

Featured Department:

University of Ottawa: Department of Biochemistry, Microbiology and Immunology

History of the Department

Although the University of Ottawa celebrated its 150th anniversary in 1998, its medical school is much younger. The Department of Biochemistry was established in 1946 as part of the University's new Faculty of Medicine, which for the first several years occupied a group of temporary military barracks that had been vacated by the Canadian Women's Army Corps. The first years of the Department were rather unsettled as three different Chairs served terms of one year. The first was Vlassios Vlassopoulos, recruited from the University of Athens by the Canadian Ambassador to Greece. Vlassios Vassopoulos was bilingual, in keeping with the special bilingual character of the University of Ottawa. However, it was discovered on his arrival in the fall of 1946 that the languages he spoke were Greek and German. After experiencing one Ottawa winter Vlassios Vassopoulos returned to Greece. The next Chairs were Danin Hingerty followed by Maurice Murnaghan, both coming from Ireland to join the University of Ottawa. Maurice Murnaghan had come to Ottawa to take up the position of Professor of Pharmacology but he also filled in as Acting Chair of Biochemistry when Danin Hingerty left for a year in the United States and then returned to Ireland.

Jean Etori arrived from the Faculty of Medicine in Paris in 1949 and was to remain as Chairman of Biochemistry until shortly before his untimely death in 1961. During his tenure the main focus of the Department was on medical student teaching. Jean Etori had an intense interest in the design of laboratories and laboratory equipment and many of his designs were incorporated into the new facilities of the Department when it moved from the barracks to the new medical building in 1954. Antoine D'Iorio was appointed Chair of the Department in 1961, coming from the University of Montreal. It was during Antoine D'Iorio's term that the Department of Biochemistry underwent its first major expansion with the addition of staff having strong research backgrounds and interests. Antoine D'Iorio was also instrumental in creating a single Biochemistry Department for both the Faculties of Medicine and Science in 1969. Before this time

undergraduate biochemistry in the Faculty of Science had been taught by a committee of the Departments of Biochemistry, Biology and Chemistry. When Antoine D'Iorio became Dean of the Faculty of Science and Engineering in 1969 Donald Layne assumed the chairmanship of the Department. He had joined the Department in 1968 from the Food and Drug Directorate in Ottawa. Under Donald Layne's direction the undergraduate biochemistry program in the Faculty of Science was fully implemented and five new members were added to the academic staff. This necessitated the physical expansion of the Department beyond the confines of the Medicine building to a nearby building that had been occupied by Electrical Engineering.

Jean Himms-Hagen succeeded Donald Layne as Chair when he became Vice-Dean of Medicine in 1975. Under her leadership the Department was to undergo another expansion when a program in Nutrition/Dietetics was initiated in 1976. Nicole Begin-Heick was appointed director of the program and four staff members with research interests in nutritional biochemistry joined the Department. As with the Chairs that had preceded her, Jean Himms-Hagen was involved in the planning of new research facilities for the Department. In 1982 the Faculty of Medicine moved once again to a new building that was part of a health sciences complex that included area hospitals but was situated some distance from the main campus of the University of Ottawa. Approximately half of the biochemistry staff moved to the new Medicine building, the remainder staying on the main campus. Morris Kates, who succeeded Jean Himms-Hagen as Chair in 1982 was the first to direct the Department operating at two distant locations. During the years that followed staff members were relocated from the main campus to the health sciences complex. At present one staff member is located on the main campus together with the student laboratories and offices associated with the Department's undergraduate biochemistry program.

The period 1985 to 1998 saw no further expansion in the Department in terms of staff or academic programs. Indeed the Department decreased from a maximum of 17 professors in 1982 to 13 in

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1998 as retiring professors were not replaced. During this period Harvey Kaplan, Peter Anderson and Denis Williamson served terms as Chair. In 1998, as part of a restructuring of the basic sciences in the Faculty of Medicine, the Department of Biochemistry and the Department of Microbiology and Immunology merged, forming the Department of Biochemistry, Microbiology and Immunology. The Department currently has 21 professors and 15 technical and support staff. Jo- Anne Dillon, the former Chair of the Department of Microbiology and Immunology is serving as Interim Chair.

Academic programs

The Department offers undergraduate programs in the Faculty of Science which lead to the B.Sc. with concentration in Biochemistry or an Honours B.Sc. in Biochemistry. All biochemistry courses for the B.Sc. with concentration in Biochemistry are offered in English and in French. The Department, in collaboration with the Department of Chemical Engineering in the Faculty of Engineering, also offers a combined Biochemistry/Chemical Engineering program in Biotechnology. Students in this program can obtain both a B.Sc. in Biochemistry and a B.A.Sc. in Chemical Engineering in a period of five years. All of the undergraduate biochemistry programs have co-op options in which students alternate study terms on campus with four-month work terms in an industrial or research environment. There are approximately 400 students enrolled in the various undergraduate biochemistry programs at the University of Ottawa. The Department is also involved, together with the Departments of Biology and Chemistry, in a newly created undergraduate program leading to an Honours B.Sc. in Biopharmaceutical Science. Within this program students can choose between a medicinal chemistry or genomics option.

The Department offers graduate programs in biochemistry and in microbiology and immunology. More recently the Department has initiated a collaborative graduate program in human and molecular genetics with the first students enrolling in the fall of 1999. The graduate programs of the Department are strengthened through the participation of a number of investigators from various research institutes and government laboratories in the Ottawa region, including the University of Ottawa Heart Institute, the Loeb Health Research Institute, the Ottawa Hospital Research Institute, the Ottawa Regional Cancer Centre, the Children's Hospital of Eastern Ontario Research Institute, the National

Research Council, Health Canada and the Canadian Blood Services. These investigators are associated with the Department as cross-appointed or adjunct professors. With a total involvement of 75 professors in the graduate programs of the Department, students have an opportunity for study in a variety of research areas. There are currently 110 students enrolled in the graduate programs of the Department.

Faculty and Research

Research in the Department of Biochemistry, Microbiology and Immunology is evolving in two general thematic areas, one is Microbial and Host Resistance while the other is Receptor Biology. The Microbial and Host Resistance theme research is focussed on virology and viral pathogenesis, bacterial pathogens and targets, environmental microbiology and epidemiology, HIV pathogenesis, and immunology and vaccine development. Molecular recognition and design and cellular and whole animal responses are two areas of research concentration within the Receptor Biology theme. Research in both of the general thematic areas is multidisciplinary in nature and the theme members include researchers from other faculty departments, research institutes and government laboratories.

The list that follows identifies the research



Faculty members of the Department of Biochemistry, Microbiology and Immunology, University of Ottawa.

Front row, L to R: Steffany Bennett, Alvin Chan, Kathryn Wright, Mary-Ellen Harper, Syed Sattar. Back row, L to R: Stephen Evans, John Baenziger, Vasek Mezli, Earl Brown, Jo-Anne Dillon.

interests of the core members of the Department of Biochemistry, Microbiology and Immunology. Not included in this summary are **Vasek Mezl**, **John Patrick**, and **Denis Williamson** whose responsibilities are primarily in the teaching programs of the Department. **Nicole Begin-Heick**, **Leo Benoiton**, **Jean Himms-Hagen** and **Morris Kates** are professors emeriti in the Department and continue to make valuable contributions to its academic and research programs.

Members of **Illimar Altosaar's** laboratory are studying the molecular parallels between animal defence systems and those in plants which involve conserved molecules of the ancient immune system: resistance factors produced by R genes, Toll-like receptors, salicylic acid, antimicrobial peptides like tryptophanin and indolicidin. As a gateway platform to producing specific foods with engineered drug effects, several medically important biopharmaceuticals (cytokines, vaccines, markers of cellular differentiation) are studied in transgenic plant models like rice, carrots, grapes.

Peter Anderson's research is directed toward the study of the proteins involved in blood coagulation. Chemically modified proteins are used to examine how membrane environments regulate and localize the formation of blood clots. The current focus is on the formation and action of the ser-

ine proteases factor Xa and thrombin.

John Baenziger's research is focussed on unraveling the complicated role played by neurotransmitter receptors in the human brain. Dr. Baenziger's lab uses a variety of novel physical methods to study the structure and mechanisms of function of these important integral membrane proteins.

Steffany Bennett's research group is examining the role of intercellular communication (gap junctions) in determining neuronal cell fate and on characterizing novel lipid mediator receptors in progressive neurodegenerative disorders.

Research in **Earl Brown's** laboratory is centred on two areas of viral molecular genetics; the molecular evolution of virulence in influenza virus in an animal model and the role of the reovirus mu2 protein in viral replication and interferon response.

Danielle Carrier is using spectroscopic tools, and particularly infrared spectroscopy, to investigate the molecular interactions of membrane components and molecules affecting their functions, for example antibiotics causing nephrotoxicity and bioactive lipids capable of modulating the activity of gap junctions.

Alvin Chan is studying the interactions of antioxidant nutrients and the role of vitamin E in the regulation of bioactive lipids.

Using approaches of molecular biology, genomics and proteomics, **Jo-Anne Dillon** investigates the role of various proteins involved in cell division in coccal bacteria, particularly Gram negative cocci. She also investigates the mechanisms and molecular epidemiology of antibiotic resistant bacteria, leading an international surveillance network in the Americas and the Caribbean for monitoring the susceptibility of *Neisseria gonorrhoeae* isolates.

Kenneth Dimock's research focusses on understanding, at the molecular level, interactions between viral proteins and between viral and cellular proteins (i.e. receptors) involved in virus entry into host cells.

In **Stephen Evan's** laboratory research is centred on proteins that are involved in the biosynthesis and immune recognition of carbohydrate tumor antigens, and the development of protein mimetics.

Lionel Filion's research concerns the importance of cytokine "immune hormones" in autoimmune diseases such as Multiple Sclerosis. He is investigating the role of the cytokines in modulating the immune response in patients with Multiple Sclerosis.



Faculty members of the Department of Biochemistry, Microbiology and Immunology, University of Ottawa.

Front row, L to R: Leonard Kleine, Odette Laneuville, Danielle Carrier, Ken Dimock. Back row, L to R: Lionel Filion, Peter Anderson, Denis Williamson, John Webb. Not present : Illimar Altosaar, John Patrick, Sylvia Vidal.

The research conducted in **Mary-Ellen Harper's** laboratory examines changes in the efficiency and control of energy transduction processes in a variety of mammalian cell types. In particular, the group is interested in the functions of the recently identified uncoupling proteins, and possible clinical implications of uncoupled energy metabolism (obesity, effects of aging, protection from reactive oxygen species).

Leonard Kleine's research is directed towards the study of the involvement of signal transduction components (the isoforms of PKC and PKA, MAP kinases) in the control of proliferation, differentiation and apoptosis of neuroblastomas. How these events are affected by gap junctions and the different types of connexins, and how gap junction properties are modulated by signal transduction components are also being closely examined.

Odette Laneuville's research studies are focussed on the regulation of expression of the enzyme prostaglandin endoperoxide H synthase-1, with a particular interest in the translational regulation of the gene for this enzyme.

Research in the laboratory of **Syed Sattar** focuses on how human pathogens get into and sur-

vive in the environment and the use of chemical germicides in preventing and controlling their spread.

Sylvia Vidal's laboratory is using a molecular genetic approach to understand the molecular basis of susceptibility or resistance to infection with cytomegalovirus in inbred strains of mice. Identification of host resistance genes should provide a rational to develop alternative therapeutic strategies for immunocompromised individuals at risk of severe and even fatal consequences of an infection with cytomegalovirus.

Research in **John Webb's** laboratory is aimed at understanding host immune responses to the protozoan parasite *Leishmania*, an obligate intracellular organism that is endemic in many tropical and subtropical areas of the world. Various screening approaches are used to identify parasite antigens that recognized by CD4+ T cells in the context of MHC class II molecules. These antigens may be useful in terms of diagnostic or vaccine reagents.

Kathryn Wright's research interests lie in the general area of viral pathogenesis and immunology, and more specifically, understanding the basis of protective immunity against respiratory viruses.