissatisfaction continued with the length of time that graduate students were spending preparing their proposals, and there were questions about its value in the education of the students, so in 1992 the research proposal was made optional, designated as BCH 2023H, and allowed to satisfy the requirement for an internal minor half-course. Students who chose not to prepare a research proposal were required to complete two half courses for their internal minor. Currently, the course requirements for the Ph.D. degree are one unit of BCH 2021H, plus two other graduate level half courses.

Although weekly seminar presentations by graduate students began in 1924, it is not clear when the 4 o'clock Wednesday afternoon seminars were first listed as BCH 2022 and M.Sc. candidates were required to present at least one seminar of 20 minutes, and Ph.D. candidates at least three. These requirements are listed by the department in 1975, but may have been in force much earlier. By 1979, the instructions for graduate students suggested that "some Ph.D. students, particularly those approaching the completion of their programme, may arrange to give a longer seminar". It was not until 1992 that the requirement for this longer seminar appears in the "Procedures and Regulations for Biochemistry Graduate Students". At that time, the practice was begun of having the attending professorial staff provide feedback in a "constructive criticism" session following each seminar presentation. The attending professorial

staff now rate the student's performance, and the ratings are added to the student's file.

### **M.Sc. Program**

Originally, the master's degree awarded by the Department of Biochemistry (and other science departments) was Master of Arts (M.A.). The second recipient was James Bertram Collip in 1913 and the third was Agnes Isabel Muldrew in 1919. In 1965, the degree was changed to Master of Science (M.Sc.). Up until the academic year 1998-1999, the departmental course requirement for the masters degree was that "the candidate must complete or have completed course requirements that demonstrate a level of expertise equivalent to that of a specialist in the biochemistry undergraduate program at the University of Toronto". Thus many students in the masters program did not have to take any additional courses. Beginning in 1999, as a result of criticism in the 1997 review of the department by the Ontario Council of Graduate Studies, candidates for the master's degree were also required to complete one session of BCH 2021H, Selected Topics in Biochemistry. Participation in the Master's Seminar course in Biochemistry, now designated BCH 2020Y, and presentation of one 30 minute seminar, continued to be requirements, with "constructive criticism" of the seminar as described for the seminars by Ph.D. candidates. Preparation of a thesis and successful completion of an oral examination, organized by the department, has almost always been a requirement for the master's degree, although in 1949 and 1955, two students obtained an M.A. degree "by examination".

### **Graduate student supervision**

A 1966 memo states that "the Department has now adopted the policy of appointing a co-supervisor for each graduate student". This arrangement continued until 1992 when the practice began of having supervisory committees with a minimum of three faculty members. At least yearly, students are required to prepare a short report of their work to date, give an informal, but

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organized, presentation to their committee, and discuss the direction that the research is taking. A report is prepared for the student's file.

In 1970, Canadian biochemists became concerned that the numbers of graduating Ph.D. and M.Sc. students were so large that they would have difficulty finding employment. Prof. G. R. Williams wrote an article in the Bulletin of the Canadian Biochemical Society outlining this perceived problem. In that year, our department had granted 27 graduate degrees, 13 of them Ph.D. degrees, although there were only 16 professors in the core department and 3 status-only/cross-appointed professors. In 1971, Prof. G. R. Williams proposed that we limit the number of graduate students to 2 per professor at any one time, and the professorial staff agreed. However, by 1978 this "rule-of-two" was abolished since the system appeared to be self-regulating.

In 1999, an optional rotation system (three periods of 6 weeks each) was introduced for entering graduate students who wished to have experience in different laboratories before reaching a mutually satisfactory arrangement with a supervisor.

The number of periods of rotation was soon reduced to two, and over the years only a few students have made use of this option before choosing a supervisor. In 2000, a Supervisor-Student Agreement form was introduced to formalize the arrangements made between the entering student and the supervisor. Detailed instructions for graduate students are now on the Biochemistry Website.

By November of 2007, graduate student numbers in Biochemistry had reached 142, almost equally divided between the M.Sc. and Ph.D. programs. Today our graduates have an incredible diversity of opportunities. While most Ph.D. graduates pursue post-doctoral studies (usually in the USA) many go on to medical, dental or veterinary school. Some M.Sc. graduates also enrol in these professional programs or in Law or Business Administration. Others find employment as laboratory technicians in universities, hospitals,

and in the biotechnology sector. Upon completion of post-doctoral training, many of our graduates have taken up faculty positions. Others have gone into industry as project directors, or found employment in scientific publishing, research administration, and other rewarding careers.

### **Graduate Student Activities**

The Biochemistry Graduate Students' Union (BGSU) was formed in 1971, coinciding with the adoption of the Constitution of the Department of Biochemistry. The BGSU is not a labour union, but an organization to co-ordinate the activities of the graduate students. The 1970 draft of the Constitution provided for 8 graduate students to be elected by their fellow graduate students to be on the Departmental Council, 4 of these were to be members of the Graduate Committee, and one was to be on the Executive Committee. Changes over the years resulted in only 2 or 3 graduate students on the Graduate Committee during the 1980's, and none from 1989 to 1996. From 1997 to the present, only the president of the BGSU has been on the Graduate Committee. In addition, the BGSU executive meets on a regular basis with the Graduate Coordinator and Department Chair to address issues of importance to students, such as student funding situations. The Executive (or Council) of the BGSU, currently numbering 8 students, is elected each year by the graduate students. In addition, numerous non-elected active participants facilitate the activities of the BGSU.

The BGSU organizes the graduate student seminar program on Wednesdays at 4:00 p.m., the Open House for prospective graduate students in January, Research Day in the spring, the participation of graduate students in U of T day each fall, and several information sessions. Social events include an annual ski day during the February study week, a squash ladder, and baseball during the summer. Also, the BGSU has had an active role in organization of the "Last Friday of the Month" parties, a monthly social gathering of students from all departments of the Faculty of Medicine at the University

of Toronto. In 2002, a golf day was introduced. The BGSU plays an important part in organizing events to welcome new students to the Department every year. The BGSU also organizes the Schachter Lectureship, introduced in 2004, that allows for the invitation of an alumnus of the Department to visit and meet with current students and to share his/her career and personal experiences since graduation.

The BGSU is a member union of the Graduate Student Union of the University of Toronto. As such, their representatives attend monthly meetings to represent the students of the Department of Biochemistry within the greater community of all graduate students at the University of Toronto.

From 1984 to 2005, the Bioeclectic Journal Club, organized by Professor Jacqueline Segall, had their meetings on the fifth floor of MSB on Friday mornings at 9:00 a.m. However, presentations were not limited to those of graduate students.

In 2001-02, the BGSU published a "Who's Who Handbook of Biochemistry" with pictures and information about the current graduate students and the professors. In 2003, the BGSU website was launched ([www.bgsu.ca](http://www.bgsu.ca)) that replaced the publication of a paper Handbook and has provided a forum for biochemistry graduate students whose laboratory space is located throughout the University of Toronto research community

In 2007 the BGSU had the following statement on the web: "Our mission is to improve the quality of the education and experience of biochemistry graduate students by facilitating academic and social events. We endeavour to create a vibrant community among and between graduate students of the biochemistry department and various academic departments." Over the years, the participation of the BGSU in departmental activities has been greatly appreciated by the professorial staff who recognize the unique contributions that the BGSU makes to decisions about graduate studies and to the experiences of the graduate students.



Ski Outing, Blue Mountain, 1972

Jack Kornblatt, Judy Kornblatt, Joel Parkes, Jeanne Orr, Jean Gagnon, Mike Asselin, Cathy Painter, Chuck Painter, Bob Painter, ?



Ski Day 2007



Baseball 2007

Karen Rothfels, Rishi Rakhit, Ronnie Lum, David Williams, Battista Calvieri, Johnny Tkach, Lori Rutkevich, Sian Patterson, Steven Doyle, Joanne McLaurin

# CHAPTER 15

## Graduate Student Awards

### David A. Scott F.R.S. Award

In 1975, the first recipient of the David A. Scott, F.R.S. award was David Isenman, who later (1978) joined the professorial ranks in the department. This annual award is the income from \$2000 given by Mrs. Bertha Scott in memory of her husband who had died in 1971. He was a graduate of the Honours Science program at U of T, and also obtained a Master's degree and a Doctorate (1925) here. Dr. Scott had been a Research Member of Connaught Medical Research Laboratories, involved in modifications of insulin and the establishment of an international standard. He discovered that zinc and some other metals could be used to produce insulin crystals and in 1935, his recipe for growing crystals of insulin enabled Dorothy Hodgkins to begin her famous X-ray investigations of insulin structure. In addition to being elected as a Fellow of the Royal Society, he was the recipient of several prestigious medals for his research work. The award in his name was to be given to "the best all-round student using as criteria, seminars, readiness and willingness to assist their fellow graduate students or staff, and perhaps demonstrator abilities, etc.". Nominations were to be solicited from all departmental members, and a committee of four (Departmental Chairman, Graduate Coordinator, one other faculty member and one graduate student) were to make the selection.

### Table 19

#### Recipients of the David A. Scott Award

1975	David Isenman
1976	Allison McGeer
1977	John Greenberg
1978	Susan Loeb
1979	Hardy Limeback
1980	Richard Zuk
1981	Margaret Rand
1982	Michael Ellison
1983	Richard Bozzatto
1984	James Down
1985	Simon Ives and Marc Perry
1986	David Haniford
1987	Linda Laciš
1988	David Law
1989	Moira Glerum
1990	Joseph Casey and Zenek Pristupa
1991	Mark Glover
1992	Not awarded
1993	Not awarded
1994	Aiko Taniguchi-Sidle
1995	Not awarded
1996	Not awarded
1997	Owen Rowland
1998	Michael DiDonato
1999	Zayna Khayat
2000	Anthony Harris and Paul Yip
2002	Roberto Botelho
2003	Ravi Ramjeesingh
2004	Christopher Tsang and Johnny Tkach
2005	Guillaume Thibault
2006	Costin Antonescu

### **Dr. L. Bradley Pett Graduate Award in Biochemistry**

In 1998, Dr. Pett made a gift of \$50,000 to establish an endowment for graduate awards in biological chemistry (Faculty of Arts and Science) and biochemistry (Faculty of Medicine) on the basis of academic achievements and financial need. Academic aspects to be considered include graduate courses taken, experimental ability, seminar presentations, posters presented at local, national and international meetings, and publications.

Dr. Pett was a graduate student in the Department of Biochemistry with Prof. A.M. Wynne. He was awarded the M.A. degree in 1932 and the Ph.D. in 1934; the titles of his theses were "The early stages of carbohydrate degradation by bacteria" and "The enzymatic breakdown of phosphoric acid esters". Upon the award of a major scholarship, he did cancer research in Stockholm, Sweden and in Cambridge, England. On his return to Canada he found employment at the University of Alberta where he played a major role in the early development of nutrition research in Canada and received his medical degree. In 1941 he moved to Ottawa as the Director of Nutrition Services for the Department of National Health and Welfare, as part of the war effort and personally wrote the first draft of Canada's Official Food Rules. From 1941 to 1962, Dr. Pett represented Canada at many international meetings related to food supplies, agriculture and nutrition. From 1946 to 1961, he was Chief of the Nutrition Division of the Department of National Health and Welfare and then became Principal Officer for Research Development and later Deputy Director General of Health Services until his retirement in 1970. He was an Advisor to the UN Relief and Rehabilitation Administration (UNRRA) from 1945-1959, chaired the International Wheat Utilization Mission and undertook missions for the WHO. In 1995, at the age of 86, Dr. Pett received the United Nations Award of Honour Medal.

### Table 20

#### **Recipients of Dr. L. Bradley Pett Graduate Award**

(supervisor is in brackets)

- 1999 Michael Leach (Prof. D.B. Williams)
- 2001 James Shaw (Prof. C. Yip)
- 2003 Bhooma Thiruvahindrapuram (Prof. B. Steipe)

#### **Beckman Coulter Award for the Best First Author Publication**

This award began in 1993 as the Beckman Award, and in 2000 it became the Beckman Coulter Award. It is supported by a generous donation from Beckman-Coulter. The dates are the year of the publication. Judging is done in the following year by a committee of professors in the department, drawn from the Graduate Committee.

### Table 21

#### **Recipients of the Beckman Coulter Award**

(supervisor is in brackets)

- 1993 Yong Rao (Prof. C.-H. Siu)
- 1994 W. Suh (Prof. D.B. Williams)
- 1995 Karen Williams (Prof. C.M. Deber)
- 1996 Bushan Nagar (Prof. J.M. Rini)
- 1997 Piotr Sliz (Prof. E.F. Pai)
- 1998 Shelley Hepworth (Prof. J.M. Segall)
- 1999
- 2000 Ning Wu (Prof. E.F. Pai)
- 2001 Christopher Lemke (Prof. P.L. Howell)
- 2002 Peter M. Hwang (Prof. L.E. Kay)
- 2003 Guillaume Thibault and Urszula Wojtyra (Prof. W.A. Houry)
- 2004 Meryl Nelson (Prof. C.A. Smibert) and Jennifer Marles (Prof. A.R. Davidson)
- 2005 Karen Rothfels (Prof. J.M. Segall)
- 2006 Tania Roberts (Prof. G.W. Brown)

### **Dorothy Sterling Dow Walsh Award**

The Dorothy Sterling Dow Walsh/Ontario Graduate Scholarship in Biochemistry was established in 2003 based on a generous donation to the University of Toronto from Marguerite Ruth Dow, a Professor Emeritus from the University of Western Ontario. She named this award in honour of her sister, Dorothy Sterling Dow Walsh, a renowned biochemist who worked for many years in the Canada Department of Agriculture.

Dorothy Walsh was born in Ottawa on August 8, 1922 and after graduating from Queen's University she enjoyed a distinguished career in scientific research. From 1942 to 1946 she was a research assistant in the Division of Physical Chemistry at the National Research Council in Ottawa and then she became a research biochemist in the Animal Research Institute of the Canada Department of Agriculture from 1946 to 1977. Concurrent positions include a Research Fellowship at the University of Amsterdam in 1963, a professorship in the Graduate Studies Program at the Central University of Venezuela in 1966 and a Visiting Professorship at Vanderbilt University in 1969. Dorothy Walsh lived in Ottawa close to her family home in the Glebe under the care of her sister, until her death in 2004.

This \$15,000 Scholarship will be given on an annual basis to the top ranked graduate student in the Department of Biochemistry who has received an OGS award. The department is very grateful for this generous award, which supports our best graduate students.

### Table 22

#### **Recipients of Dorothy Sterling Dow Walsh Award**

(supervisor is in brackets)

- 2004 Michael Chang (Prof. G.W. Brown)
- 2005 Laura Rendl (Prof. C.A. Smibert)
- 2006 Mary Christine Bruce (Prof. D. Rotin)

### **Outstanding Teaching Assistant Award**

This award began in 2005. It was proposed by our undergraduate students to recognize excellence in clarity, knowledge base, adaptability, performance, approachability and course development by the Biochemistry Teaching Assistants. BUSS provides funding that is matched by the Department.

### Table 23

#### **Recipients of the Outstanding Teaching Assistant Award**

- 2005 Jonathan Steels, Karen Rothfels
- 2006 Lisa Pell, Ghadeer Shubassi, Costin Antonescu, Eden Fussner
- 2007 Dana Patterson, Sian Patterson

### **Poster Day Awards**

Although there are records of Research Days (organized by GOFOM, Graduate Organization, Faculty of Medicine) with posters in January of 1983 and May of 1984, with two guest lecturers, the annual Biochemistry Poster Day was not formally inaugurated until 1988, with first, second and third prizes for posters by M.Sc. candidates and by Ph.D. candidates. Beginning in 2004, there was no 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> place, just 3 winners for Ph.D. and 3 for M.Sc. A prize for the best Post Doctoral Fellow poster was introduced and 3 oral presentation awards were given.

The prize money is derived from funds established upon the retirements of Prof. Hanes (1968) and Prof. Crocker (1970), originally used for the Emeritus Professor Book Prize for undergraduates, combined with a fund established in honour of Prof. Jeanne Manery Fisher. In 1990, the Annual Theo Hofmann Biochemistry Lecture, established in 1989 upon his retirement, became part of Poster Day activities. Records of the winners of the first four Poster Days (1988-1991) have not been found.

Table 24

**Recipients of Poster Day Awards**

1992	Ph.D. Roger Ebanks, Yong Rao M.Sc. Lawrence Ebisuzaki, Arvind Nanda	2002	Ph.D. Arianna Rath, Tony Mittermaier, Roberto Botelho M.Sc. Urszula Wojtyra, Jennifer Marles, Linh Van
1993	Ph.D. Yong Rao, (Karen Williams, Pretty Brar) tied M.Sc. Janet Souliere, Richard Kim, Paul Robson	2003	Ph.D. Jeffrey Lee, Bomina Yu, Jianfei Qi M.Sc. Jennifer Marles, Eileen Lo, Guillaume Thibault
1994	Ph.D. Frank Merante, Kathy Vassilakos, Frieda Chen M.Sc. Woongkyung Suh, Xiaoning Zhao, Lisa Tam	2004	Ph.D. Jeffrey Lee, Ravi Ramjeesingh, Tania Roberts M.Sc. Ronnie Lum, Monika Podkowa, Wanyi Xiang PDF Shintaro Besshoh Oral Presentations: Rishi Rakhit, Cameron Scott, Karen Rothfels
1995	Ph.D. (Shelley Hepworth, Kathy Vassilakos) tied, Fabian Seibert M.Sc. Celia Taha, Andre Siegel	2005	Ph.D. Lellean Jebailey, Ben Pinder, Yinan Zhang M.Sc. Lia Cardarelli, Sagar Dugani, Rishi Rakhit PDF Anna Gribun Oral Presentations: Eva Amsen, Michael Chang, Emmanuelle Cordat (PDF)
1996	Ph.D. Kathy Vassilakos, Woongkyung Suh, Pamela Plant M.Sc. Celia Taha, James Kuo, Piotr Sliz	2006	Ph.D. Ben Pinder, Sean Reichheld, Wanyi Xiang M.Sc. Jean-Philippe Julien, Sarah Mansour, Sian Patterson PDF Yuri Lobsanov Oral Presentations: Fiona Cunningham, Arash Zarrine-Afsar, Johnny Tkash
1997	Ph.D. Piotr Sliz, Shelley Hepworth, Woongkyung Suh M.Sc. Ariel DiNardo, Chunzhong Yang, Voula Kanelis	2007	Ph.D. Usheer Kanjee, Ben Pinder, Shrivani Sriskanthadevan M.Sc. Jean-Philippe Julien, Wioletta Glowaska, Derek Ng, Jenny Hsu PDF Allison Ferguson Oral Presentations: David Tulumello, Tania Roberts
1998	Ph.D. John Vince, Nana Lee, Michael Didonato M.Sc. Bernie Charlton, Liliana Sampaleanu, Leonard Foster		
1999	Ph.D. Tony Harris, John Vince, Pamela Plant M.Sc. Julian Northey, Chen Wang, Andy Jankowski		
2000	Ph.D. Natalie Goto, Zayna Khayat, Ariana Rath M.Sc. (Varinder Randhawal, Roberto Bothelho) tied, Ning Chen		
2001	Ph.D. Christopher Lemke, Voula Kanelis, Janne Quilty M.Sc. Victoria Stronge, (Jeffrey Lee, Jianfei Qi) tied		

# CHAPTER 16

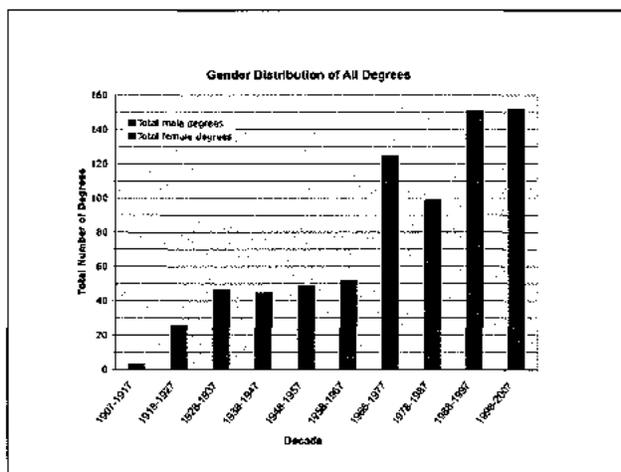
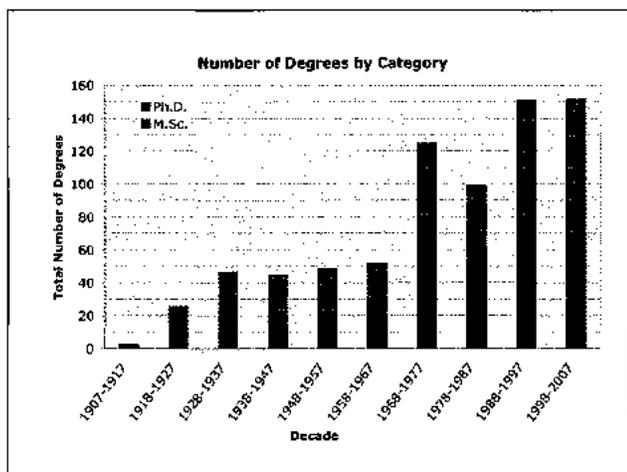
## Students Granted Graduate Degrees Through the Department of Biochemistry

Although Professor A.B. Macallum became head of the newly created Department of Biochemistry in 1907-08, the first graduate degree in biochemistry was not awarded until 1912. Degrees were also granted by the Department of Zymology (Chairman Prof. H.B. Speakman) from 1919 until 1929 when it merged with the Department of Biochemistry. These degrees are listed in our records and many of the theses are in the department's collection, probably because they were saved by Prof. Wynne.

Until 1975, a number of students whose supervisors were in other departments were granted degrees through the Department of Biochemistry, and until 1964 when the Ontario Agricultural College (OAC) became part of the newly formed University of Guelph, some of the OAC students obtained their degrees through the Department of Biochemistry at the University of Toronto. In addition, there appears to have been a connection (1929-1933) with Dr. A.G. Lochhead at the Central Experimental Farm in Ottawa.

The date in several theses differs by a year from that printed in "University of Toronto Doctoral Theses, 1897-1967" and "1968-1975". In addition, the title in some of the theses is not the same as that recorded by the University. In both these instances, the dates and titles are given below as they appear on the theses in the department's collection. A number of theses, particularly earlier ones, are missing, but their titles have been found in the University Archives. The following information up to the end of 2007 also exists as a card index, arranged alphabetically.

By the end of 2007 the department had granted 749 graduate degrees, 381 Masters degrees and 368 Ph.D. degrees. The number of degrees granted rose sharply after 1967. Although men have always outnumbered women (66% vs 34%) in the number of degrees obtained, the imbalance was greatest in the early years.



## Table 25

### Graduate Students Who Later Became Heads of Departments

Many graduate students who obtained Ph.D. degrees in the Department of Biochemistry later became Heads of Departments of Biochemistry and related disciplines in Canada and in other countries. At least three became Presidents of Universities. The following list is undoubtedly incomplete.

Professors Arthur Wynne, George Connell and Harry Schachter became the Chair of Biochemistry at the University of Toronto, and Professors Marian Packham, David Williams and David Isenman served as Acting Chairs at Toronto.

	Date of Chairmanship	University
James Bertram Collip (Ph.D. 1916)	1922-28	Alberta
James Bertram Collip	1928-41	McGill
Henry Borsook (Ph.D. 1924)		Cal. Tech. USA
(He chaired the department of biochemistry twice.)		
Arthur Marshall Wynne (Ph.D. 1925)	1951-60	Toronto
Herbert Bruce Collier (Ph.D. 1930)	1946-49	Saskatchewan
Herbert Bruce Collier	1950-61	Alberta
Marvin Don Darrach (Ph.D. 1941)	1950-72	British Columbia
John Alexander McCarter (Ph.D. 1945)	1950-65	Dalhousie
Harold Brown Stewart (Ph.D. 1950)	1965-70	Western Ontario
Dean of Graduate Studies 1971-1985		
Christopher Walter Helleiner (Ph.D. 1955)	1965-78	Dalhousie
George Edward Connell (Ph.D. 1955)	1965-70	Toronto
Gordon H. Dixon (Ph.D. 1956)	1972-74	Sussex, U.K.
Gordon H. Dixon	1983-93	Calgary
Alastair T. Matheson (Ph.D. 1957)	1984-85	Victoria
(In 1985 he became Dean of Science.)		
James M. Neelin (Ph.D. 1958)	1978-85	Carleton
and	1989-93	
(He was also Dean of Science, Jan. 1984 for 5 1/2 years.)		
Karl D. Freeman (Ph.D. 1959)	1973-79	McMaster
Harry Schachter (Ph.D. 1964)	1984-89	Toronto
W. Carl Breckenridge (Ph.D. 1970)	1993-?	Dalhousie
Kevin M. Keough (Ph.D. 1971)	1986-93	Memorial
(He became Vice President, Research, in 1992)		
Gerhard Gerber (Ph.D. 1975)	1991-96	McMaster
Jeffrey T. Wong (Ph.D. 1962)	1990-	Hong Kong Univ. of Science and Technology

Table 26

**Chairs of Departments other than Biochemistry**

	Date of Chairmanship	University
Hugh D. Branion (Ph.D. 1933) (Chair of Dept. of Nutrition)	1938-64	OAC (Guelph)
James H. Dauphinee (Ph.D. 1929) (Chair of Dept. of Pathological Chemistry)	1947-66	Toronto
Joseph Francis Morgan (Ph.D. 1945) (Chair of Dept. of Cancer Research)	1962-76	Saskatchewan
Rose Sheinin (Ph.D. 1956) (Chair of Department of Microbiology and Parasitology)	1976-82	Toronto
Michael C. Archer (Ph.D. 1970) (Chair of Department of Nutritional Sciences)	1999-08	Toronto

Table 27

**University Presidents**

	Date of Chairmanship	University
George Edward (Eddie) Hall (M.A. 1931)		Western Ontario
Lung-Hsien Chang (Ph.D. 1942)		University of Peking
George Edward Connell (Ph.D. 1955)	1977-84	Western Ontario
George Edward Connell (Ph.D. 1955)	1984-90	Toronto

Table 28

## List of Biochemistry Graduate Students (1912-2007)

Year	Student	Degree	Supervisor	Year	Student	Degree	Supervisor
1912	Campbell, Walter Ruggles	M.A.	A.B. Macallum	1924	Borsook, Henry	Ph.D.	H. Wasteneys
	On the elimination of acids by the mammalian kidney.				The synthesising action of pepsin.		
1913	Collip, James Bertram	M.A.	A.B. Macallum	1924	Dauphinee, James Arnold	M.A.	A. Hunter
	Some observations on the structure and microchemistry of nerve cells.				The distribution of arginase in animals with special reference to the shore fishes of the east coast of Vancouver Island.		
1916	Collip, James Bertram	Ph.D.	A.B. Macallum	1924	Dunbar, Violet Evelyn	M.A.	H. Wasteneys
	On the formation of hydrochloric acid in the gastric tubules in the vertebrate stomach.				Studies in the kinetics of peptic digestion of egg albumin.		
1919	Muldrew, Agnes Isabel	M.A.	A. Hunter	1924	Morrell, Joseph Alan	Ph.D.	A. Hunter
					Kinetics of arginase.		
1921	Robinson, Guy Chapman	M.A.	H.B. Speakman	1924	Ridout, Jessie Hamilton	M.A.	A. Hunter
	The fermentation of the common sugars by <i>Bacillus granulobacter butylicum</i> .				The relation between glycemia and cholesterolemia in normal, hypoglycemic and hyperglycemic animals.		
1921	Urquhart, R.W. Ian	M.A.	A. Hunter	1925	Geddes, William Faraday	M.A.	A. Hunter
	The formation of unsaturated acids by bacteria action.				A study of the enzyme asparaginase.		
1922	Borsook, Henry	M.A.	H. Wasteneys	1925	Gee, Albert Haldane	Ph.D.	H.B. Speakman
	The peptic digestion of globin.				Influence of sodium chloride and other salts on growth and metabolism of yeast in wort.		
1922	Emory, Vernon H.	M.A.		1925	McAlpine, Kenneth Langrill	M.A.	A. Hunter
	The nitrogen metabolism of <i>B. granulobacter pectinovorum</i> (degree not granted)				The action of insulin in vitro.		
1922	Smith, Ralph Grafton	M.A.	A. Hunter	1925	Morrell, Clarence A.	M.A.	H. Wasteneys
	A study of the tryptic digestion of proteins.				A critical study of the effect of temperature and substrate concentration on the peptic hydrolysis of albumin.		
1923	Dempsey, Annie Evelyn	M.A.	A. Hunter	1925	Scott, David Aylmer	Ph.D.	Rogers
	The rate of the peptone formation in the acid hydrolysis of proteins.				A further investigation of the chemical properties of insulin.		
1923	Eadie, Gordon Sharp	M.A.	A. Hunter	1925	Wynne, Arthur Marshall	Ph.D.	H.B. Speakman
	The normal blood sugar of the rabbit and the effect on it of the subcutaneous injection of glucose, epinephrine and insulin.				The influence of acids on the growth and metabolism of <i>Bacillus granulobacter pectinovorum</i> .		
1923	Gee, Albert Haldane	M.A.	H.B. Speakman	1926	Barbour, Alexander Douglas	M.A.	H. Wasteneys
	Influence of sodium chloride on metabolism and growth of yeast in barley wort.				The enzymatic synthesis of glycogen.		
1923	Hutchison, F.L.	M.A.	A. Hunter	1926	Shelton, Bertram M.	M.A.	A. Hunter
					Determination of the optimum pH for the tryptic digestion of gliadin and globin.		
1924	Berkeley, Garvin Hugh	Ph.D.	A. Hunter				
	Studies on <i>Botrytis</i> .						

1927	MacFadyen, Douglas Archibald	M.A.	H. Wasteneys	The effect of hydrogen ion concentration on protein synthesis by pepsin.
1927	McKay, Donald D.	M.A.	H.B. Speakman	Bacterial deamination.
1928	Barbour, Alexander Douglas	Ph.D.	H. Wasteneys	Studies on glycogen hydrolysis.
1929	Branion, Hugh D.	M.A.	A. Hunter	The vitamin "A" content (growth promoting factor) of the liver oil of the ling ( <i>Lota maculosa</i> ).
1929	Collier, H. Bruce	M.A.	H. Wasteneys	The liberation of amides in tryptic proteolysis.
1929	Dauphinee, James A.	Ph.D.	A. Hunter	1. The quantitative determination of arginine by the use of arginase. 2. The application of the arginase method to the determination of the rate and extent of the liberation of arginine from proteins by trypsin.
1929	Dunbar, Violet E.	Ph.D.	H. Wasteneys	A study of the hydrolysis of proteins.
1929	Farrell, Leone N. (Miss)	M.A.	H.B. Speakman	An investigation of the causes of the fermentation of certain Ontario honeys, and a report of a new method for the micro-estimation of nitrogen in the presence of relatively large quantities of carbohydrates.
1929	McFarlane, William Douglas	M.A.	H.L. Fulmer & A. Hunter	A study of the comparative nutritional value of certain commercial protein supplements in poultry nutrition. I. By feeding trial. II. Analytically
1929	Stanford, G. Hunt	M.A.	H.B. Speakman	Metabolism in <i>Aspergillus niger</i> .
1930	Collier, H. Bruce	Ph.D.	H. Wasteneys	The action of light on enzymes.
1930	Heard, Robert Donald Hoskin	M.A.	A.M. Wynne	The role of phosphorus in the acetone-butyl alcohol fermentation.
1930	Johnston, William Wallace	M.A.	A.M. Wynne	The metabolism of <i>Clostridium acetobutylicum</i> (Weizmann).
1931	Emslie, Arthur Raymond Gordon	M.A.	H. Wasteneys	The formation of glycogen in the chick from ingested glucose and some three-carbon compounds.
1931	Hall, G. Edward	M.A.	E.J. King	Calcium phosphorus metabolism in the chicken.
1931	Hambleton, Arthur	M.A.	A.M. Wynne	Research on the complement fixing antibodies of tuberculosis and non-specific reactions of the complement fixation test.
1932	Butler, Margaret Ruth	Ph.D.	H. Wasteneys	An examination of the biochemical properties of the polysaccharides extracted from a marine alga <i>Chondrus crispus</i> .
1932	Campbell, James Jr.	M.A.	H. Wasteneys	The proteolytic tissue enzymes.
1932	Huntsman, M. Elinor	M.A.	C.H. Best	The role of lecithin in fat metabolism.
1932	Jenner, Harley D.	M.A.	H.D. Kay	Phosphatase – its activation by magnesium and other properties.
1932	Johnston, William Wallace	Ph.D.	A.M. Wynne	The metabolism of <i>Clostridium acetobutylicum</i> (Weizmann).
1932	MacKenzie, Ann Sadie Espigh	M.A.	H. Wasteneys	Tooth phosphatase.
1932	Maltby, Ernest J.	M.A.	H. Wasteneys	The digestion of beef proteins in the human stomach.
1932	Matenko A.	M.A.	A.M. Wynne	Salt-effects on metabolism of <i>C. acetobutylicum</i> (Weizmann).
1932	McFarlane, William Douglas	Ph.D.	R. Hamilton & A. Hunter	Studies in nutritional anaemia I, II, and III.
1932	Pett, L. Bradley	M.A.	A.M. Wynne	The early stages of carbohydrate degradation by bacteria.
1932	Riggs, Margaret	M.A.	H. Wasteneys	Investigations on the possibility of a growth promoting hormone in human tonsils.

1933	Branion, Hugh D.	Ph.D.	H.D. Kay	1935	Ignatieff, Vladimir (Jim)	Ph.D.	H. Wasteneys
	Some observations on fat-soluble vitamins A and D.				The distribution of phosphatase in some of the higher plants.		
1933	Crocker, Bruce Fenton	M.A.	H. Wasteneys	1935	Lawson, Marion Jane	Ph.D.	A.M. Wynne
	The growth function of the tonsils.				The carbohydrate metabolism of the kidney.		
1933	Farrell, Leone Norwood	Ph.D.	A.G. Lochhead	1935	Rabinowitch, Leve (Rob)	M.A.	A.M. Wynne
	Comparison of the behaviour of a number of species of yeasts in various liquid and solid culture media.				Some major factors controlling lipolytic activity.		
1933	Graham, William Richard Jr.	Ph.D.	H.D. Kay	1936	Brown, Anthony William A.	Ph.D.	H. Wasteneys
	The effect of thyroidectomy and thyroid feeding on the milk fat formation and milk secretion of cows.				Studies on protein catabolism in insects.		
1933	Jukes, Thomas Hughes	Ph.D.	H.D. Kay	1936	Cohen, Saul Louis	Ph.D.	G.F. Marrian
	Observations on the protein of avian eggs.				A study of the combined forms of oestrin occurring in human pregnancy urine.		
1933	Lawson, Marion Jane	M.A.	H.D. Kay	1937	Rabinowitch, Leve (Rob)	Ph.D.	A.M. Wynne
	The carbohydrate metabolism of kidney cortex.				Studies on pancreatic lipase.		
1933	Lemon, Herbert W.	M.A.	H.D. Kay	1938	Butler, Gordon Cecil	Ph.D.	G.F. Marrian
	The enzymatic hydrolysis and synthesis of the ethereal sulphates.				Chemical studies on some compounds isolated from human urine.		
1934	Farber, Lionel	Ph.D.	A.M. Wynne	1938	Odell, Arthur Duston	Ph.D.	G.F. Marrian
	A study of the pancreatic proteinase.				Studies on the intermediary metabolism of steroid hormones.		
1934	Hargreaves, Florence Ida	M.A.	H. Wasteneys	1939	Batho, Edith L. (m. Anderson)	Ph.D.	G.F. Marrian
	The influence of the heat labile factors of vitamin B on the large intestine of rats.				The identification of equol as 7-hydroxy-3-(p-hydroxyphenyl) chroman and the synthesis of racemic equol methyl ether.		
1934	McVicar, George Archibald	Ph.D.	H.D. Kay	1939	Fishman, William Harold (Bill)	Ph.D.	G.F. Marrian
	The enzymatic synthesis of phosphoric acid esters.				Studies on $\beta$ -glucuronidase.		
1934	Pett, L. Bradley	Ph.D.	A.M. Wynne	1939	Macpherson, Elizabeth A.	M.A.	A.M. Wynne
	The enzymatic breakdown of phosphoric acid esters.				A study of pancreatic lipase.		
1934	Proctor, Lorne D.	M.A.	W.R. Franks	1939	Mundell, Dorothy B.	M.A.	B. Mendel
	Some aspects of intermediate carbohydrate metabolism.				Purification of acetyl choline esterase.		
1934	Weinstein, Samuel	Ph.D.	A.M. Wynne	1939	Schachter, Benjamin	Ph.D.	G.F. Marrian
	Studies of pancreatic lipase.				Studies of the conjugated oestrogens and related compounds in mares' pregnancy urine.		
1935	Beall, Desmond	Ph.D.	G.F. Marrian	1939	Young, D. Murray	Prog. Report	E.W. McHenry
	A chemical study of some phenolic compounds of horses' urine.				Methods for the determination of riboflavin in biological material.		
1935	Brown, Anthony William A.	M.A.	H. Wasteneys	1940	Crocker, Bruce Fenton	Ph.D.	H. Wasteneys
	Preliminary studies on protein catabolism in insects.				A study of protein digestion in the dog.		
1935	French, Ray Palmer Curtis	Ph.D.	A.M. Wynne				
	Studies on wheat and other cereal lipases and on the fat metabolism of yeast.						

- 1940 Freed, Myer Ph.D. A.M. Wynne  
Studies of the synthesis of glycerides by means of pancreatic lipase.
- 1940 Hamilton, Paul Bernard Ph.D. H. Wasteneys  
The use of deuterium in studies of protein digestion in vivo.
- 1940 Ryan, Ernest A. M.A. G.F. Marrian  
Chemical studies on some compounds isolated from normal male urine.
- 1940 Stephenson, Norman R. M.A. F.G. Banting  
Biochemical studies of histamine.
- 1940 Wenzel, John Stanley M.A. R.A. Cleghorn  
Studies of iodoacetate poisoning in dogs.
- 1941 Biehn, Margaret E. M.A. A.M. Wynne  
Carbohydrate and fat formation in yeast.
- 1941 Darrach, Marvin Don Ph.D. C.E. Dolman  
The separation and identification of antigenic components of staphylococcal culture filtrates.
- 1941 Irvine, Owen Rutledge M.S.A. W.H. Sproule  
A study of some of the factors believed to be involved in the production of volatile acidity and peroxides in cheddar cheese during ripening.
- 1941 Slinger, Stanley J. M.S.A. J. Manery Fisher  
Electrolyte studies in developing telent eggs.
- 1941 Tuba, Jules Ph.D. A.M. Wynne  
Some properties of yeast phosphatase and factors affecting its formation.
- 1942 Chang, Lung-Hsiang Ph.D. L. Young  
A study of the absorption and metabolism of polycyclic hydrocarbons.
- 1942 Clarke, Albert Percival W. M.A. D. Graham  
Tissue electrolyte studies in shock and adrenal insufficiency.
- 1942 Laughland, Donald H. M.A. L. Young  
An investigation of the properties of aryl hydrogen sulphates and the development of methods of isolating them from urine.
- 1942 Macpherson, Elizabeth Adams Ph.D. A.M. Wynne  
The properties and formation of intestinal phosphatase.
- 1942 Stephenson, Norman Robert Ph.D. B. Mendel  
An investigation into the purification, the kinetics of the action of histaminase, the nature of the reaction catalysed by the enzyme, and the value of histaminase in the therapy of histamine shock.
- 1942 Watson, James Keith Ph.D. E.J. King  
Organic compounds of silicon.
- 1942 Zbarsky, Sidney Howard M.A. L. Young  
A chemical and biochemical study of the mercapturic acids.
- 1942 Shen, Chao-wen Ph.D. A.M. Wynne  
Factors affecting the formation and the action of yeast phosphatase.
- 1943 Patrick, Sydney John M.A. L. Young  
Biochemical studies of the action of mustard gas on skin
- 1943 Simpson, Stuart Douglas M.A. L. Young  
Studies of the synthesis, toxicity and antidotal properties of thiols.
- 1943 Young, D. Murray M.A. E.W. McHenry  
Methods for the determination of riboflavin in biological material.
- 1944 Barton, Ambrose Donald M.A. L. Young  
Studies of the chemistry of the monoaryl sulphates.
- 1944 Emmett, Mary A. M.A. A.M. Wynne  
Intestinal phosphatase.
- 1945 Graham, Walter Donald M. Ph.D. A.M. Wynne  
The mechanism of the toxic action of W in the animal body.
- 1945 McCarter, John Alexander Ph.D. L. Young  
Biochemical aspects of mustard gas poisoning.
- 1945 McKonkey, Hilda M. M.A. by examination  
Biochemical genetics.
- 1945 Morgan, Joseph F. Ph.D. A.M. Wynne  
Physiological and biochemical studies on the mode of action of the toxic protein W.
- 1945 Motzok, Ilary Ph.D. A.M. Wynne  
Studies on the phosphatases of rachitic chicks.
- 1946 Zbarsky, Sidney Howard Ph.D. L. Young  
A study of the antidotal activity of BAL with respect to lewisite.

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|------|-----------------------------|------------|--------------------------|---|
| 1946 | Lourié, Marianne            | M.A.       | A.M. Wynne               | Purification of the alkaline phosphatase of kidney and the influence of metallic ions and amino acids on its activity.  |
| 1946 | Patrick, Sydney John        | Ph.D.      | L. Young                 | Biochemical studies of the action of mustard gas and two of its derivatives.  |
| 1946 | Rose, Dyson                 | Ph.D.      | A.M. Wynne               | I. Studies on the fermentation of dextrose by <i>Aerobacillus polymyxa</i> (Donker) under anaerobic and aerobic conditions. II. Studies on the amylase produced by <i>A. polymyxa</i> . |
| 1946 | Simpson, Stuart Douglas     | Ph.D.      | L. Young                 | Biochemical studies of BAL (British anti-lewisite).   |
| 1947 | Berenbom, Max               | Ph.D.      | L. Young                 | Part I. Studies of the effect of BAL (British anti-lewisite) on cadmium poisoning. Part II. The metabolism of 1- and 2-naphthol in the rat.   |
| 1947 | Laidlaw, John C. (Jack)     | M.A.       | L. Young                 | The mode of formation of ethereal sulphates in the rat.   |
| 1947 | Manson, Lionel Arnold       | M.A.       | L. Young                 | The metabolism of 2-naphthylamine and its acetyl derivative.  |
| 1947 | Stewart, Gordon Stafford    | Ph.D.      | A.M. Wynne               | Biochemical studies on the mechanism of action of W.  |
| 1948 | Barlow, John Stanley (Jack) | M.A.       | J. Manery Fisher         | The sodium, potassium, chloride and water concentration, and the permeability to chloride of young chick muscle.  |
| 1948 | Holmes, William L.R.        | M.A.       | A.M. Wynne               | The effect of transplanted mouse mammary carcinoma on the cytochrome oxidase – cytochrome c system of the chick embryo.   |
| 1948 | Josseau, Oriana             | M.A.       | C.C. Lucas               | Phosphorus-containing compounds precipitated from solutions of lipids by magnesium chloride.  |
| 1948 | Low, G.A.                   | B.Sc. Med. | G.C. Butler              |   |
| 1948 | Porter, Charles Jack        | M.A.       | B.F. Crocker             | Chromatographic techniques in relation to biochemistry.   |
| 1948 | Solkin, Elizabeth R.        | M.A.       | L. Young and G.C. Butler | Quantitative studies on conjugated glucuronic acid formation in animals.  |
| 1948 | Wilson, D. Laurence         | M.A.       | J. Manery Fisher         | The permeability of rabbit leukocytes to sodium, potassium and chloride.  |
| 1949 | Boylen, Joyce B.            | M.A.       | A.M. Wynne               | The effect of alloxan diabetes and connective tissue sarcoma on serum alkaline phosphatase and blood sugar level in the albino rat.   |
| 1949 | Laughland, Donald Hartney   | Ph.D.      | A.M. Wynne               | Biochemical studies related to vitamin A.   |
| 1949 | Little, James Alexander     | M.A.       | G.C. Butler              | The enzymatic degradation of thymus desoxyribonucleic acid.   |
| 1949 | Moore, Alexander McBain     | Ph.D.      | L. Young and G.C. Butler | A biochemical study of certain compounds related to the purines and pyrimidines.  |
| 1949 | Slater, Robert J.           | B.Sc. Med. | G.C. Butler              | The immunochemistry of thymonucleoprotein and nucleic acid.   |
| 1949 | Smith, David Burrard        | Ph.D.      | G.C. Butler              | An investigation of the mechanism of the action of ionizing radiations on sodium thymonucleate.   |
| 1949 | Stewart, C. Gordon          | M.A.       | A.M. Wynne               | An investigation of the carbohydrate metabolism of humans suffering from malignant neoplasia.   |
| 1950 | Eldridge, Eleanor           | M.A.       | L.B. Macpherson          | An inositol-containing phospholipid from soy bean.  |
| 1950 | Holmes, William L.R.        | Ph.D.      | A.M. Wynne               | Investigations of the enzyme systems and of the metabolisms of normal and tumor-bearing chick embryos.  |
| 1950 | Jackson, Albert William     | Ph.D.      | A.M. Wynne               | The purification and properties of bacterial amylases.  |
| 1950 | Lau, R.E.                   | B.Sc. Med. | H. Wasteneys             | Studies on amino acid metabolism.   |
| 1950 | O'Reilly, John D.           | M.A.       | A.M. Wynne               | The enzymatic degradation of glucosamine.   |
| 1950 | Stewart, Harold Brown       | Ph.D.      | A.M. Wynne               | The action of chloramine-T on $\alpha$ -amino acids and the purification and analysis of cytochrome c.  |

- 1952 Barlow, John Stanley (Jack) Ph.D. J. Manery Fisher  
Changes in the concentrations of electrolytes in chick tissues during growth.
- 1952 Hurst, Robert Osmond Ph.D. G.C. Butler  
The enzymatic degradation of thymus nucleic acid.
- 1952 Koppel, Johannes Leopold (Leo) Ph.D. B.F. Crocker  
Mechanism of the synthesis of enzymes.
- 1952 Maclean, Ian M.A. B.F. Crocker  
The adaptive nature of serine deaminase in *E. coli*.
- 1952 Marko, Arthur Myrosław Ph.D. G.C. Butler  
Chemical studies of desoxyribonucleoprotein.
- 1952 Smillie, Lawrence Bruce M.A. J. Manery Fisher  
Changes in the rate of oxygen consumption and in the potassium content of muscles caused by insulin and lactate in media of different potassium concentrations.
- 1952 Stewart, Pauline (née Blake) M.A. J. Manery Fisher  
The effect of ions on the interaction of adenosine triphosphate and isolated rabbit psoas muscle fibres.
- 1953 Porter, Charles Jack Ph.D. B.F. Crocker  
The mechanism of the induced formation of enzymes.
- 1953 Sheinin, Rose M.A. B.F. Crocker  
Investigation of the metabolism of succinic acid in normal rat liver and rat hepatoma.
- 1953 Wilson, James Douglas M.A. R.J. Wilson  
Proteinuria in the male albino rat.
- 1954 Cohen, Leonard Harvey Ph.D. G.C. Butler  
Studies of nucleic acid metabolism in the chicken embryo.
- 1954 Odense, Paul H. M.A. B.F. Crocker  
A study of fat digestion in the dog.
- 1954 Packham, Marian Aitchison Ph.D. G.C. Butler  
Studies of glucuronide synthesis and glucuronic acid metabolism in the rat.
- 1954 Shimizu, T. M.A. W.R. Franks  
The biochemistry of anoxia with specific reference to the determination of pre-mortem anoxia as a cause of death in accidents.
- 1954 Walker, Ian Gardner Ph.D. G.C. Butler  
The isolation and properties of desoxyribose nucleotides and nucleosides.
- 1955 Broniszer, Zuleika (Miss) M.A. G.C. Butler  
Nucleic acid metabolism in *Escherichia coli*.
- 1955 Connell, George Edward Ph.D. C.S. Hanes  
Aspects of  $\gamma$ -glutamyl transpeptidation reactions.
- 1955 Helleiner, Christopher Walter Ph.D. G.C. Butler  
Studies of the structure of desoxyribonucleate.
- 1955 Holmes, Richard Ph.D. B.F. Crocker  
The mechanism of the biosynthesis of enzymes.
- 1955 Smillie, Lawrence Bruce Ph.D. G.C. Butler  
The isolation and properties of proteins associated with desoxyribonucleic acids.
- 1956 Dixon, Gordon Henry Ph.D. C.S. Hanes  
Transpeptidation reactions in biological systems, with special reference to the specificity and kinetics of the reaction catalyzed by the cabbage glycyl transpeptidase.
- 1956 O'Neill, K. Eleanor (née Toye) M.A. J. Manery Fisher  
An investigation of the effect of insulin on the potassium content of frog muscles. II. The effects of inhibitors.
- 1956 Sheinin, Rose Ph.D. B.F. Crocker  
Some investigations into the mechanism of enzyme formation.
- 1956 Govind, K. Kochu Ph.D. C.C. Lucas  
Some studies of fatty and cirrhotic livers.
- 1957 Bojarski, Tadeusz B. Ph.D. A.M. Wynne  
Biochemical studies on cellular constituents derived from normal and malignant cells.
- 1957 Hu, Stella T. (née Chang) M.A. G.C. Butler  
Studies of nucleotide metabolism in *Escherichia coli*.
- 1957 Husdan, Hyman Ph.D. J. Manery Fisher  
The relation of electrolytes to metabolism in brain tissue.
- 1957 Kinsman, George Herbert Ph.D. G.C. Butler  
Studies of the biosynthesis of urinary glucuronides.
- 1957 Matheson, Alistair Taylor Ph.D. C.S. Hanes  
A study on certain intracellular peptidases.
- 1957 Meakin, J. William M.A. J. Manery Fisher  
The effect of insulin on the electrolytes and rate of oxygen consumption of frog muscle. III. The influence of pH, various metabolites and inorganic ions.

1957	Murray, Daniel Harry	Ph.D.	G.C. Butler	Studies of nucleic acid metabolism with radioactive isotopes.
1957	Taylor, Joyce	M.A.	B.F. Crocker	Certain aspects of the mechanism of the induced formation of enzymes.
1958	Michener, Diana Mary Louise	Ph.D.	B.F. Crocker	Further aspects of the biosynthesis of enzymes.
1958	Neelin, James Michael	Ph.D.	G.C. Butler	Physical and chemical studies of nuclear proteins.
1958	Wade, Elizabeth H.M. (Beth)	M.A.	C.S. Hanes	Quantitative chromatography of the amino acids in proteins and polypeptides.
1959	Craston, Ann (née Robertson)	M.A.	J. Manery Fisher	Electrolyte studies in mitochondria.
1959	Diringer, Renata (m. Maas)	Ph.D.	G.C. Butler	Chemical and metabolic studies of nucleic acids using snake venom diesterase.
1959	Freeman, Karl Boruch	Ph.D.	G.C. Butler	Studies of ribonucleases and ribonucleate metabolism.
1959	Harris, Clifford Kaye	Ph.D.	C.S. Hanes	Enzymic studies relating to the problem of protein synthesis.
1959	Kahan, Fred M.	M.A.	B.F. Crocker	The permeability barrier to galactosides in <i>Escherichia coli</i> .
1959	Lane, Byron George	Ph.D.	G.C. Butler	The alkali hydrolysis of ribonucleates.
1959	Morton-Coval, Helen J.	M.A.	B.F. Crocker	A study of the formation of enzymes by <i>E. coli</i> B in the absence of external inducers.
1959	Walsh, Kenneth Andrew	Ph.D.	C.S. Hanes	Mechanisms of enzyme transfer reactions.
1960	Mayoh, Helen	M.A.	J. Manery Fisher	Carbohydrate metabolism in the frog.
1960	McMurray, Astra (née Hasner)	M.A.	J. Manery Fisher	The effect of insulin on the electrolytes and rate of oxygen consumption of frog muscle.
1961	Marcus, George Jacob	Ph.D.	J. Manery Fisher	Electrolytes and metabolism in pigeon muscle mitochondria.
1961	Ma'Tuk, Yousef K.	M.A.	J. Manery Fisher	Lens metabolism and ion movement.
1961	Murray, Robert Kincaid	Ph.D.	G.E. Connell	The role of haptoglobin in haemoglobin metabolism.
1961	Webb, Thomas Evan	Ph.D.	C.S. Hanes	A study of certain conjugated peptidases.
1962	Kalutich, Leonard Peter	M.A.	G.E. Connell	The purification of human serum cholinesterase.
1962	Moscarello, Mario Anthony	Ph.D.	C.S. Hanes	Some biochemical studies related to the growth of tumour cells.
1962	Shaw, Ralph William	M.A.	G.E. Connell	The estimation, purification and properties of serum haptoglobin.
1963	French, Ian Willfred	Ph.D.	J. Manery Fisher	The effect of aldosterone on cell electrolytes and metabolism.
1963	Ma'Tuk, Yousef K.	Ph.D.	J. Manery Fisher	Metabolic factors influencing lens electrolytes.
1963	Wong, Jeffery Tze-Fei	Ph.D.	C.S. Hanes	Kinetic criteria of reaction mechanisms in enzymic group-transfer systems.
1964	Aston, Katherine (née Halliday)	M.A.	G.H. Dixon	The chemical modification of bovine trypsin.
1964	Aston, William P.	M.A.	G.H. Dixon	Some chemical modifications of insulin.
1964	Donovan, Ross Grant	Ph.D.	C.S. Hanes	The enzymic degradation of elastin.
1964	Freedman, Murray Harvey	Ph.D.	G.E. Connell	Physicochemical and immunological studies on urinary gamma-globulins.
1964	Herz, Albert	Ph.D.	B.F. Crocker	Studies on the mechanism of preinduction and induction of beta-galactosidase of <i>Escherichia coli</i> B.

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|------|--|------------|------------------|------|---|--------------------|---------------|
| 1964 | Schachter, Harry   | Ph.D.      | G.H. Dixon       | 1967 | Corkum, Thomas P.   | M.Sc.              | H. Schachter  |
|      | The chemical modification of alpha-chymotrypsin.   |            |                  |      | Purification of human chorionic gonadotropin using an immunological assay technique.  |                    |               |
| 1965 | Dunkley, Colleen Rose Dustan   | Ph.D.      | J. Manery Fisher | 1967 | Dixon, Joan W. (m. Parkes)  | M.Sc.              | T. Hofmann    |
|      | Phosphate uptake by isolated frog muscle.  |            |                  |      | Studies on the active site of chymotrypsin.   |                    |               |
| 1965 | Hawke, M.  | B.Sc.Med.  | G.E. Connell     | 1967 | Gladstone, Richard Michael  | B.Sc. Med.Y. MaTuk |               |
| 1965 | Israel, Yedy   | Ph.D.      | H. Kalant        |      | Protein synthesis: the incorporation of L-leucine-1- <sup>14</sup> C <sup>14</sup> OOH into bovine retina.                                    |                    |               |
| 1965 | Maung, Mya   | M.Sc.      | R.K. Murray      | 1967 | Keough, Kevin M.W.  | M.Sc.              | W.Thompson    |
|      | Structural and metabolic studies of animal haptoglobins.   |            |                  |      | Triphosphoinositide hydrolysis in the rat brain.  |                    |               |
| 1965 | Tattrie, Brenda L.   | M.Sc.      | G.E. Connell     | 1967 | Mustard, Merrilyn Dawn  | M.Sc.              | J.T.Wong      |
|      | Structural studies on human haptoglobin.   |            |                  |      | Regulation of RNA synthesis in <i>Escherichia coli</i> .  |                    |               |
| 1966 | Breckenridge, W. Carl  | M.Sc.      | A. Kuksis        | 1967 | Ottaway, Clifford A.  | M.Sc.              | D.O.Tinker    |
|      | A comparative study of the triglyceride structure of bovine and human milk fat.                    |            |                  |      | Optical rotary dispersion and circular dichroism: conformational studies of systems involving lipamide dehydrogenase.                         |                    |               |
| 1966 | Campbell, D. Wayne   | M.Sc.      | G.E. Connell     | 1967 | Parkes, Joel G.   | M.Sc.              | W.Thompson    |
|      | The enzymatic fragmentation of human haptoglobin.  |            |                  |      | Some properties of outer and inner membranes of guinea pig liver mitochondria.  |                    |               |
| 1966 | Davis, Kenneth Andrew  | Ph.D.      | G.R. Williams    | 1967 | Steen, Lorraine   | M.Sc.              | G.E. Connell  |
|      | Glyoxalase I.  |            |                  |      | Comparison of the light chains from a myeloma protein found in the serum with the Bence-Jones protein found in the urine of the same patient. |                    |               |
| 1966 | Ferguson, Shelagh M.F. (m. Miller)   | M.Sc.      | G.R. Williams    | 1967 | Stuart, Susette Christine R.  | Ph.D.              | G.R. Williams |
|      | Metabolite interactions in isolated mitochondria.  |            |                  |      | Metabolic studies on rat liver mitochondria.  |                    |               |
| 1966 | Hogg, Nancy M.   | M.Sc.      | G.E. Connell     | 1968 | Bronskill, Patricia M.  | M.Sc.              | J.T.Wong      |
|      | Aspects of the primary structure of a Bence-Jones protein.   |            |                  |      | Ribosome-bound $\beta$ -galactosidase in <i>Escherichia coli</i> .  |                    |               |
| 1966 | Jackson, Susan Ann (Cameje)  | M.Sc.      | R.A. Anwar       | 1968 | Gunetileke, Kapugama Geeganage  | Ph.D.              | R.A. Anwar    |
|      | Peptides released by the action of elastase on elastin.  |            |                  |      | Biosynthesis of uridine-5'-diphospho-N-acetylmuramic acid.  |                    |               |
| 1966 | Lawford, George Ross   | Ph.D.      | H. Schachter     | 1968 | Holub, Bruce J.   | M.Sc.              | A. Kuksis     |
|      | Studies on the biosynthesis of glycoproteins.  |            |                  |      | Structural characterization of phosphatidyl ethanolamine by hydrolysis with phospholipase C.  |                    |               |
| 1966 | Ozge-Anwar, Asha H.  | D.Clin.Sc. | G.E. Connell     | 1968 | Lavers, Barbara (née DeGrey)  | M.Sc.              | D.O.Tinker    |
|      | The action of adrenaline and proteolytic enzymes on specific phases of the blood clotting process. |            |                  |      | Liver and tumor lipid composition in mice bearing extra-hepatic tumors.   |                    |               |
| 1966 | Scrimger, Stefanie Thordis   | M.Sc.      | T. Hofmann       | 1968 | Luks, Cynthia L. (née Jephcott)   | M.Sc.              | G.E. Connell  |
|      | Studies on the active site of trypsin.   |            |                  |      | Aggregation of an immunoglobulin fragment by sulphhydryl oxidation.   |                    |               |
| 1966 | Tsai, Jane Huei Jeng   | Ph.D.      | G.R. Williams    |      |   |                    |               |
|      | Chemical and enzymological studies of cytochrome c.  |            |                  |      |   |                    |               |
| 1967 | Burrowes, Clement  | M.Sc.      | H. Schachter     |      |   |                    |               |
|      | Chemical modification of acetylcholine esterase and $\alpha$ -chymotrypsin.                        |            |                  |      |   |                    |               |

- 1968 Marai, Louis M.Sc. A. Kuksis  
Molecular species of lecithins of the plasma and erythrocytes of man and rat.
- 1968 Ofosu, Frederick A. M.Sc. G.E. Connell  
Characterization of the plasmin fragments of human haptoglobin.
- 1968 Wu, Tai-Wing M.Sc. D.O. Tinker  
Purification and properties of phospholipase A from *Crotalus atrox* venom.
- 1969 Bell, David D. M.Sc. B. Sarkar  
Ferrous iron binding to apotransferrin.
- 1969 Boegman, Ronald Johan Ph.D. J. Manery Fisher  
ATP-hydrolysing enzymes of membranes isolated from muscle.
- 1969 Czarnocki, Jadwiga (Miss) M.Sc. W. Thompson  
A comparative study of <sup>32</sup>P-uptake into phospholipids of pineal and other tissues.
- 1969 Gornall, Douglas A. M.Sc. A. Kuksis  
Chromatography of egg-yolk lipoproteins on thin layers of hydroxyapatite.
- 1969 Kirby, Erle John M.Sc. J.T. Wong  
The role of methionine in the regulation of RNA synthesis in *Escherichia coli*.
- 1969 Kurosky, Alexander M.Sc. T. Hofmann  
Studies on the amino terminal groups in serine proteinases.
- 1969 Morrish, Brian B.Sc. Med. E.R.M. Kay  
The lipid particles of Erlich ascites tumor cells.
- 1969 Oliver, Joanne E. M.Sc. R.A. Anwar  
Biosynthesis of uridine-diphospho-N-acetyl muramic acid in various organisms.
- 1970 Adamson, Eileen Dora Ph.D. G.E. Connell  
The purification and characterization of  $\gamma$ -glutamyl cyclotransferase (lactamase) from pig liver.
- 1970 Ambus Tiiu Ph.D. J. Manery Fisher  
Lactate uptake and ion movement in frog muscle.
- 1970 Archer, Michael Christopher Ph.D. K.G. Scrimgeour  
Mechanisms in the oxidation of reduced pteridines.
- 1970 Bennick, Anders Ph.D. G.E. Connell  
Purification and partial characterization of four proteins from human parotid saliva.
- 1970 Bowman, Aina Kibermanis M.Sc. R.A. Anwar  
Isolation and structure of desmosine and isodesmosine containing peptides from the elastase digest of bovine elastin.
- 1970 Breckenridge, William Carl Ph.D. A. Kuksis  
Studies of lipid absorption by the rat intestine.
- 1970 Buell, Linda Ann M.Sc. J.T. Wong  
Kinetic studies of the RNA polymerase catalyzed reaction.
- 1970 Davis, Norman Roger Ph.D. R.A. Anwar  
Desmosine and isodesmosine crosslinks of elastin.
- 1970 Eng, Francisco W. Hong Tai Ph.D. G.H. Dixon  
Studies on the biosyntheses of peptide bonds catalyzed by a dipeptidyl ligase, transpeptidase isozymes, and amino acid ester polymerases from cabbage (*Brassica oleracea*) leaves (2 volumes).
- 1970 Gray, Gail Louise M.Sc. T. Hofmann  
Studies of penicillopepsin.
- 1970 Guccione, Maria A. M.Sc. M.A. Packham  
The interaction of platelets with adenosine diphosphate.
- 1970 Hartman, Mary Kathleen M.Sc. G.R. Williams  
The type A cytochrome of *Bacillus subtilis*.
- 1970 Jabbal, Inderjit (Miss) M.Sc. H. Schachter  
Glycosyltransferases of mammalian liver.
- 1970 Lewis, A. Franklyn Ph.D. G.E. Connell  
Structural studies of an atypical immunoglobulin.
- 1970 Lukowsky, Walter A. M.Sc. R.H. Painter  
Isoelectric focusing of erythropoietin.
- 1970 Mains, Geoffrey M.Sc. T. Hofmann  
Studies on the specificity of penicillopepsin.
- 1970 Nazar, Ross Nickolas Ph.D. J.T. Wong  
Regulation of macromolecular syntheses during inhibitor-induced shift-downs in *Escherichia coli*.
- 1970 Perry, Gloria Lee Ph.D. G.R. Williams  
Interaction of cytochrome b in the mammalian respiratory chain.

1970	Riordan, John Richard	Ph.D.	J. Manery Fisher	1971	Gurr, Patricia Anne	Ph.D.	C.S. Hanes and J.T. Wong
	Enzyme activities at the surface of muscle cells.				Kinetic studies of horse-liver alcohol dehydrogenase.		
1970	Shimada, Wayne	M.Sc.	R.A. Anwar	1971	Holub, Bruce John	Ph.D.	A. Kuksis
	Isolation of desmosine and isodesmosine-containing peptides from elastase digest of elastin.				Interrelationships in phospholipid metabolism.		
1970	Siren, Kenneth P.J.	M.Sc.	D.O. Tinker	1971	Hunt, Barbara Jean	M.Sc.	J. Manery Fisher
	A phase study of the system: hexadecan-1-ol-methanol-water.				Methods applicable to magnesium and calcium determination in biological tissue and fluids.		
1970	Skov, Kirsten Anne	Ph.D.	G.R. Williams	1971	Keough, Kevin Michael W.	Ph.D.	W. Thompson
	Modifications of structure and function of cytochrome c.				Studies of phosphoinositide phosphodiesterase in brain.		
1970	Šodec, Jaroslav	Ph.D.	T. Hofmann	1971	Lawford, Hugh Gibson	Ph.D.	G.R. Williams
	Studies on mould acid proteinases.				The transport of citrate and other tricarboxylic acids in <i>Pseudomonas fluorescens</i> .		
1970	Subbiah, Mandapanda T.	Ph.D.	A. Kuksis	1971	Oakden, Kathleen M.	M.Sc.	B.G. Lane
	Studies on the metabolism of plant sterols in the rat.				Physical heterodispersity in preparations of plant ribonucleates.		
1970	Swensen, Mary Margaret	M.Sc.	M.A. Moscarello	1971	Odura Minta, Joe	Ph.D.	R.H. Painter
	Fractionation of the seromucoid from rat plasma.				Studies on the Fc fragment of immunoglobulin G.		
1970	Tumatis, Theresa Donna Ann (m. Kennedy)	M.Sc.	B.G. Lane	1971	Ofori, Frederick	Ph.D.	G.E. Connell
	A trace nucleoside constituent of yeast transfer ribonucleates.				Structural studies on human haptoglobin.		
1970	Wills, Michael C.	M.Sc.	D.O. Tinker	1971	Stockwell, Margaret Jane	M.Sc.	J.A. Lowden
	Proton binding by phosphatidyl inositol.				Hyperphenylalaninemia: effect on the metabolism of developing rat brain.		
1970	Yogeeswaran, Ganesa	M.Sc.	R.K. Murray	1971	Wasi, Safia	Ph.D.	T. Hofmann
	Biochemical studies of the lipids of mammalian cells in tissue culture.				Studies on conformational changes in pancreatic serine proteases.		
1971	Beatty, Barbara Gwendolyn	Ph.D.	J.T. Wong	1971	Wong, E. Roberta	M.Sc.	W. Thompson
	Studies of the biosynthesis of ribosomal proteins in <i>Escherichia coli</i> .				Choline oxidation and labile methyl groups in the normal and choline-deficient rat liver.		
1971	Cheema, Pavittar	M.Sc.	R.K. Murray	1971	Wong, Show-Chu	Ph.D.	S.I. Kandel
	Studies on the gangliosides of murine liver.				Covalent labelling of the active site of human, bovine, and horse carbonic anhydrases by different reagents.		
1971	Eggert, F. Michael	M.Sc.	R.C. Burgess	1971	Woo, Yin-Tak	M.Sc.	J. Manery Fisher
	Amelogenins, purification and partial characterization of proteins from developing bovine dental enamel.				Muscle surface enzymes ecto-ATPase, cyclic 3',5'-nucleotide phosphodiesterases and adenylyl cyclase.		
1971	Forstner, Janet Ferguson	Ph.D.	J. Manery Fisher	1971	Wu, Tai-Wing	Ph.D.	K.G. Scrimgeour
	Calcium binding to erythrocyte membranes.				IMP dehydrogenase from <i>Bacillus subtilis</i> .		
1971	Graham, John E.S.	M.Sc.	T. Hofmann				
	Pepsin homologues from <i>Tetrahymena</i> and <i>Rhizopus</i> .						

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|------|--|-------|-----------------|------|---|-------|-----------------|
| 1972 | Buchwald, Barbara Mary   | Ph.D. | G.E. Connell    | 1973 | Azad, Ahmed Abdullah  | Ph.D. | B.G. Lane       |
|      | Studies on the sulphhydryl groups of human immunoglobulin G.                               |       |                 |      | A study of some of the chemical and physical properties of high (18S and 26S) and low (5S and 5.8S) molecular weight ribonucleates from wheat embryo ribosomes. |       |                 |
| 1972 | Chang, Puay-Lim  | M.Sc. | M.A. Packham    | 1973 | Baker, Robert Roy   | Ph.D. | W. Thompson     |
|      | The effects of thrombin and collagen on washed platelets from rabbits.                     |       |                 |      | Metabolism of fatty acids in rat brain phospholipids.   |       |                 |
| 1972 | Cheema, Surinder (m. Dhadli)   | Ph.D. | K.G. Scrimgeour | 1973 | Chatterjee, Subroto B.  | Ph.D. | R.K. Murray     |
|      | Quinonoid dihydropterin reductase from sheep tissues.                                      |       |                 |      | Biochemical studies of the glycosphingolipids of cultured mouse embryo cells.   |       |                 |
| 1972 | Dennis, Alan William (Bill)  | Ph.D. | K.G. Scrimgeour | 1973 | Kwong, Tai Chiu   | Ph.D. | B.G. Lane       |
|      | GMP reductase from bacterial sources.  |       |                 |      | A study of the biogenesis of $N^2$ -dimethylguanylate, a nucleotide component of wheat embryo transfer RNA.   |       |                 |
| 1972 | Gornall, Douglas Allan   | Ph.D. | A. Kuksis       | 1973 | Lau, Louis Chotuen  | Ph.D. | J.T. Wong       |
|      | Origin of the yolk lipoproteins of the domestic hen ( <i>Gallus domesticus</i> ).          |       |                 |      | Thermal control and regulation of L929 cells.   |       |                 |
| 1972 | Ho, Joseph Wing-Tao  | M.Sc. | R.H. Painter    | 1973 | Lau, Raymond Yu-Cho   | Ph.D. | B.G. Lane       |
|      | A plasma protein fractionation procedure for use in protein metabolism studies in the rat. |       |                 |      | A study of the modified nucleotide components in ribosomal ribonucleates from yeast and wheat embryos.  |       |                 |
| 1972 | Hudgin, Roger Lance  | Ph.D. | H. Schachter    | 1973 | Mains, Geoffrey   | Ph.D. | T. Hofmann      |
|      | Studies on mammalian glycoprotein glycosyltransferases.                                    |       |                 |      | Studies on the mechanism of action of pepsin family proteases.  |       |                 |
| 1972 | Kawai, Mutsufumi   | Ph.D. | K.G. Scrimgeour | 1973 | Milne, Alexander Norman   | Ph.D. | J.T. Wong       |
|      | Chemical reduction of folate and dihydrofolate.  |       |                 |      | Synthesis of ribosomal proteins as a function of growth conditions in <i>Escherichia coli</i> .   |       |                 |
| 1972 | Kurosky, Alexander   | Ph.D. | T. Hofmann      | 1973 | Radojewski-Hutt, Aleksandra   | M.Sc. | M.A. Packham    |
|      | Studies on the amino acid sequence of penicillopepsin.                                     |       |                 |      | Platelet sialic acid and mucopolysaccharides.   |       |                 |
| 1972 | Parkes, Joel Grant   | Ph.D. | W. Thompson     | 1973 | Taku, Akio  | Ph.D. | R.A. Anwar      |
|      | Metabolic relations between phospholipids of hepatic microsomes and mitochondria.          |       |                 |      | Purification and properties of uridine diphospho-N-acetylenolpyruvyl-glucosamine reductase.   |       |                 |
| 1972 | Percy, Maire Ede   | Ph.D. | G.E. Connell    | 1973 | Yeung, Stephen Kai Faan   | M.Sc. | A. Kuksis       |
|      | The structure and properties of IgG (Sac), an atypical immunoglobulin.                     |       |                 |      | Structural and metabolic studies on phosphatidylserine.   |       |                 |
| 1972 | Pushie, Harold D.H.  | M.Sc. | E.R.M. Kay      | 1974 | Bailey, Denis John  | Ph.D. | R.K. Murray     |
|      | A study of the nuclear RNA of the Ehrlich letré ascites cell.                              |       |                 |      | Electrophoretic analyses of membrane proteins from rat liver and rat hepatomas.   |       |                 |
| 1972 | Yogeeswaran, Ganesa  | Ph.D. | R.K. Murray     | 1974 | Korri, Karl K.  | M.Sc. | K.G. Scrimgeour |
|      | Studies on the glycosphingolipids of normal and transformed cultured mammalian cells.      |       |                 |      | Quinonoid dihydropterin reductase from beef liver.  |       |                 |
| 1972 | Yuen, Raymond Shiu Yat   | Ph.D. | H. Schachter    | 1974 | Mak, William Wai-Nam  | M.Sc. | J.T. Wong       |
|      | Studies on the metabolism of L-fucose in pig liver.  |       |                 |      | Use of stringency to study the in vivo assembly of ribosomal proteins in <i>Escherichia coli</i> .  |       |                 |
| 1973 | Asselin, William Michael   | M.Sc. | G.R. Williams   |      |   |       |                 |
|      | The sulphhydryl groups of cytochrome oxidase.  |       |                 |      |   |       |                 |

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|------|---|-------|------------------|------|--|-------|------------------|
| 1974 | Moore, R. Blaine  | M.Sc. | J. Manery Fisher | 1975 | Woo, Yin-Tak   | Ph.D. | J. Manery Fisher |
|      | The structural role of calcium in membranes.  |       |                  |      | The plasma membrane of frog skeletal muscle: its relation to the metabolism and transport of nucleosides and nucleotides.                                      |       |                  |
| 1974 | Nwokoro, Ngozi Alachewe   | Ph.D. | H. Schachter     | 1975 | Yasmeen, Dilruba   | Ph.D. | R.H. Painter     |
|      | 2-Keto-3-deoxy-L-fuconate metabolism in mammalian liver.  |       |                  |      | Evidence that the domain model forms the structural basis for differentiation of the secondary biological functions of immunoglobulin G.                       |       |                  |
| 1974 | O'Doherty, Patrick J.A.   | Ph.D. | A. Kuksis        | 1975 | Zemell, Ronald I.  | Ph.D. | R.A. Anwar       |
|      | Studies on the control of triacylglycerol synthesis and release by rat intestine.   |       |                  |      | Phosphoenolpyruvate:uridine diphospho-N-acetyl-2-amino-2-deoxyglucose-3-enolpyruvyltransferase. Purification, feedback inhibition, mechanism.                  |       |                  |
| 1974 | Rao, Leticia Gomez  | Ph.D. | T. Hofmann       | 1976 | Baig, Kouser Munawar   | M.Sc. | R.A. Anwar       |
|      | Studies on the primary structure of penicillopepsin.  |       |                  |      | Studies on amino acid sequences around the crosslinks of elastin.  |       |                  |
| 1974 | Treloar, Margaret Anne  | M.Sc. | M.A. Moscarello  | 1976 | Ellerson, James Robert   | Ph.D. | K.J. Dorrington  |
|      | Effects of puromycin on galactosyltransferase of Golgi membranes.   |       |                  |      | Isolation and characterization of biologically active fragments corresponding to the C $\gamma$ 2 and C $\gamma$ 3 homology regions of human immunoglobulin G1 |       |                  |
| 1975 | Appleton, David William   | Ph.D. | B. Sarkar        | 1976 | Gagnon, Jean   | Ph.D. | M.A. Moscarello  |
|      | Model systems for the interaction of Zn(II) and Co(II) with carbonic anhydrase.   |       |                  |      | Studies of a hydrophobic myelin protein.   |       |                  |
| 1975 | Assimeh, Seth Nadutey   | Ph.D. | R.H. Painter     | 1976 | Ilsenman, David Elliot   | Ph.D. | R.H. Painter     |
|      | The macromolecular structure of the first component of human serum complement.  |       |                  |      | Structure and function of immunoglobulin domains: the interaction between immunoglobulin G and the first component of complement.                              |       |                  |
| 1975 | Butler, Margaret M.   | M.Sc. | W. Thompson      | 1976 | Knapp, Antonietta (Salvatore)  | M.Sc. | R.K. Murray      |
|      | The transfer of phosphatidylserine from liposomes or microsomes to mitochondria.  |       |                  |      | Studies related to the biosynthesis of rat testicular sulfolactosylglycerolipid.   |       |                  |
| 1975 | Gerber, Gerhard Ernst   | Ph.D. | R.A. Anwar       | 1976 | Laschinger, Carol  | M.Sc. | G.E. Connell     |
|      | Structural studies of elastin.  |       |                  |      | An unusual tryptic cleavage of immunoglobulin G.   |       |                  |
| 1975 | Munro, John Ronald  | Ph.D. | H. Schachter     | 1976 | Lee, George  | M.Sc. | D.O. Tinker      |
|      | Studies on mammalian glycoprotein glycosyltransferases.   |       |                  |      | Purification and characterization of a protease from the venom of <i>Crotalus atrox</i> .  |       |                  |
| 1975 | Purdon, A. David  | Ph.D. | D.O. Tinker      | 1976 | McGeer, Allison  | M.Sc. | G.R. Williams    |
|      | Physical studies on lipid and lipid protein interactions in hydrolysis of phosphatidylcholine by phospholipase A <sub>2</sub> . |       |                  |      | The reaction of cytochrome oxidase subunits with N-ethylmaleimide.   |       |                  |
| 1975 | Ward, John Victor   | M.Sc. | M.A. Packham     | 1976 | Minter, Peggy M.   | Ph.D. | K.J. Dorrington  |
|      | The isolation and characterization of a chondroitin-4-sulphate-protein complex from rabbit and pig platelets.                   |       |                  |      | Induced circular dichroism as a probe of combining-site structure and heterogeneity in antibodies showing specificity for nitrophenyl ligands.                 |       |                  |
| 1975 | Wells, James William  | Ph.D. | S.I. Kandel      |      |  |       |                  |
|      | Catalytic and structural properties of two chemically modified carbonic anhydrases.   |       |                  |      |  |       |                  |
| 1975 | Williams, David Bruce   | M.Sc. | H. Schachter     |      |  |       |                  |
|      | Glycopeptides as substrates for mammalian glycosyltransferases.   |       |                  |      |  |       |                  |

- 1976 Morris, Gregory M.Sc. R.N. Lewis  
The behavior of histone H3 in aqueous solutions.
- 1976 Tam, Siu-Cheung Michael M.Sc. J.T.Wong  
Soluble dextran-haemoglobin complexes.
- 1976 Wong, Sze Ngun (May) M.Sc. M.A. Moscarello  
Conformational studies of myelin basic protein.
- 1976 Young, Mary Elizabeth Moir M.Sc. M.A. Moscarello  
The binding of lectins to Golgi membranes and subsequent modification of glycosyltransferase activity.
- 1977 Blair, Maria V.A. M.Sc. B. Sarkar  
Nickel binding constituents of human serum and nickel binding to a peptide model of the amino terminus of serum albumin.
- 1977 Chauvin, Michael M. M.Sc. K.G. Scrimgeour  
Affinity chromatography purification of dihydropteridine reductase.
- 1977 Mak, William Wai-Nam Ph.D. J.T.Wong  
Reversible morphological changes in mammalian cells induced by phenylalaninol and related compounds.
- 1977 Simpson, Robert C M.Sc. K.G. Scrimgeour  
Quinoid dihydropterin reductase purification and inhibitor studies.
- 1978 Chan, Julia Yuk-Ching M.Sc. H. Schachter  
L-fucose metabolism in pork liver.
- 1978 Foster, Debora E. Barnett M.Sc. R.H. Painter  
Studies on the structural requirements of human immunoglobulin G for monocyte and granulocyte binding.
- 1978 Fraser, Nancy Lynn M.Sc. J.W. Callahan  
Purification and characterization of two rabbit brain acid  $\beta$ -galactosidases.
- 1978 Greenberg, John Ph.D. M.A. Packham  
Studies on the role of platelet membrane glycoproteins in platelet function.
- 1978 Kwok, Yau Daniel M.Sc. J.T.Wong  
Functional evolution of transfer RNAs and their aminoacyl-tRNA synthetases.
- 1978 Lakusta, Helen Ph.D. B. Sarkar  
Studies of models designed to mimic protein metal-binding sites.
- 1978 Moore, R. Blaine Ph.D. J. Manery Fisher  
The role of calcium in the structure and function of erythrocyte membranes: calcium-binding sites and permeability to substrates of enzymes.
- 1978 Stern, Sol Ben M.Sc. R.H. Painter  
A survey of some of the physicochemical properties of serum amyloid P-component.
- 1978 Tam, Siu-Cheung (Michael) Ph.D. J.T.Wong  
Study of soluble dextran-hemoglobin complexes as potential blood substitutes.
- 1979 Dalziel, Peter D. Ph.D. T. Hofmann  
X-ray crystallographic studies on penicillopepsin.
- 1979 de Escallón, Inés E. M.Sc. R.H. Painter  
A comparison of the properties of amyloid P-component with its serum counterpart.
- 1979 Fenje, Nicholas M.Sc. T. Hofmann  
Chemical modification of acid proteases by ethoxyformic anhydride.
- 1979 Lam, Stephen C.T. M.Sc. M.A. Packham  
Studies on nucleoside diphosphokinase – a possible receptor for ADP on the platelet surface.
- 1979 LeMesurier, James M.Sc. M.A. Moscarello  
Sequence studies on lipophilin, a hydrophobic myelin membrane protein.
- 1979 Lee, Jean Pi M.Sc. R.H. Painter  
Studies on the properties of immunoglobulin G fragments obtained by urea pepsin digestion.
- 1979 Limeback, Hardy Fred Ph.D. J. Sodek  
Collagen synthesis and processing by periodontal-ligament cells.
- 1979 Loube, Susan Ruth Ph.D. K.J. Dorrington  
Studies on the isolation and characterization of the P388D1 mouse macrophage surface receptor for immunoglobulin G.
- 1979 Torbicki, Edward A. M.Sc. J.F. Forstner  
The effect of polyamines on the synthesis and secretion of rat small intestinal goblet cell mucin.
- 1979 Van der Meulen, John M.Sc. K.J. Dorrington  
Studies on Fc receptor activity in human placenta.

- 1980 Asselbergs, Pieter John M.Sc. T. Hofmann  
Comparative studies on porcine pepsin and penicillopepsin and their acetylated forms.
- 1980 Behar-Bannelier, Monique Ph.D. R.K. Murray  
Studies of liver microsomal membrane proteins.
- 1980 Breuer, William V. M.Sc. C.-H. Siu  
Identification of endogenous glycoprotein receptors for the lectin discoidin-I in *Dictyostelium discoideum*.
- 1980 Chiu, Susan Suk-Man M.Sc. P.N. Lewis  
Conformational studies of nucleosomes.
- 1980 Hanley-Bowdoin, Linda Kay M.Sc. B.G. Lane  
Proteins specified by mRNA of dry and imbibing wheat embryos.
- 1980 Lee, Kay Pi M.Sc. P.N. Lewis  
Studies on transcriptionally active yeast chromatin.
- 1980 Longmore, Gregory D. M.Sc. H. Schachter  
The product identification and substrate specificity of reactions catalyzed by a pork liver fucosyltransferase.
- 1980 Savidou, Georgoulla M.Sc. K.J. Dorrington  
Structural studies on the light chain of a monoclonal human immunoglobulin G1 in which some molecules are glycosylated in the J region of the light chain.
- 1980 Zuk, Richard Thomas M.Sc. W. Thompson  
Chemical and enzymatic studies on CDP-diacylglycerol.
- 1981 Colman, Laurence David M.Sc. J.W. Callahan  
Tritosomes, tritosomal membranes and partial purification of acid hydrolases.
- 1981 D'Iorio, Helene M.Sc. R.K. Murray  
Effects of acute ischemia on the messenger RNA fraction of rat liver.
- 1981 Lacroix, Martial Ph.D. I.B. Fritz  
Identification and partial characterization of a plasminogen activator activity associated with rat sertoli cells.
- 1981 Levine, Mark E. Ph.D. R.K. Murray  
Studies on glycolipids of testis, spermatozoa and brain.
- 1981 Marks, Josephine Elisabeth M.Sc. R.H. Painter  
A study of the use of diafiltration as a means of measuring calcium binding properties of proteins and the effect of calcium binding on the spectral properties of C15.
- 1981 Rajan, Andrew I. M.Sc. A. Bennick  
Identification of two proline rich proteins in rabbit parotid saliva.
- 1981 Williams, David Bruce Ph.D. H. Schachter  
Biosynthesis of mucin oligosaccharides.
- 1981 Child, Peter John Ph.D. A. Kuksis  
The selective absorption of sterols by the intestine: a study in vitro.
- 1981 Connelly, Philip Walter Ph.D. A. Kuksis  
Importance of particle size and lipid composition in the transfer of rat plasma apolipoproteins to lipoprotein-like artificial lipid emulsions.
- 1982 Cruz, Tony F. Ph.D. J.W. Gurd  
A study of intrinsic synaptic membrane sialidase and its endogenous substrates.
- 1982 Devereux, Karen M. M.Sc. J.T. Wong and W. Thompson  
Studies on the participation of transfer RNA in phosphatidylserine synthesis in bacterial systems.
- 1982 Ekong, Janey Ime (née Amana) M.Sc. B.H. Robinson  
Studies of the deficiencies of pyruvate dehydrogenase.
- 1982 Lannigan, Deborah M.Sc. C.M. Deber  
A synthetic cyclic octapeptide  $Ca^{2+}$  ionophore.
- 1982 Maler, Thomas Ph.D. J.R. Riordan  
Studies on plasma membranes and glycoproteins in cells cultured from patients with cystic fibrosis.
- 1982 Rand, Margaret L. Ph.D. M.A. Packham  
Studies of changes in rabbit platelets as they age in vivo.
- 1982 Rivera, Jorge M.Sc. J.T. Wong and K.G. Scrimgeour  
Purification and properties of the prolyl-tRNA synthetase from *Thermus aquaticus*.
- 1982 Tsai, David C. M.Sc. H. Schachter  
Studies on N-glycosyl oligosaccharide branching.
- 1983 Ellison, Michael J. Ph.D. D.E. Pulleyblank  
Assembly of novel nucleohistone complexes: implications for the structure and function of the nucleosome.
- 1983 Krawetz, Stephen Andrew Ph.D. J.T. Wong and R.A. Anwar  
Isolation of elastin mRNA: characterization and processing of the in vitro translated products and the signal sequence of elastin 'A'.

- 1983 Raychaudhuri, Gopa M.Sc. R.H. Painter  
Studies on the Fc receptor of the human monocytoid U937 cell line.
- 1983 Russiello, Vincenzo M.Sc. D.O. Tinker and C. Hsai  
A spin label and equilibrium dialysis study of the binding specificities of rat serum albumin – the allosteric domain model.
- 1984 Blaschuk, Orst William Ph.D. I.B. Fritz  
Purification and characterization of a cell aggregating factor (clusterin) from ram rete testis fluid.
- 1984 Bozzato, Richard Paul Ph.D. D.O. Tinker  
Phospholipid transfer proteins in bovine liver and yeast: regulation of the transfer reaction by the membrane interface and the search for a functional role.
- 1984 Brockhausen, Inka Ph.D. H. Schachter  
N-acetylglucosaminyltransferases involved in mucin-type oligosaccharide biosynthesis.
- 1984 Chow, Virginia Ph.D. R.K. Murray  
Studies on the biosynthesis of rabbit haptoglobin.
- 1984 Fraser, Paul Edward M.Sc. C.M. Deber  
Membrane binding characteristics of myelin basic protein: a nuclear magnetic resonance study.
- 1984 Lam, Stephen Chi-Tak Ph.D. M.A. Packham  
Adenine nucleotides and platelets: studies of inhibitors of cyclic AMP phosphodiesterases and purification of nucleoside diphosphokinase.
- 1984 Mangano, Fortunato Ph.D. A. Kuksis  
Purification and characterization of monoacylglycerol acyltransferase from rat intestinal mucosa.
- 1984 O'Neil, Joseph Ph.D. T. Hofmann  
Spectroscopic studies on pig intestinal calcium-binding protein.
- 1984 Pâquet, Michel Robert Ph.D. M.A. Moscarello  
A beta-1,4 galactosyltransferase involved in the biosynthesis of N-linked glycoproteins: purification from the Golgi apparatus of the rat liver and characterization.
- 1984 Rampersaud, Vikarna M.Sc. R.A. Anwar  
Isolation of mRNA's from fetal bovine ligamentum nuchae and the characterization of putative elastin cDNA clones.
- 1984 Taylor, Malcolm James M.Sc. J.M. Segall  
The construction and in vitro transcription of variant tRNA and 5S RNA genes of the yeast *Saccharomyces cerevisiae*.
- 1984 Zelinka, Alena M.Sc. J.R. Riordan  
Copper uptake by cultured human cells.
- 1985 Cheifetz, Sela Ph.D. M.A. Moscarello  
Charge microheterogeneity of myelin basic protein: a mechanism for dynamic change in myelin.
- 1985 Chin, Christine M.Sc. A. Marks  
Production of a monoclonal antibody against human osteosarcoma.
- 1985 Clark, Peggy Elisabeth M.Sc. M.A. Moscarello  
Lipid modulation of rat liver beta 1,4 galactosyltransferase.
- 1985 Down, James Arthur Ph.D. K.J. Dorrington  
Structure of a human placental Fc receptor.
- 1985 Fahim, Raafat E.F. Ph.D. J.F. Forstner  
Structural features of rat goblet cell mucin.
- 1985 Hussain, Rochan M.Sc. F.W. Keeley  
Control of elastin synthesis in chick aorta.
- 1985 Lowe, David George Ph.D. L.A. Moran  
Characterization of the mouse major heat shock protein (HSP70) gene family.
- 1985 Smith, Molly Theresa L.V. (m. Pind) M.Sc. B.H. Robinson  
Studies on the purification of phosphoenolpyruvate carboxykinase from pig liver mitochondria.
- 1985 Wong, Jerry K.-C. Ph.D. C.J. Ingles  
Eukaryotic RNA polymerase II: mutation, identification and molecular cloning of the AMA<sup>R</sup> gene locus in eukaryotes.
- 1986 Allen, Barbara M.Sc. T. Hofmann  
Kinetic studies on penicillopepsin.
- 1986 Allen, Stephen D. Ph.D. H. Schachter  
Control of glycoprotein biosynthesis: studies on N-glycosyl oligosaccharide branching.
- 1986 Brandl, Christopher John Ph.D. D.H. MacLennan  
Structure and expression of the Ca<sup>2+</sup> ATPases of sarcoplasmic reticulum.

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|------|---|-------|-----------------------|------|---|-------|-----------------|
| 1986 | Chung, Dae  | Ph.D. | PN. Lewis             | 1987 | Eng, Susan  | M.Sc. | T. Hofmann      |
|      | Conformations of the core nucleosome.   |       |                       |      | Metal binding studies on pig intestinal calcium binding protein.  |       |                 |
| 1986 | Coombs, Neil A.   | M.Sc. | PN. Lewis             | 1987 | Jobb, Elizabeth Angelica  | M.Sc. | J.W. Callahan   |
|      | A quantitative dark field electron microscopic study of nucleosome structure.   |       |                       |      | Acid sphingomyelinase in normal tissues and biosynthesis in normal and Neimann-Pick fibroblasts.  |       |                 |
| 1986 | Hamel, Paul Adonis  | Ph.D. | K.J. Dorrington       | 1987 | Love, Mary Louise   | Ph.D. | J.T. Wong       |
|      | Structural and functional studies on the preferential reassociation of immunoglobulin subunits.   |       |                       |      | Amino acid specificity of tryptophanyl-tRNA synthetase from <i>Bacillus subtilis</i> : its role in growth adaptation to 4-fluorotryptophan. |       |                 |
| 1986 | Haniford, David Bernard   | Ph.D. | D.E. Pulleyblank      | 1987 | Nicholson, Richard Charles  | Ph.D. | L.A. Moran      |
|      | Sequence dependent DNA polymorphisms.   |       |                       |      | The HSP70 multi-gene family in <i>Saccharomyces cerevisiae</i> .  |       |                 |
| 1986 | Jones, Duncan Van Buskirk   | M.Sc. | D.E. Pulleyblank      | 1987 | Percival-Smith, Anthony   | Ph.D. | J.M. Segall     |
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- 1998 Leong, Peng Khun Ph.D. D.H. MacLennan  
Complex interactions between skeletal muscle ryanodine receptor and dihydropyridine receptor proteins.
- 1999 Robson, Paul Ph.D. F.W. Keeley  
Biochemical and molecular studies of the cartilaginous endoskeleton of adult lampreys and hagfish.
- 1999 Tong, Jiefei Ph.D. D.H. MacLennan  
Defects in the Ca<sup>2+</sup> release channel of skeletal muscle sarcoplasmic reticulum that are associated with malignant hyperthermia and central core disease.
- 1999 Pomroy, Neil Christopher Ph.D. C.M. Deber  
Solubilization of hydrophobic peptides by reversible cysteine PEGylation.
- 1999 Liu, Dong Ph.D. C.L. Hew  
The role of FTZ-F1 in the regulation of Chinook salmon gonadotropin II beta subunit gene.
- 1999 Voura, Evelyn Beatrice Ph.D. C.-H. Siu  
Molecular events during melanoma transendothelial migration in vitro.
- 1999 Yaworsky, Karen Lynne M.Sc. A. Klip  
Engagement of the insulin-sensitive pathway in the stimulation of glucose transport by  $\alpha$ -lipoic acid.
- 1999 DiDonato, Michael Ph.D. B. Sarkar  
Characterization of a novel amino-terminal domain from a copper transporting P-type ATPase implicated in human genetic disorders of copper metabolism.
- 1999 Mak, Baldwin Ph.D. M.A. Moscarello  
The role of post-translationally modified myelin proteins in the mechanism of demyelination and the attenuation of disease by paclitaxel in the ND4 transgenic mouse.
- 1999 Wu, Ning M.Sc. E.F. Pai  
Structural analysis of oncogenic H-ras mutants G12A and G13A.

1999	Wang, Chen	M.Sc.	C.M. Deber	Autonomous folding of transmembrane helices: characterization of M13 coat protein dimerization motifs in a peptide system.
1999	Yuen, Christopher Tze Kiu	M.Sc.	C.M. Deber	Bacteriophage M13 major coat protein: roles of aromatic residues at the membrane-water interface.
1999	Phillips, Michael Sean	Ph.D.	D.H. MacLennan	The structural organization of the human skeletal muscle ryanodine receptor gene (RYR1) and its involvement in malignant hyperthermia.
2000	Charlton, Bernard	M.Sc.	D. Rotin	Cloning and characterization of <i>Drosophila</i> Nedd4 as a putative binding partner of the proline-rich region of inscuteable.
2000	Wroblewski, Karol	M.Sc.	A. Bennick	Characterization of the molecular nature of the interaction of human salivary histatins (histidine rich proteins) with tannins.
2000	Pan, Qun (Sandy)	M.Sc.	D.E. Isenman	Two clusters of acidic amino acids at the NH <sub>2</sub> -terminus of complement component C4 $\alpha'$ -chain are important for C2 binding.
2000	Plant, Pamela	Ph.D.	D. Rotin	A role for the C2 domain of the protein ubiquitin ligase Nedd4.
2000	Popov, Milka	Ph.D.	R. Reithmeier	Sugars in space: N-glycosylation mutants of the erythrocyte anion exchanger.
2000	Chan, Maggie Tin Lai	M.Sc.	A. Bennick	Proteolytic processing of recombinant human salivary proline rich protein precursors (PRPs).
2000	Taha, Celia	Ph.D.	A. Klip	Translational control of GLUT1 glucose transporter mRNA in response to insulin in adipose and muscle cells in culture.
2000	Sliz, Piotr	Ph.D.	E.F. Pai	Structure, function and interactions of enzyme IIA from the phosphoenolpyruvate:lactose phosphotransferase system.
2000	Dhani, Sonja Urmilla	M.Sc.	C.M. Deber	Experimental approaches for the structural characterization of membrane- spanning segments in proteins.
2000	Plaskos, Nicholas Peter	M.Sc.	C.M. Yip & E.F. Pai	A biophysical study of human type II inosine 5'-monophosphate dehydrogenase: identification of a reversible self-associating system and an active monomeric species.
2000	Vince, John William	Ph.D.	R. Reithmeier	Interaction of chloride/bicarbonate anion exchangers with carbonic anhydrase II.
2000	Lee, So Young	M.Sc.	B.H. Robinson	The function of the Qcr7 protein of the ubiquinol: cytochrome c oxidoreductase in mitochondria of <i>Saccharomyces cerevisiae</i> .
2000	Chiang, Mae S.M.	M.Sc.	C.-H. Siu	The contractile vacuole secretory pathway in <i>Dictyostelium discoideum</i> .
2000	Bajno, Lydia	M.Sc.	S. Grinstein & W.S. Trimble	Focal exocytosis of VAMP3-containing vesicles at sites of phagosome formation.
2001	Seyda, Agnieszka	Ph.D.	B.H. Robinson	Pyruvate dehydrogenase complex – correlation between structure and function.
2001	Lee, H. R. Nana	Ph.D.	B.H. Robinson	The genetic elucidation of Saguenay-Luc-Saint-Jean cytochrome oxidase deficiency.
2001	Bryson, Steven Patrick	Ph.D.	E.F. Pai	Structure determination of the apo-form of human inosine 5'-monophosphate dehydrogenase type II.
2001	Miao, Megan (Ming)	Ph.D.	C.L. Hew	Transcriptional regulation of the antifreeze protein genes in winter flounder.
2001	Kanagarajah, Dhushy	M.Sc.	B.H. Robinson	The molecular and biochemical characterization of the MLRQ subunit of NADH:ubiquinone oxidoreductase in the human mitochondrial respiratory chain.
2001	Chen, Ning	M.Sc.	C.-H. Siu	Role of cell adhesion molecules in melanoma transendothelial migration.
2001	Goto, Natalie Kazumi	Ph.D.	C.M. Deber and L.E. Kay	The development and application of methods for the study of multi-domain protein structure by solution NMR.

- 2001 Schapiro, Florencia Ph.D. S. Grinstein  
pH homeostasis of the Golgi complex.
- 2001 Chandy, Mark M.Sc. C.L. Hew  
Structural and functional characterization of a zebrafish fushi tarazu factor-1 homologue.
- 2001 Foster, Leonard James Ph.D. A. Klip  
Insulin-responsive glucose transporter traffic.
- 2001 Tsay, Mike J. M.Sc. B. Sarkar  
Expression, purification and characterization of the LEC-rat N-terminal metal binding domain from Atp7b, an orthologue to ATP7B, a copper transporting P-type ATPase implicated in Wilson disease.
- 2001 Nagar, Bhushan Ph.D. J.M. Rini  
X-ray crystallographic analysis of 1) the two N-terminal domains of epithelial cadherin and 2) C3d, a fragment of the complement protein C3.
- 2001 Hew, Yin Ph.D. F.W. Keeley  
Developmental regulation of elastin synthesis in chicken aorta by transcriptional and post-transcriptional mechanisms.
- 2001 Jheon, Andrew H. Ph.D. J. Sodek  
Identification and characterization of AJ18, a novel zinc finger transcription factor expressed during skeletal development.
- 2001 Kanelis, Voula Ph.D. J. Forman-Kay and D. Rotin  
Characterization of Nedd4 WW domain – ENaC peptide interactions.
- 2001 Khayat, Zayna A. Ph.D. A. Klip  
Multiple mechanisms of regulating glucose transport and glucose transporters in skeletal muscle cells.
- 2001 Chen, Shihao Ph.D. H. Schachter  
Caenorhabditis elegans  $\beta$ 1,2 N-acetylglucosaminyltransferase I (GnT I) genes and functions.
- 2001 Northey, Julian G.B. M.Sc. A. Davidson  
Protein folding determinants and transition state analysis of the Fyn SH3 domain.
- 2001 Stronge, Victoria M.Sc. D.B. Williams  
Relationship between the chaperone functions of calnexin and BiP using glycosylated and nonglycosylated substrates.
- 2002 Wang, Jun Ph.D. C.-H. Siu  
Structural and functional characterization of the cell adhesion molecule gp150 in Dictyostelium discoideum.
- 2002 Cheung, Herman Ho-Man Ph.D. J.W. Gurd  
Phosphorylation of the N-methyl-D-aspartate receptor in control and ischemic rat brain.
- 2002 Fung, Amy D. M.Sc. G.W. Brown  
A novel function of the S phase regulator Dfp1.
- 2002 Wong, Estella F.S. Ph.D. C.-H. Siu  
Characterization of the calcium-dependent cell adhesion molecule DdCAD-1 in Dictyostelium discoideum.
- 2002 Somwar, Romel Ph.D. A. Klip  
GLUT4 activation: a component of the stimulation of glucose uptake by insulin.
- 2002 Sandhu (Grewal), Bimal M.Sc. D.H. MacLennan  
Transmembrane topology of the skeletal muscle ryanodine receptor.
- 2002 Randhawa, Varinder M.Sc. A. Klip  
Functional characterization of vesicle-snares in GLUT4 glucose transporter vesicle traffic.
- 2002 Lemke, Christopher Tony Ph.D. P.L. Howell  
X-ray crystallographic studies of argininosuccinate synthetase.
- 2002 Pham, Nam Ph.D. D. Rotin  
Identification and characterization of CNrasGEF and other Nedd4-interacting proteins.
- 2002 Quilty, Janne Aleksis Ph.D. R. Reithmeier  
Trafficking of anion exchanger 1 mutants.
- 2002 Low, Woon-Kai Ph.D. C.L. Hew  
An investigation of skin-type antifreeze proteins in North Atlantic sculpins and flounders.
- 2002 Carbone, Mary Anna Ph.D. B.H. Robinson  
Human pyruvate carboxylase deficiency: correlation of genotypes with the clinical and biochemical phenotypes.
- 2002 Wu, Ning Ph.D. E.F. Pai  
Structural and mechanistic studies of orotidine 5'-monophosphate decarboxylase.
- 2003 Hanwell, David M.Sc. D. Rotin  
Trafficking and cell surface stability of the epithelial Na<sup>+</sup> channel expressed in epithelial MDCK cells.

- 2003 Sampaleanu, Liliana M. Ph.D. P.L. Howell  
Using duck  $\delta 1$  and  $\delta 2$  crystallin to investigate the enzymatic mechanism of argininosuccinate lyase.
- 2003 Harris, Tony Ph.D. C.-H. Siu  
The structure and assembly of gp80 adhesion complexes in *Dictyostelium discoideum*.
- 2003 Bader, Gary David Ph.D. C.W.V. Hogue  
Design and use of the biomolecular interaction network database (BIND) for storing and analyzing protein-protein interaction data.
- 2003 Jankowski, Andrzej Ph.D. S. Granstein  
Ionic and pH homeostasis in metabolically active compartments.
- 2003 Feldman, Howard Jonathan Ph.D. C.W.V. Hogue  
Computational protein structure prediction.
- 2003 Ho, Sylvia M.Sc. J.R. Glover  
Chaperone-assisted protein disaggregation in the mammalian system.
- 2003 Whetstone, Heather Catherine M.Sc. C.A. Lingwood  
The influence of a soluble conjugate of sulfogalactosylceramide on the ATPase activity of bovine brain Hsc70.
- 2003 Wojtyra, Urszula Alina M.Sc. W.A. Houry  
Characterization of the N-terminal domain of the molecular chaperone ClpX.
- 2003 Marles, Jennifer Anne M.Sc. A. Davidson  
Significance of the ligand-binding affinity of the SHO1 SH3 domain for in vivo function.
- 2003 Xu, Hao Ph.D. W.S. Trimble  
Studying the roles of *Drosophila* SNAREs in membrane traffic.
- 2003 Di Nardo, Ariel Arinthian Ph.D. A. Davidson  
Systematic analysis of highly conserved residues in the Fyn SH3 domain.
- 2003 Wang, John M.Sc. D.E. Isenman  
Expression, structural, and functional characterization of the netrin domains of complement components C3 and C4.
- 2003 Lo, Eileen I-Lin M.Sc. R. Bishop  
Structure and function of the outer membrane phospholipid: lipid A palmitoyl transferase PagP from *Escherichia coli*.
- 2003 Crowhurst, Karin Ann Ph.D. J. Forman-Kay  
Structural characterisation of the unfolded state of an SH3 domain.
- 2003 Li, Karpra Gar Pui M.Sc. C.A. Smibert  
A structure-function analysis of the Smaug RNA-binding domain.
- 2003 Huynh, My Ngan M.Sc. P.L. Howell  
Mutational analysis of residues involved in substrate binding and catalysis of *E. coli* argininosuccinate synthetase.
- 2003 Vij, Shilpa M.Sc. J.W. Gurd  
Differential phosphorylation of the NR1 subunit of the N-methyl-D-aspartate receptor following hypoxia-ischemia in 7- and 21-day-old rat brains.
- 2003 Beites, Crestina Ph.D. W.S. Trimble  
The septin CDCrel-1: protein associations, modifications and effects on exocytosis.
- 2004 Partridge, Anthony William Ph.D. C.M. Deber  
Aberrant transmembrane helix-helix interactions as a biophysical cause of human disease.
- 2004 Melnyk, Roman Alexander Ph.D. C.M. Deber  
Design of soluble transmembrane peptides as mimics and inhibitors of membrane protein folding & function.
- 2004 Yip, Paul Manlang Ph.D. C.-H. Siu  
Characterization of LI- $\alpha$ v 3 interactions and signaling pathway in neurite outgrowth.
- 2004 Mittermaier, Anthony Ph.D. L.E. Kay  
NMR methods for studying the dynamics of proteins in solution.
- 2004 Van, Linh M. M.Sc. C.-H. Siu  
Signaling mechanism involved in LI- $\alpha$ v 3-mediated neurite outgrowth from PC12 cells.
- 2004 Choi, Mei Yee M.Sc. C.M. Deber  
Interactions between transmembrane helices of the cystic fibrosis transmembrane conductance regulator (CFTR).
- 2004 Jack, Fernando Edmond (Andy) M.Sc. J. Forman-Kay  
ATCUN-Derived paramagnetic distance restraints in the study of an SH3 domain.
- 2004 Khan, Shekeb M.Sc. E.F. Pai  
Cloning, purification and biophysical characterization of the IgA1 protease associated  $\alpha$ -proteins from *Neisseria gonorrhoeae* and *Neisseria meningitidis*.

- 2004 Poon, Kwan Sheung Vincent M.Sc. A. Klip  
Bindings of p38 and PRAK to the large cytoplasmic loop of GLUT4.
- 2004 Smith, Scott Douglas M.Sc. B. Sarkar  
Copper metalloproteomics: using immobilized metal affinity chromatography two-dimensional gel electrophoresis and mass spectrometry to search for hepatocellular proteins with copper-binding ability.
- 2004 Chan Celine Sze Lai M.Sc. C.M. Deber  
Interactions of antimicrobial peptides with biofilms of *Pseudomonas aeruginosa*.
- 2004 Davidson, Toni M.Sc. W.A. Houry  
Towards understanding the functions of the GroEL and ClpX chaperone systems in *Escherichia coli*.
- 2004 Castelli, Mary Lisa M.Sc. D. Rotin  
Biological functions of Comm and dNedd4 in axon guidance and muscle synaptogenesis.
- 2004 Slade, Andrea-Lynn Ph.D. C. Yip  
Functional force mapping of membrane-associated protein complexes.
- 2004 Rath, Arianna Ph.D. A. Davidson  
Engineering thermodynamic stability and peptide binding properties of the ABPIP SH3 domain.
- 2004 Botelho, Roberto J. Ph.D. S. Grinstein  
Lipid signaling and the role of COPI in Fcγ receptor-mediated phagocytosis and phagosome maturation.
- 2004 Abu-Abed, Mona Ph.D. D.H. MacLennan  
Characterization of the nucleotide binding domain of the sarco(endo)plasmic reticulum Ca<sup>2+</sup>-ATPase: probing nucleotide effects by NMR.
- 2004 Dumontier, Michel Justin Ph.D. C.W.V. Hogue  
Species-specific optimization of sequence and structure.
- 2004 Leach, Michael Ryan Ph.D. D.B. Williams  
Structure-function analysis of the molecular chaperones calnexin and calreticulin.
- 2004 Surka, Mark Christopher Ph.D. W.S. Trimble  
Regulation and function of mammalian septins during cell division.
- 2004 Yu, Bomina Ph.D. A. Davidson  
Intragenic complementation and protein oligomerization studies in argininosuccinate lyase and its homologue δcrystallin.
- 2005 Ramjeesingh, Ravi Avinash Ph.D. C.-H. Siu  
Mechanism of CXCL8-mediated chemotaxis during transendothelial migration of melanoma cells.
- 2005 Michaličková, Kateřina Ph.D. C.W.V. Hogue  
SeqHound: an integrated bioinformatics resource and its applications.
- 2005 Chen, Yi-jing (Eva) Ph.D. D.M. Clarke  
Molecular basis of folding and trafficking defects in wild-type and mutant CFTRs.
- 2005 Hwang, Peter Ph.D. L.E. Kay  
Solution NMR spectroscopy of integral membrane proteins.
- 2005 Betel, Doron Ph.D. C.W.V. Hogue  
A computational study of the role of conserved domains in protein interactions.
- 2005 Lee, Jeffrey Ph.D. P.L. Howell  
Structural and functional studies of 5'-methylthioadenosine/S-adenosylhomocysteine nucleosidase
- 2005 Scott, Cameron Ph.D. S. Grinstein  
Control of phagocytosis and phagosome maturation by phosphoinositides.
- 2005 Cheung, Joanne Chun Yeng Ph.D. R. Reithmeier  
Topology and biosynthesis of the anion exchanger 1 mutant of Southeast Asian ovalocytosis.
- 2005 Chang, Michael Ph.D. G.W. Brown  
Identification of novel DNA damage response genes using functional genomics.
- 2005 Thomson, Sten Paul M.Sc. D.B. Williams  
Delineation of the lectin site of the molecular chaperone calreticulin.
- 2005 Thiruvahindrapuram, Bhooma M.Sc. B. Steipe  
Schematikon, an encyclopedia of structural motifs in proteins.
- 2005 Isserlin, Ruth M.Sc. C.W.V. Hogue  
Developing a confidence measure for protein-protein interactions in *Saccharomyces cerevisiae*.
- 2005 Nguyen, Quang Vinh M.Sc. P.N. Lewis  
Structural and functional characterization of yeast histone deacetylase Hos3.

- 2005 Dugani, Chandrasagar M.Sc. A. Klip  
Morphological characterization of perinuclear GLUT4 distribution in L6 myoblasts.
- 2005 Paroutis, Paul M.Sc. S. Grinstein  
Quantitative and dynamic assessment of the contribution of the endoplasmic reticulum to phagosome formation.
- 2005 Bawa, Damanpreet M.Sc. J.W. Gurd  
Effects of transient global ischemia on distribution and phosphorylation of the  $\alpha$ -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptors at the synapse.
- 2006 Nethery-Brookx, Kathleen M.Sc. D. Rotin  
Subcellular localization of human Nedd4-2 splice isoforms.
- 2006 Lau, Wing M.Sc. E.F. Pai  
Translocation of neisserial  $\alpha$ -proteins into mammalian cells.
- 2006 Fussner, Eden Margaret M.Sc. G. Privé  
Heterodimerization and oligomerization of the BTB domain.
- 2006 Luong, Winnie M.Sc. C.E. Bear & P.L. Howell  
Biochemical studies of the regulation of the gating of CIC-2.
- 2006 Khan, Alia Nisa Ph.D. P.N. Lewis  
Enzymatic properties of Sir2 proteins.
- 2006 Rothfels, Karen Ph.D. J. Segall  
Cys2-His2 zinc-finger transcription factors in the regulation of expression of the 5S RNA and DIT genes in *Saccharomyces cerevisiae*.
- 2006 Chung, Martin M.Sc. F.W. Keeley  
Comparative analysis of tropoelastin structure and sequence in vertebrates.
- 2006 Siu, Roberta M.Sc. D. Rotin  
Regulation of axon growth by PTPsigma and its substrates N-cadherin and beta-catenin.
- 2006 Qi, Jianfei Ph.D. C.-H. Siu  
Role of N-cadherin and beta-catenin signaling during transendothelial migration of melanoma cells.
- 2006 Block, Gregory M.Sc. D.P. Bazett-Jones  
Transcriptional potential of the promyelocytic leukemia nuclear body.
- 2006 Chen, Gong M.Sc. C.M. Deber  
Interhelical interactions of transmembrane segments 9 and 10 in the cystic fibrosis transmembrane conductance regulator.
- 2007 Quon, Gerald T. M.Sc. S. Wodak  
The landscape of false-positive transcription factor binding site predictions in yeast.
- 2007 JeBailey, Lellean Ph.D. A. Klip  
The role of Rho GTPases in insulin-induced actin remodelling and GLUT4 mobilization in L6 muscle cells.
- 2007 Lee, Hyejin (Rosa) M.Sc. J. Sodek  
Critical role of membrane-type 1 matrix metalloproteinase in collagen phagocytosis by fibroblasts.
- 2007 Kuo, Hsin Hen M.Sc. C.M. Deber  
Alginate in the *Pseudomonas aeruginosa* biofilms: barrier to cationic antimicrobial peptides.
- 2007 Tsang, Christopher Wilson Ph.D. W.S. Trimble  
Septin GTPases in the central nervous system: an investigation into axon specification, formation and function.
- 2007 Johnson, Rachel Marie Ph.D. C.M. Deber  
Determinants of membrane protein folding.
- 2007 Rodinger, Tomas Ph.D. R. Pomès & P.L. Howell  
Efficient free energy simulations for structure based drug design.
- 2007 Gordon, Roni David M.Sc. J.M. Rini  
Structural insights into rabbit N-acetylglucosaminyltransferase I Donor specificity, acceptor binding and catalysis.
- 2007 Tkach, John Ph.D. J.R. Glover  
Analysis of Hsp104-mediated protein refolding in vitro and in vivo.
- 2007 Snider, Jamie Donald Ph.D. W.A. Houry  
Characterization of the MoxR family of AAA+ ATPases.
- 2007 Patterson, Dana M.Sc. W.S. Trimble  
Study of the relationship between parkin and septin5 in neurons.
- 2007 Wong, Diana M. M. M.Sc. K. Adeli  
Proteomic profiling of prechylomicron transport vesicles (PCTVs) involved in assembly and secretion of apoB-48-containing chylomicrons by the intestine.
- 2007 Ku, Shao-Yang Ph.D. P.L. Howell  
5-Methylthioribose kinase: structure, function and drug design.

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- 2007 Tsai, May Ph.D. P.L. Howell  
Structural and functional studies to determine the argininosuccinate lyase/fumarase C superfamily catalytic mechanism.
- 2007 Shaw, James Eric Ph.D. C.Yip  
Studies of protein-protein interactions at membrane interfaces using correlated atomic force and fluorescence microscopy.
- 2007 Chan, Sophia M.Sc. J. Sodek & B. Ganss  
Overexpression of the transcription factor Zfp60 in a multipotential mesenchymal cell line and its effects on gene expression and cell differentiation potential.
- 2007 Thibault, Guillaume Ph.D. W.A. Houry  
Characterization of the role of the N-terminal zinc binding domain of the chaperone ClpX in cofactor and substrate recognition.
- 2007 Roberts, Tania Ph.D. G.W. Brown  
Characterization of the DNA damage resistance gene RTT107.

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# CHAPTER 17

## Epilogue

**T**he main part of this history of the Department of Biochemistry has been presented chronologically, describing the roles of the Chairs of the department in its development. Many others, of course, have made major contributions to the department. The professorial staff members have divided their time between undergraduate and graduate teaching and research, which in most cases is equated with guiding graduate students and interacting with post-doctoral fellows. In addition, many of the professors have taken major administrative roles, not only within the department and the university, but also in national and international scientific societies and granting bodies.

The scope of the research work carried out in the department over the years is indicated by the theses prepared by the graduate students, and by publications. Chapter 16 has a chronological list of theses produced in the department since 1912. An alphabetical card index list of theses authors is in our archives. Our collection of theses is shelved in the seminar room, but unfortunately, some are missing, particularly early ones. It would be unwieldy to list the many publications from the department that have appeared in scientific journals. Year by year records of these can be found in the early President's reports and, up until 1974-75, in the reports of the Dean of the Faculty of Medicine. After that time, the reports became triennial and listed only the most outstanding publications, lectures, and addresses. However, in our archives are the departmental notices about publications between 1971 and 1982. The increasing number of publications has made such notices and lists too unwieldy, and other sources for such information are now available.

The many awards for research contributions that have been won by the professorial staff have been listed. They include 15 FRSC, 4 FRS, 2 Gairdner, 3 University Professor, 1 Izaak Walton Killam, and 9 Ayerst (Merck-

Frosst) awards of the Canadian Biochemical Society (now called the Canadian Society of Biochemistry, Molecular & Cellular Biology).

In addition to the professorial staff and graduate students, many others have contributed to the work of the department. The Senior Tutors and Lecturers have had major teaching and organizational roles in the undergraduate laboratories and have taken responsibility for some of the lecturing. Post doctoral fellows, research associates, research assistants, and technical staff have participated in the instruction of graduate students and made major contributions to the research programs. The members of the office staff – business officers, administrative assistants and secretaries – have ably supported the teaching and research functions of the department. In earlier years, technical staff in the department competently organized solutions and equipment for the undergraduate laboratories, kept the departmental stores of chemicals, made and repaired gadgets and equipment, cared for the experimental animals, cleaned the laboratories, and washed the glassware. When we moved into the present Medical Sciences Building in 1968, these tasks (except glassware washing for the research laboratories) were centralized. Although our records are not complete, lists of the individuals who supported the department in these ways have been included in this history.

### **Influence within the university**

Following the example of Professor Macallum, and reaching an apex with the presidency of Professor Connell, many of the professors of the department have made major contributions to the administration of the university. Although the various administrative responsibilities taken by the chairs of the department have been described, it has been possible to name only some of the professors who have chaired and

been members of departmental, faculty and university committees, because records are incomplete. The many hours that have been devoted to serving on these committees would be impossible to document.

### **Influence outside the university**

Members of the professorial staff have taken active roles in the Canadian Biochemical Society (now the Canadian Society of Biochemistry, Molecular & Cellular Biology) since its inception in 1958, Prof. Wynne serving as its first president. Professors Gordon Butler, G. Ronald Williams, George Connell, Harry Schachter, Peter Lewis and Reinhart Reithmeier have also been presidents of this society. Nine others who obtained their Ph.D. in our department were presidents of this society – Professors Marvin D. Darrach, J. Alexander McCarter, Sidney Zbarsky, Rose Sheinin, Lawrence Smillie, Alastair Matheson, Gordon Dixon, Kevin Keough and Joseph R. Casey - and Professors Butler, G.R. Williams and Keough also served as presidents of the Canadian Federation of Biological Societies. Many others have been active on the executives of these societies and served as editors of their journals.

It is not possible to provide detailed information about the participation of departmental members on the councils and committees of granting agencies in Canada and in the United States; the hours spent as editors and reviewers of scientific journals; and the organization of national and international scientific meetings.

Graduate students from the department have taken posts in every department of biochemistry in Canada and many have become heads of these departments. Others have joined departments in related disciplines. Some have gone to other countries to pursue careers in biochemistry – the United States, the United Kingdom, Hong Kong, China, Brazil, Ceylon, Greece, Singapore, Switzerland and many others.

The thousands of undergraduates who studied biochemistry in the department can be found throughout the world. It is impossible to estimate the influence that members of the department may have had on them.

### **Table 29**

#### **Faculty and Graduate Students Who Became Presidents of the Canadian Biochemical Society**

(now the Canadian Society of Biochemistry and Molecular & Cellular Biology)

Arthur M. Wynne	1957-58
Marvin D. Darrach	1960-61
Gordon C. Butler	1961-62
J. Alexander McCarter	1966-67
Sidney Zbarsky	1967-68
G. Ronald Williams	1971-72
George E. Connell	1973-74
Lawrence B. Smillie	1974-75
Rose Sheinin	1975-76
Alastair T. Matheson	1980-81
Gordon H. Dixon	1982-83
Kevin M. Keough	1988-89
Harry Schachter	1993-94
Peter N. Lewis	1999-00
Joseph R. Casey	2004-05
Reinhart A. F. Reithmeier	2007-08

### **Table 30**

#### **Presidents of other Societies of the Canadian Federation of Biological Societies**

Rose Sheinin (Canadian Society for Cell Biology)	1973-74
Bruce Holub (Canadian Society for Nutritional Sciences)	1974-75
James Neelin (Canadian Society for Cell Biology)	1983-84

### **Table 31**

#### **Presidents of the Canadian Federation of Biological Societies**

Gordon C. Butler	1967-69
G. Ronald Williams	1974-75
Kevin M. Keough	1990-91

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# APPENDIX

## Materials Archived in the Department of Biochemistry

1. Biographies, obituaries, and articles about departmental chairs.
2. Biographies, obituaries, and articles about some of the professors, tutors, and lecturers.
3. Biographies, obituaries, and articles about some of our graduates.
4. Articles about some of our undergraduates.
5. Brochures describing research activities 1977, 1980, 1984, 1988, and 1992-93, and list of graduate research activities in 1999.
6. Peterson's Guides listing faculty and their research activities 1971, 1972, 1975, 1977, and 1978, a 1979 American Chemical Society list and a 2001 Directory of Graduate Research of the ACS.
7. Curriculum vitae of Professors Emeriti
8. Alphabetical card index of graduate students, their supervisors, date and title of thesis 1912-2007.
9. Two books "University of Toronto Doctoral Theses" 1897-1967 and 1968-1975.
10. Reports of the Dean of the Faculty of Medicine 1967-68 to 1971-72.
11. The 1967 MacPherson Report and the 1969 New Program in Arts and Science
12. Lists of occupations of some former graduate students.
13. Lists of reprints 1971-1982.
14. Departmental committees and representatives 1981-2007.
15. Biochemistry teaching assignments 1979-2007.
16. Lists of staff addresses and phone numbers 1977-1989 and departmental directories 2000-2007.
17. B.G.S.U. Who's Who Handbook 2001-2002. Seminar lists 1987-1989, Open House notices 2003-2007
18. Poster Day abstracts 1989, 1993, notices from 2003-2007, and 1984 GOFOM Research Day abstracts.
19. Undergraduate Handbooks/Brochures 1985, 1987, 1990, 1994, 1996, 1998, 1999.
20. B.U.S.S. formation in 1988 and letters from Philip Wu.
21. Historical departmental budgets e.g. 1949-1950.
22. Cross appointment and status only guidelines 1965, 1967, 1976, 1979, 1983.
23. Departmental Constitution 1974.
24. 1987 "White Paper" on departmental planning and undergraduate offerings.
25. Retreat in 1981 and Research Days in 1993, 1998, 2005, 2007.
26. Departmental reviews 1982, 1983, 1988, 1990, 1995, 2001, 2004, 2007.
27. Information about the XI International Congress of Biochemistry 1979 and the cancelled XIXth.
28. Professorial staff meeting minutes, 1984-2007 (incomplete).
29. Departmental committee meeting minutes: Senior Advisory Committee 1982-1984, 1985-1991; ¼ Committee (undergraduate teachers) 1971-1988, 1993, 1997.
30. Social events – retirement parties, Christmas parties, 75<sup>th</sup> anniversary, George Connell Inaugural Lectureship etc.
31. Photographs (mounted in binder).
32. Professor Thompson's poems.
33. Professor Bruce Crocker's 2 volumes of "Lectures in General Biochemistry" 1963.
34. 1973 History of the Department of Biochemistry and the 2003 History.
35. 2002 Short History of the Department of Biochemistry for Bulletin of CSB/CMB.
36. History of Women in the Department 1984 and 2003, 2004 discussion group, Maud Menten, Clara Benson, Jeanne Manery Fisher information.
37. 1961-62 Laboratory Manual for Medical Students.
38. 1976-77 and 1978-79 BCH 371H Laboratory Manuals.
39. Bound volume of 1967-68 essays by graduate students in BCH 2021.
40. Record books describing graduate students' performances on oral examinations 1934-1944 and 1945-1951.
41. Logs of degrees completed 1919-1980 and 1981-2000.
42. 1945 letters and data from Dr. Chao-wan Shen to Prof. Wynne about research projects, and a 2001 biography of Dr. Shen by Hailun Tang.
43. Bulletins of the Canadian Biochemical Society (now CSB/CMB) 1972, 1975-2006 and a CD of the 50<sup>th</sup> meeting in 2007.
44. Canadian Federation of Biological Societies Proceedings 1960-1991, 1993, 1996. News Bulletins 1965, 1967-1979, 1983-1994. Constitution and By-laws 1965, 1968.

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45. University of Toronto President's Reports 1972-73 and 1973-74.
  46. University of Toronto Staff Publications and Honours 1974-75 and 1975-76.
  47. Calendars, Faculty of Arts and Science, St. George Campus 1971-72, 2000-01.
  48. School of Graduate Studies Handbook 2001-2004, 2005-2007.
  49. Clinical Research Society of Toronto Programme 1989, 1990, 1992, 1993, 1996.
  50. Biochemistry Library sign-out book with signatures. Feb. 29, 1968- Dec. 3, 1986.
  51. Framed 1911 article about Prof. A.B. Macallum in the Editorial Section of the Toronto Sunday World. "A Man Who has Delved Deep into Nature's Secrets"
  52. Lismor sketch of Andrew Hunter in his laboratory (in the Chair's office).
  53. Framed photographs of some of the early professors.
  54. Framed photograph of some of the members of the department in 1976, in connection with the retirement of Jeanne Manery Fisher.
  55. Cup commemorating the 1990 retirement of University of Toronto President George Connell.
  56. Text books and monographs dating back to 1895.
  57. Old scientific apparatus.

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