

Australian Society for Biochemistry and Molecular Biology Inc.

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MONASH UNIVERSITY - BIOCHEMISTRY DEPARTMENT PROFILE

The foundation of the Department of Biochemistry at Monash University in 1961 coincided with major developments in both the science itself and Australian academia in general. The field of biochemistry was then maturing into a well-structured and rapidly-expanding discipline.

Enzymology, protein chemistry and metabolism were already well established. Molecular biology was emerging and was well into its exciting phase of the cracking of the genetic code, as part of the unravelling of the molecular details of genetic inheritance, gene expression and protein synthesis.

The principles of genetic and metabolic regulation as well as the biochemical roles of cellular structures were being elucidated.

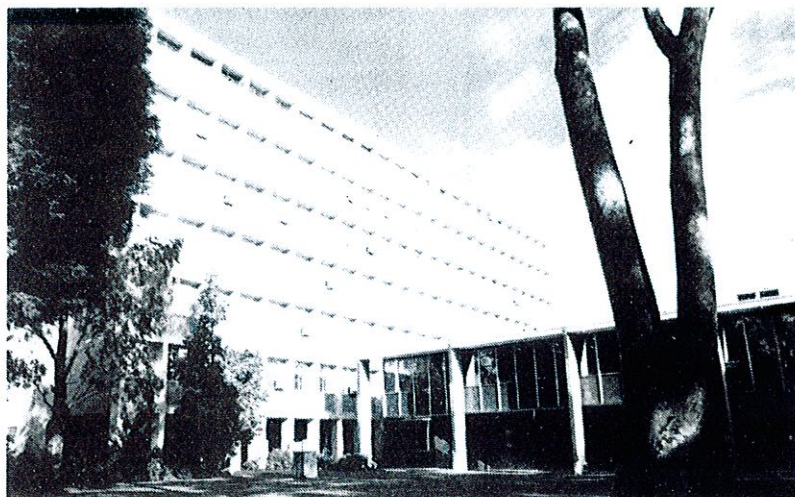
At the same time, the Universities in Australia were rapidly expanding in both size and number. A remarkable upgrading of the tertiary education system in Australia was taking place.

The Department of Biochemistry at Monash University was able to capitalise on this twin set of circumstances to rapidly achieve a prominent position in the Australian Biochemical scene.

EARLY DAYS

Monash University itself took its first students in 1961. The ample campus at Clayton with its often muddy unsealed footpaths was known as 'The Farm'. The much longer established University of Melbourne, downtown, was in turn referred to as 'The Shop'.

The new staff appointees at Monash in the Department of Biochemistry, and the Faculty of Medicine as a whole, set themselves the task of establishing an



The Biochemistry building at Monash University

international reputation in the context of developing a vibrant and successful University.

Joseph Bornstein was appointed Foundation Professor of Biochemistry in 1961. Bornstein, a medical graduate, had previously been Senior Research Fellow at the University of Melbourne and later an endocrine physiologist in charge of scientific research at the Alfred Hospital.

With extensive overseas experience in chemical pathology at King's College, London and in metabolic regulation at St Louis with Carl and Gertie Cory, Joe Bornstein recognised that molecular mechanisms, as deduced from biochemical research, would provide the solution to many medical problems. He set about organising a Department of Biochemistry in which research activi-

ties would take a very prominent position alongside the teaching programmes.

Nevertheless, the early years of the Department were spent in the context of a major dispute within Monash concerning, of all things, the authority to teach biochemistry

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Monash University Profile (contn.)

to science students. Whilst biochemistry was recognised within the University as an appropriate discipline for teaching in the medical faculty, the view was strongly held in the Faculty of Science that biochemistry for science students should be taught by the Department of Chemistry.

It was reportedly the opinion at that time of a senior Chemistry academic at Monash, that anything biological did not really constitute proper science.

As a reflection of this unsavory (and, from today's standpoint, hardly believable) dispute, the Department was initially called the Department of Medical Biochemistry, until this situation was resolved in Biochemistry's favour by the end of 1963.

Until that time, the Department of Chemistry had taught biochemistry in second year science and gave Biochemistry staff only a limited role in teaching biochemistry in the third year of the BSc course.

It was due to Bornstein's remarkable political skills and undeterred tenacity that he was able to place Biochemistry within Monash University as a Department recognised in its own right to teach both medical and science students.

As medical teaching at Monash University was due to start in February 1962, the early days of the Department were characterised by the imperative of efforts to establish the first teaching programmes in Biochemistry.

Early appointments included Ian Parsons, a clinical biochemist from Melbourne; Laurie Austin, a Melbourne University graduate who had been working in the Defence Laboratories in Melbourne; Dennis Lowther, an Englishman, who had been a research fellow on virology at the Australian National University; and Tony Linnane, a graduate of the University of Sydney, who had recently returned from David Green's laboratory at the Enzyme

Institute, Madison, Wisconsin and was a Senior Lecturer in Biochemistry at Sydney.

Linnane was the only one of those early academic staff members with significant undergraduate teaching experience. Together this small group developed medical (and later, science) biochemistry courses in a very exciting and challenging atmosphere.

Practical experiments for teaching were worked out with little time before the scheduled classes took place, and notes written hurriedly the night before the class formed the basis of many aspects of these new courses.

As was the trend at that time, the medical biochemistry courses tended to be clinically oriented and emphasised metabolic pathways and their regulation. On the other hand, Linnane and colleagues perfused the science courses with the excitement of the contemporary new advances in biochemistry then taking place.

The active research interests of the academic staff members led to a third year B.Sc. course in Biochemistry that had the flavour much more of today's "molecular and cell biology" textbooks, than the "structure and metabolism" texts in biochemistry prevalent in the 1960's and 1970's.

Many further staff appointments took place in the early 1960's. Academic staff members who worked in the Department for a relatively short time included P R Davoren, H S Bachelard, R J Young, L W Wheeldon and P R Stewart. Staff members appointed in the 1960's, who still remain in the Department today, include Mick Gould, Barry Preston, Bruce Lukins, John Armstrong, Bill Murphy, Clem Robinson and Frank Ng. Geoffrey Kellerman was with the Department eight years from 1967-75, before moving on to a Chair in Biochemistry at the University of Newcastle, serving there for some years as Dean of Medicine.

Past and Present Professors of Biochemistry at Monash University

Joseph Bornstein
(1961-1984)



Anthony W. Linnane
(1965-present)



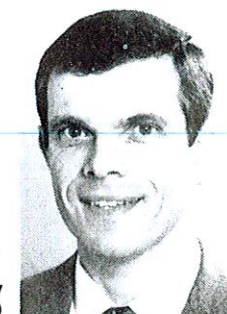
Dennis A. Lowther
(1969-1991)



Milton T W Hearn
(1986-present)



Phillip Nagley
(1990-present)



Monash University Profile (contn.)

GROWTH AND CONSOLIDATION

In the early days the Monash biochemists were initially housed within the Department of Chemistry. In 1965, the Department of Biochemistry moved into a new six storey building which it shared with the Department of Physiology. For a limited period the Department of Genetics also had space in this building.

Later, with Physiology's departure to a new building, the six storey building was allocated entirely to Biochemistry and in 1980 was refurbished throughout.

A separate Biochemistry Teaching Laboratories building, opened about 1972, enabled the instruction of some 240 second year science students (in classes of 80 on three days per week) and up to 144 third year science students (in classes of 36 on four days per week). The medical teaching classes were run in another large laboratory, then part of the Medical Faculty but later to belong to Biochemistry as such.

The Department of Biochemistry, over its 30 year existence, has been generously equipped with modern biochemical instrumentation, including ultracentrifuges, both preparative and analytical, many spectrophotometers, an early peptide synthesis apparatus, an electron microscope and many other items which supported a set of modern research programmes in biochemistry. In 1984, the Department housed one of the first consolidated peptide/nucleotide laboratories in an Australian University, with an automated peptide synthesiser, a gas phase peptide sequencer and an automated DNA synthesiser.

From the earliest days, a definitive policy was established for the organisation of research in the Department. There were to be a small number of active research groups focussing on specific areas of biochemical research.

Thus, by the late 1960's, Joe Bornstein headed a group working on

growth hormone, insulin and diabetes; Tony Linnane's group investigated the biogenesis of mitochondria, mostly in yeast, applying a broad range of molecular biological and genetic techniques; Dennis Lowther's group focussed on the biochemistry of the extracellular space, including work on joints and cartilage and their macromolecular components, particularly polysaccharides and proteoglycans; a smaller group led by Laurie Austin focussed on neurobiochemistry, aimed at understanding aspects of the biochemistry of the brain and nervous system.

For the most part, at their inception, these programmes represented new and challenging aspects within the field of biochemistry. Their bold development of new areas put Monash biochemistry on the map both nationally and internationally.

Tony Linnane, who had been appointed as a

Reader in 1962, took up the second Chair of Biochemistry at Monash in 1965. Dennis Lowther, having been promoted to Reader in 1966, was awarded a Personal Chair in Biochemistry in 1969. Laurie Austin led his group as another Reader in the Department.

Administratively, the Department of Biochemistry always had a Professor as its Chairman, that being the established practice at Monash University (and still currently the case). Bornstein, as Foundation Professor was Head of Department throughout the early years. A system of rotating headship was subsequently introduced, such that from the 1970's until Bornstein's retirement in 1984, each of the three professors occupied the Chairmanship for a two year period, on a six year cycle.

Staff members at the level of Lecturer and above, who were appointed during the 1970's and early 1980's and participated in Departmental group research activities included L C C Weerasinghe (Endocrinology); J M Haslam, P Nagley, S Marzuki, R M Hall, M K Trembath and C E Novitski (Mitochondria); C J Handley (Connective Tissue); P L Jeffrey, B G Livett (Neurobiochemistry). These new staff members worked alongside more senior colleagues within a particular group: Bornstein, Parsons, Ng, Gould, Armstrong (Endocrinology); Linnane, Lukins, Kellerman (Mitochondria); Lowther, Preston,



Three of the original academic staff of Monash Biochemistry, pictured at the recent farewell dinner for L Austin and D A Lowther. From left to right: Ian Parsons (1962-1988), Laurie Austin (1962-1991), Dennis Lowther (1962-1991).

Murphy, Robinson (Connective Tissue); Austin (Neurobiochemistry).

PRESENT ORGANISATION

On the retirement of Joseph Bornstein at the end of 1984, Dennis Lowther took up that vacant Departmental Chair and, at the same time, a third Chair in Biochemistry was established. Milton Hearn, a graduate in Chemistry of the University of Adelaide, and by then a bioseparation scientist working as a NH&MRC Principal Research Fellow at St Vincent's Medical Research Institute in Melbourne, was appointed Professor of Biochemistry in 1986.

The group organisation of the

(Continued Page 13)

Monash University Profile *(contin. from page 3)*

Department now became restructured into three substantial research groups. The academic staff formerly associated with Bornstein, as well as Austin, joined Hearn to form the Macromolecular Structure and Function group.

The activities of this group focussed on molecular separation science as a basis for analysing hormones and growth factors, incorporating molecular modelling techniques; the research also included neuromuscular biochemistry work of Austin, together with monoclonal antibody work of John Underwood who joined the Department in 1988.

went on to encompass other interests such as autoimmunity, and cancer diagnostics based on monoclonal antibody technology.

The research on the molecular biology of yeast mitochondria grew to encompass work on mitochondrial diseases and, most recently, the human ageing process. This group became known as the Molecular Biology group.

Further staff who joined this group were Manfred Beilharz, Rodney Devenish and Brian Cheetham. Phillip Nagley, from 1983 a Reader in the Department, was promoted to a Personal Chair in Biochemistry in 1990.



Tony Linnane and colleagues in 1982, at the announcement of the successful cloning of human interferon genes at Monash. From left to right: Mark Murphy, Gabrielle McMullen, Tony Linnane, Graeme Woodrow, Paul Hertzog.

The research of the Connective Tissue group continued its focus on dynamic and biochemical properties of extracellular matrices and the synthesis and degradation of extracellular macromolecules in cartilage and ligaments, in relation to arthritis and other diseases. Academic staff additions to this group included Wayne Comper, whose research extended to studies on glomerular ultrafiltration and kidney function.

With the explosive development of recombinant DNA technology, the staff in the Mitochondria group had expanded its range of activities, to include research in human interferons; this group's activities

Biology and Medicine. The establishment of this Centre in 1983, under the Directorship of Professor Linnane, represented a major innovative development at that time.

The Centre, structured with a Board of Management including business and community leaders, set out to bring its molecular biology and medical research into broader community profile. One goal of this Centre was to foster strategic research with commercial application.

The Centre initially developed in conjunction with other medical research units in Melbourne, particularly the Department of Medicine at Monash University located at the Alfred Hospital whose interests

encompassed haematology and the control of blood clotting.

This Centre has contributed to the development of the Department of Biochemistry through its ability to attract additional funds from a variety of sources, and broadening its biomedical research and training programmes. The Centre's senior staff hold appointments as academic staff of the Department, particularly within the Molecular Biology group.

In 1988 the Centre for Bioprocess Technology was founded under the Directorship of Professor Hearn. This centre, with links to the Department of Chemistry and Faculty of Engineering at Monash University, aimed at the development of commercial and industrial applications of the research in the Macromolecular Structure and Function group and its collaborators.

CENTRES OF RESEARCH

In order to meet the challenges facing University research in the early 1980's, certain activities in the Department of Biochemistry became the focal point for the establishment of a Centre for Molecular

STUDENT TEACHING AND TRAINING

The Department of Biochemistry has responsibility for teaching in the Faculties of Science and Medicine at Monash University. In the science course, the mainstream second year subject (with approximately 250 students enrolled) leads to a third year Biochemistry major (with an enrolment of about 125). BSc students at Monash usually take two major subjects in their third year.

A minor terminating second year Biochemistry science course has been offered which has attracted some 20 to 80 students in different years. The fourth year Honours enrolment in the Department varies between 20 and 30. Biochemistry Honours students receive training within the Department's research programmes and may participate in those of the associated Centres.

In the Faculty of Medicine, for many years, the Department

Monash University Profile (contln.)

taught in both second and third years of the medical course, the courses consisting of both lectures and practical components. Commencing in 1991, the medical curriculum at Monash underwent a radical reorganisation.

In the pre-clinical years of the new course, the teaching programme is based not on subjects named after the teaching discipline (such as Biochemistry or Physiology). Rather, it is built around "systems" encompassing various anatomical or functional aspects of the body, and also including a major segment on clinical and communication skills.

A substantial presence in the medical course was maintained by the Department of Biochemistry (and not without much strong and determined endeavours on our part). The first semester of the new first year medical course incorporates a unit denoted "Principles of Biochemistry" (ironically, the Department of Chemistry has given up its teaching of fundamental chemistry to medical students in favour of the Department of Biochemistry).

In the second semester of first year, and on into second year, are a series of units called Cellular and Molecular Biology. The vast majority of teaching in these units is carried out by the Biochemistry Department (Shakespeare put it this way: 'That which we call a rose, by any other name would smell as sweet'). The Department also makes significant contribution to other newly created units such as Endocrinology, Principles of Human Nutrition, and Medical Genetics and Clinical Molecular Biology.

POSTGRADUATE TRAINING

The Monash Department of Biochemistry has maintained a very active programme of training postgraduate students mostly to the PhD level and, less frequently, to MSc. The current enrolment of

postgraduate students in the Department is approximately 65.

Over a relatively short Departmental history, some 100 students in Biochemistry have successfully obtained postgraduate degrees by research in this Department. Among PhD graduates of the Biochemistry Department at Monash university are many individuals who have attained senior positions locally or nationally and internationally.

Department occupy senior academic positions and research positions at many Universities and research institutions, CSIRO divisions and other scientific and technical organisations in Australia.

INVOLVEMENT WITH THE AUSTRALIAN BIOCHEMICAL SOCIETY

One of the driving forces that



Phillip Nagley and colleagues in 1985, when they reported the first complete gene to be chemically synthesised in Australia. From left to right: Phillip Nagley, the DNA synthesiser, Gabrielle McMullen, David Gearing

These include at Professional level: Bruce Caterson, University of North Carolina, Chapel Hill, USA; Kevin Catt, NIH, Maryland, USA; Ian Chubb (formerly Deputy Vice-Chancellor, University of Wollongong), presently Chairman Higher Education Council, DEET; John Hopwood, Adelaide Children's Hospital; David Jollow, University of Carolina, Charleston, USA; Sangkot Marzuki, Director-Designate of the Eijkman Institute for Molecular Biology, Jakarta, Indonesia; John Mattick, University of Queensland; Phillip Nagley, Monash University; Bryan Toole, Tufts Medical School, Boston, USA; Con Tsigonas, University of Patras, Greece; Dick Wettenhall, University of Melbourne; Paul Zimmet, Diabetes Research Institute, Melbourne.

Other PhD graduates of the

shaped the growth and consolidation of the Society was Tony Linnane, who was Secretary from 1961 to 1967. He later became President of the Society, 1974-76.

At the international levels of Biochemistry with which the Society is formally involved, Linnane was President of FAOB 1975-77 and is currently Treasurer of IUB (recently renamed the International Union of Biochemistry and Molecular Biology). The Australian Biochemical Society was heavily involved in the organisation of the 12th IUB Congress held in Perth in 1982; Linnane was President of the organising committee, with Barry Preston as Secretary.

Other staff members at Monash University who have served on the Council of ABS (as it was then known) were Mick Gould, who

Monash University Profile (contin.)

acted as Editor of the ABS Newsletter from 1967-88, interrupted by a brief period 1972-74 when Ian Parsons took over. Clem Robinson was Secretary of the Society 1977-82. Victorian State Representatives from Monash have been: John Armstrong 1970-71; Jeffrey 1978-81 (whose responsibilities included the organisation of the 24th annual meeting of ABS at Monash in 1980); Phillip Nagley 1990-92.

LOOKING TO THE FUTURE

The Department of Biochemistry at Monash University has, over the past 30 years, established itself as one of the foremost University Biochemistry departments in Australia. Many of the Academic staff have achieved substantial international reputations. In addition to their extensive publications in journals and books, they make frequent presentations at confer-

ences internationally, as well as within Australia. The Head of Department, Anthony W Linnane, has been a Fellow of the Australian Academy of Science since 1972, and in 1980 was elected Fellow of the Royal Society, London. In 1990, Milton T W Hearn was elected a Fellow of the Australian Academy of Technological Sciences.

As with other departments of this type around the country, this Department faces the multiple challenges of the increased role of Government in university activities leading to extensive university reorganisation and changes in research funding patterns. Long gone are the days when Departmental staff could discuss what sort, or how many, ultracentrifuges or scintillation counters they would like to buy out of recurrent funds next year, or how much money individual staff members are to be allocated from Departmental funds for their research programmes.

The need to recruit external

funds from ARC, NH&MRC and other government sources, from medical research trust funds and foundations, and other various sources of funding, have been well recognised by the Monash Department of Biochemistry. It has been able to maintain its position as a well equipped organisation carrying out research in several areas at the forefront of modern biochemistry and molecular biology. With oncoming changes in University staff profiles, particularly resulting from retirements of older staff, there will be in the coming years many opportunities for recruitment of young well qualified biochemists and molecular biologists to further the research and teaching programmes in Biochemistry at Monash University.

Further information about Departmental research and training programmes can be obtained from Professor A W Linnane, Head of Department, Department of Biochemistry, Monash University, Clayton, Vic 3168. Tel (03) 565 3721. Fax (03) 565 4699.

Department Profile written by Phillip Nagley.

ASBMB Financial Support for Local Biochemistry and Molecular Biology Seminars

State Representatives of the ASBMB each have State Branch funds for the support of worthy biochemical causes. Available funds are \$1000 per annum for the states with the highest numbers of ASBMB members (New South Wales and Victoria) and \$800 for the other states and the ACT (By-Law 9(a)).

Any member of the Society is welcome to seek such funds directly from his or her State Representative.

State Representatives may also apply to Council for grants to augment State Branch funds to assist, for instance, in the organisation of scientific meetings for purposes such as travel grants for interstate speakers.

Requests for such grants, which must not exceed the sum listed above for each State Branch, should be sent to the Treasurer with a full statement setting out the reasons for the application. Such applications from each State Branch will be considered only in alternate years (By-Law 9(a)).

Members of the Society interested in such support should discuss the proposition with their State Representative.

In addition, "an amount of \$1000 per calendar year can be spent by Council on support for overseas biochemists who are visiting Australia, with a maximum of \$250 per person" By-Law 5(c)).

Requests for such support may be made directly to the Honorary Treasurer, who will consult with members of the Executive and reply promptly.

Finally, under Clause 5(e) of the By-Laws, Council will provide a sum of \$2000 per year, available nationwide to support the fares of the Society's overseas Guest Lecturers to visit other states to present lectures.

It is envisaged that State Representatives, after successfully negotiating for funds with Council, will arrange the visit with the Overseas Guest Lecturer through the appropriate contact person.

Again, requests for such support may be made directly to the Honorary Treasurer.

It is stressed that any member of the ASBMB, acting on his or her own or as an officer in an ASBMB-affiliated Special Interest Group, may seek Society support as described above.

Robert L Blakeley
(Honorary Treasurer, ASBMB)