



Budget hits knowledge base

The Academy of Science has been highly critical of the Federal Government's attrition of research capacity and cuts to research resources in the 2000 Budget in May.

In a joint statement, the Academy's Secretary (Physical Sciences), Professor Bruce McKellar, and Foreign Secretary, Professor Kurt Lambeck, said, 'This year's budget continues into a fifth year the government's policy of attrition of the higher education sector's research capacity. While the Minister for Education, Training and Youth Affairs, Dr David Kemp, has acknowledged the critical state of many of our universities, the budget proposes no remedy.'

The spokesmen said that the dismal trend of inadequate grants and uncertain career paths for university researchers would continue to drive Australia's best and brightest overseas.

'It is regrettable that this continued neglect is compounded by some cuts to research resources,' they said. The modest increase in Australian Research Council grants would be funded by a cut to the money allocated directly to institutions. The funding of the biotechnology strategy would be taken from the Technology Diffusion Program.

CSIRO assets will be sold without compensation to the organisation. As a result, its future research funding would be more uncertain.

The Federal Government has indicated that it will consider the state of research and innovation later this year, after it receives the Chief Scientist's review of Australia's science capability and the report of the Innovation Summit Implementation Group. The Academy statement said, 'We can only hope that next year, as a result of the advice the government receives from its own reviews, there is an injection into government thinking of a new sense of urgency.'

'It is also essential that there be an urgent injection of significant new funds for research and development. That should not wait for the next budget.'



Professor John Shine, left, with the Minister for Industry, Science and Resources, Senator Nick Minchin, on 12 April at the handover of the cheque for \$1 million for refurbishment of the Dome. Photo: Irene Dowdy.

Shine donates \$1 million to Dome

The eminent gene scientist, Professor John Shine, has donated \$1 million to help refurbish the Academy's Dome. On 5 May the President of the Academy, Professor Brian Anderson, announced that the building, a Canberra landmark, will be renamed the Shine Dome.

Professor Shine is Executive Director of the Garvan Institute in Sydney and Professor of Medicine and Molecular Biology at the University of New South Wales. He is also a Fellow of the Academy. The donation is part of a legal settlement for gene cloning research which led to the mass production of human growth hormone. For more about Professor Shine's research see www.science.org.au/academy/media/shine.htm.

The donation will be used to renovate the Dome, which was built in 1959. The Council of the Centenary of Federation has provided \$525 000 and the Australian Heritage Commission has provided \$24 000. As a result of Professor Shine's gift and the grants,

many high priority works will be completed.

Another \$900 000 is needed to upgrade the theatre, install moat lighting and upgrade the landscaping between the Dome and Ian Potter House. Council has decided that donors who contribute an amount of \$550 or more may be acknowledged with a small plaque on a seat in the Wark Theatre. For more information see www.science.org.au/dome/donations.htm, or contact Nancy Lane by phone on (02) 6247 5777 or email at do@science.org.au.

Meanwhile, work on the Dome is under way. It follows the conservation management plan and scope of works prepared by Gutteridge Haskins and Davey in 1999. Project Coordination has been selected as the contractor, and work should be completed by the end of the year. The building will reopen in January 2001. For more about the Dome's history and renovation see www.science.org.au/dome.

Office-bearers of the Academy

President

Professor Brian Anderson

Secretary (Physical Sciences)

Professor Bruce McKellar

Secretary (Biological Sciences)

Professor John Young

Secretary (Science Policy)

Professor John White

Foreign Secretary

Professor Kurt Lambeck

Treasurer

Professor Athel Beckwith

Telephone numbers

Executive Secretary (02) 6247 5777

Publications (02) 6247 5385

Awards (02) 6247 5777

Finance (02) 6249 1362

Fellowship administration (02) 6247 5777

National Committees (02) 6247 3966

International programs (02) 6247 3966

Library (02) 6247 3966

Australian Foundation for Science (02) 6247 5777

Facsimile (02) 6257 4620

Email aas@science.org.au

This newsletter is available on the Academy's web site, www.science.org.au/academy/newslett/newslett.htm.

Published by the Australian Academy of Science, GPO Box 783, Canberra ACT 2601.

Honorary editor: Professor Neville Fletcher FAA; production by Green Words & Images, Canberra. Other assistance: members of Academy committees and Academy staff.

Printed by McPherson's Printing Group, Melbourne.

The material in this newsletter is copyright but may be reproduced with acknowledgment. To receive a regular copy of the newsletter or to respond to material in the newsletter, write to the Executive Secretary at the Academy.

ISSN 1031-9204

Print Post Approved PP 255003/00025

The next 12 months will be critical

The President of the Academy of Science, Professor Brian Anderson, believes that the next year will be critical for Australia to take up international challenges in science and higher education. He used his address to the Academy's annual general meeting, on 5 May, to outline the problems and point the way to the solution.

Professor Anderson compared a snapshot of Australia today with a decade ago: diversified resources such as BHP and Rio Tinto make up a much smaller sector of the stock market, while telecommunications has grown from almost nothing to one of the largest sectors. 'Industries are no longer based just on atoms, molecules and materials, but also on bits, bytes and information structures, including biological structures,' he said.

'Mirroring the above, profound and worldwide changes are occurring in university enrolment patterns. Many traditional science disciplines have not shared in the growth; others have been spectacularly successful.' Enrolments had increased in biology, computer science and electrical engineering. This change would flow on to the science and technology workforce.

Government laboratories are not presenting many issues of concern at the moment. Meanwhile industrial research and development appeared to be sinking. Professor Anderson said, 'Big business is one of the societal groups in Australia with least awareness of the importance of science and technology. They are less aware than their international counterparts.' In the run-up to the Innovation Summit in February, a former chief executive officer of IBM expressed much dismay at the response of his business colleagues to the importance of innovation.

On the positive side, more venture capital is available. Pre-venture capital is available through the Federal Government's COMET program, and changes to the capital gains tax are already encouraging entrepreneurship. Medical research has also gained greater government support.

Universities are in trouble. Professor Anderson observed that a leaked Cabinet submission identified eight or nine universities which were near insolvency. The higher education system suffered from run-down infrastructure, depressed salaries and the loss of key people. 'Behind all this

continued on page 4

Forthcoming events

- *Australia's Information Future*, symposium, Canberra, 16 August – see page 10
- *Schizophrenia and other psychoses*, symposium, Canberra, 20 October – see page 3

New topics on Nova

- Who will win the drugs race?
- Carbon currency – the credits and debits of carbon emissions trading
- Is Australian wildlife fair game?

Nova: Science in the news is at www.science.org.au/nova.

Basser Library

Anyone wishing to use the Basser Library should contact the librarian, Rosanne Walker, telephone (02) 6247 3966 or email rosanne.walker@science.org.au.

Gifts to the Academy

If you would like to make a gift or a bequest to the Academy of Science or the Australian Foundation for Science, please contact the Executive Secretary or the Development Officer, telephone (02) 6247 5777 or email es@science.org.au.

Intellectual feast on Australia's science future

Sir Gustav Nossal described the Academy's annual general meeting symposium on *Australia's Science Future*, held on 3 and 4 May 2000, as an 'intellectual feast'.

Summing up after the sessions, Sir Gustav said, 'This special Y2K AGM has been a long time in planning, very ambitious in scope and with a satisfyingly large and diverse audience. It has maintained interest to the very end of the sessions.'

One of the aims was to involve younger scientists as speakers and participants in discussion. Judging from the fresh presentations of speakers and the lively debate about the fundamental directions of science, this appears to have been achieved.

The organisers were the Chief Research Scientist at the CSIRO Australia Telescope, Dr Richard Manchester, and the Executive Director of the Garvan Institute of Medical Research, Professor John Shine. Other senior scientists organised speakers on the themes of the global environment, mind and brain, energy, molecular structure and recognition, IT and

telecommunications, genetic engineering, the universe, and ageing.

The speakers described the background to their fields of research, the latest developments and opportunities for Australia in the future. The presentations were clear and understandable, discussing the most fundamental research – such as the origins of the universe or the genetic code of life – and the latest applications – in health, agriculture, conservation and technology. The research raised many issues with social, economic and political implications.

As Sir Gustav pointed out, the speakers' overviews of the history of their disciplines repeatedly showed Australian scientists prominent at the frontiers of research. He said, 'The symposium illustrated what great shape Australian science is in, despite the limits of funding which we all know about. It is a precious heritage which the Academy must protect.'

For background on all the speakers and summaries of their talks, see www.science.org.au/future.



Awards for young researchers

Thirteen young researchers attended the Academy's symposium on *Australia's Science Future* with awards from the Australian Research Council and the Technology Diffusion Program of the Commonwealth Department of Industry, Science and Resources. Funding from the Technology Diffusion Program also brought two young Australian scientists, Dr Neil Hamilton and Dr Bryan Gaensler, back from overseas to speak at the symposium. The award winners are, back row from left, Dr Ron Smernik, Dr Kristen Bremmell, Dr Leanne Armand, Dr Allyson Williams, Dr Mathew Leitch, Dr Jacqueline Matthews, Dr Harvey Millar, Miss Natasha Hendrick, Mr Thomas Brinsmead; front row, Dr Colin Nexhip, Dr Samantha Richardson, Dr John Lambert, Dr David Neumann.

May to head Royal Society

An Australian scientist and Corresponding Member of the Academy, Sir Robert May, will become the next President of the Royal Society. Sir Robert is currently Chief Scientific Adviser to the UK Government and Head of the UK Office of Science and Technology. He holds these positions on leave from his Royal Society Research Professorship in Zoology at Oxford University.

He began his career studying chemical engineering, physics and maths at the University of Sydney. In 1959 he gained a PhD in theoretical physics and in 1969, at the age of 33, became Professor of Physics at the university. His research interests changed to the way wild animal populations change. In 1973 he moved to Princeton University and later to Oxford.

He steps down from his post as UK Chief Scientist in September and begins his five-year term of office as President of the Royal Society on 1 December 2000. Another Australian in England, Howard Florey, was President of the Royal Society from 1960 to 1965.

Schizophrenia and other psychoses

Translating research into policy and action

An Australian Academy of Science symposium

Friday 20 October, 2000

8.30am to 6pm

Hyatt Hotel, Canberra

This important one-day meeting will bring together policy makers, medical researchers, medical administrators, consumers and carers. Topics cover the latest research findings, the relevance of research to consumers and carers, how research guides policy and assessing value for money.

For details and registration:

web: www.science.org.au/schizophrenia

schizophrenia

email: nr@science.org.au

phone: (02) 6247 3966

The next 12 months will be critical

continued from page 2

lies the problem of the government as price fixer for the principal product of organisations who cannot control the price of their inputs and who cannot receive a premium price for a premium product.'

Only small sums of research funds were contestable. 'The imputed university salaries are the biggest ticket item. These are uncontested, and their outcomes are not assessed.'

The Australian Research Council has released a visionary strategic plan, including a program that encourages linkages between research and industry. 'The public is not really impressed by scientists getting elected to the Royal Society, or winning fancy prizes apart from the Nobel prize. On the other hand they are very impressed by scientific advances that contribute to economic outcomes. Linkages are necessary for these outcomes.'

The linkage program has a social dimension. 'Science awareness of the community is essential if we are to have intelligent responses to issues like cloning, genetically modified organisms, nuclear reactors and salinity. The Academy has taken a high profile on a number of these issues. We argue that science can inform the debate, rather than settle it.'

Professor Anderson said that there was a disconnection between the present level of funding of the Australian Research Council and the vision laid out in its strategic plan.

He pointed out that in 1972 one Australian dollar would buy US\$1.45. Now it buys 58 or 59 cents. 'This is an indictment of the last three decades of leadership, not just of our political leadership.'

'Fellows of the Academy must be part of the solution. The next 12 months will be critical as the Science Capability Review, the Innovation Summit Implementation Group and the newly fashioned ARC proclaim the message of what our corner of the economic landscape can do.'

'Some major conclusions are to be drawn. We must hope they will be wisely drawn. They will do two things. They will constitute an action agenda for the 2001 budget, and they will contain an action agenda for us, to modify some of our long-established patterns of behaviour.'

Award winners

Seven awards were presented at the Academy's annual general meeting on 5 May 2000. The David Craig Medal was reported in the last *AAS Newsletter* (number 46). Information about the Academy's awards is available at www.science.org.au/awards/awards.htm.

Matthew Flinders Lecture

Professor David Boger

Professor Boger delivered a most entertaining Flinders Lecture at the Academy's annual general meeting on 5 May.

Professor Boger is Laureate Professor of Chemical Engineering at the University of Melbourne and Director of the Particulate Fluids Processing Centre, a special research centre of the Australian Research Council.

He was born in Pennsylvania in 1939 and moved to Australia in 1965. He worked first at Monash University then, from 1982, at the University of Melbourne.

Professor Boger discovered a highly elastic constant-viscosity fluid – the Boger Fluid – which became an important test fluid. He used such materials to link surface chemistry to the properties of particulate fluids. His research broadened to encompass coal suspensions, waxy crude oils, ceramics and hydrocolloids. He turned basic research to significant industrial outcomes in the petroleum, minerals and food industries. His current research has applications in atomisation, inkjet printing and the delivery of agricultural chemicals.

The Flinders Lecture was entitled

'Research and innovation in non-Newtonian fluid mechanics: the relevance of irrelevant research.' After defining *research, innovation and non-Newtonian fluids*, Professor Boger used experiments with elastic Newtonian-like fluids to demonstrate how fluid elasticity can have a large and sometimes exciting effect.

He said that some regard the results of this work as irrelevant, as direct application to the solution of specific problems is not obvious. He then showed how this irrelevant knowledge can be used to minimise waste in the minerals industry and in the handling of crude oils. He concluded by showing how irrelevant elastic fluid research is directly relevant to inkjet printing and the delivery of agricultural chemicals – applications which were not obvious at the outset.

The Flinders Lecture, given once every two years, recognises the research of a scientist of the highest standing.

Mawson Medal

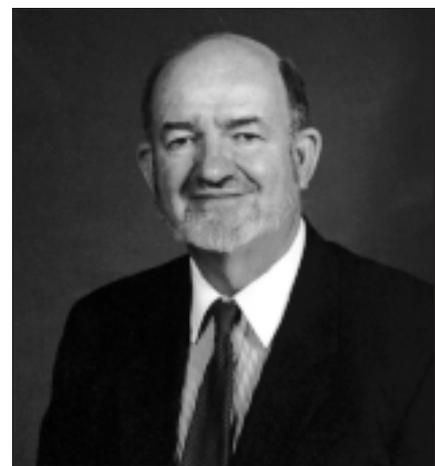
Professor Christopher Powell

Professor Powell is a leading figure in the study of tectonics during the early history of the Earth. He has studied the history of the supercontinent of Gondwanaland and the older Rodinia, both of which included much of what is now Australia.

He has also shaped current ideas in structural geology, notably in studies of the fabrics in natural rocks, the tectonics of the Himalayan region, the evolution of the Indian Ocean, the tectonics of the Lachlan Foldbelt in eastern Australia and the evolution of



Professor David Boger



Professor Christopher Powell

the Hamersley iron ore province of Western Australia.

The Mawson Medal recognises an outstanding research career in the Earth sciences.

Fenner Medal

Professor Hugh Possingham

Professor Possingham is a mathematical ecologist who has made contributions to marine, behavioural, population and community ecology. He has done pioneering work on the viability of populations of endangered species and the application of decision theory to conservation biology. He is also a vocal advocate of biodiversity conservation.

He is moving from the University of Adelaide to a position divided between mathematics, zoology and entomology at the University of Queensland.

The Fenner Medal recognises distinguished research by a younger scientist in the plant and animal sciences.

Frederick White Prize

Dr Peter Scales

Dr Scales has made lasting contributions to basic and applied colloid and surface science. He has developed a safe and environmentally friendly dense fluid that has found wide application in the processing of coal and other minerals. He has collaborated with waste water processing companies in Australia and the UK.

From his fundamental studies he has developed a new compressional rheology filtration facility which he and his students have used to improve

the design of waste water sludge filters.

Dr Scales is Senior Lecturer and Principal Research Fellow in the Department of Chemical Engineering at the University of Melbourne.

The Frederick White Prize recognises research by a younger scientist in the physical, terrestrial or planetary sciences which is important to the well-being and civilised progress of society.

Gottschalk Medal

Dr David Vaux

Through the study of the most common blood cancer, follicular lymphoma, Dr Vaux has made seminal discoveries about the cell death mechanism. Cells in follicular lymphoma have an abnormal chromosome because two chromosomes have broken and rejoined the wrong way, causing a gene called Bcl-2 to be switched on. Dr Vaux discovered that Bcl-2 is an inhibitor of cell death. This showed that the ultimate cause of the cancer is not increased cell division, as had been thought, but the failure of the damaged cells to die.

Since making these discoveries, Dr Vaux has been trying to apply his understanding of cell death to the treatment of cancer. Drug companies are also applying his findings to heart attacks and stroke.

Dr Vaux is Senior Research Fellow at the Walter and Eliza Hall Institute of Medical Research in Melbourne.

The Gottschalk Medal is awarded each year to a younger scientist who has made significant contributions to medical science.



Dr David Vaux

Pawsey Medal

Dr Anthony Murphy

Dr Murphy has applied his understanding of the chemistry and fluid dynamics of plasmas to the environmental problem of the disposal of hazardous chemicals. Plasmas are hot clouds of ionised gas. His early work focused on radio-frequency wave heating of plasmas for nuclear fusion. In the last few years a team of CSIRO scientists in Sydney and Melbourne has built small units that use the intense heat of plasmas to break down hazardous chemicals, more completely than incinerators, into their constituent atoms.

Dr Murphy has also applied his knowledge to make welding more efficient and to purify the water in swimming pools, cooling towers and small sewerage works.

Dr Murphy is a Principal Research Scientist at CSIRO Telecommunications and Industrial Physics in Sydney.

The Pawsey Medal is awarded each year to a younger scientist who has made significant contributions to physics.



Professor Hugh Possingham

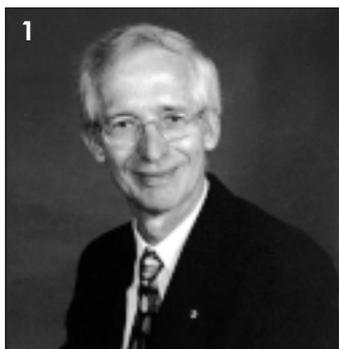


Dr Peter Scales

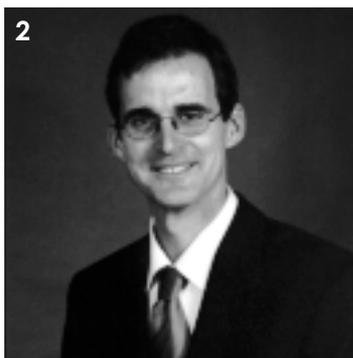


Dr Anthony Murphy

New Fellows



On 24 March the Academy of Science honoured 12 of Australia's leading scientists by election to Fellowship of the Academy. Election to the Fellowship recognises a career that has significantly advanced the world's store of scientific knowledge. There are 323 Fellows. The new Fellows are listed below. For more information see www.science.org.au/future/newfel.htm.



1. Professor Bruce Armstrong, 55, Director of the Research and Registers Division of the New South Wales Cancer Council.

Professor Armstrong received a DPhil from Oxford University for research into the role of diet in human cancer. He has since conducted epidemiological research into the relationships between sun exposure and skin cancer, diet and blood pressure, and asbestos-related cancers. After periods in health service and research management, he has directed research into environmental and genetic interactions in causing cancers related to sun exposure, into cancer screening and early diagnosis, and into the performance of cancer services.



2. Professor Adrian Baddeley, 44, Professor of Mathematics (Probability and Statistics) at the University of Western Australia.

Professor Baddeley describes statistics as the science of uncertainty. His research has dealt with uncertainties in spatial information of the sort collected by satellites, digital cameras, microscopes, medical scanners, geological surveys, medical registries or wildlife surveys. His recent work has produced ways of measuring differences between two pictures of the same scene, finding clusters in a random pattern of points, and extrapolating a spatial pattern beyond its visible boundary. These techniques could be used to analyse medical images for rare diseases or to predict the location of geological faults.



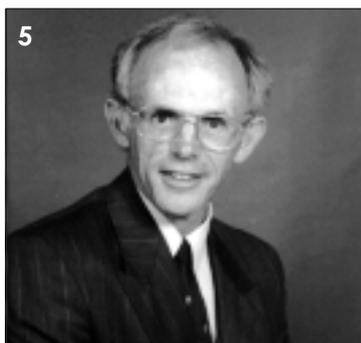
atherosclerosis. Her team has developed an artificial blood vessel, grown in the animal into which it will be grafted, which is strong and does not cause the production of antibodies or thrombosis. Lengths of living tubular tissue have been successfully transplanted into rabbits. The tissue has potential use in coronary artery bypass grafts, below-the-knee artery replacement, vascular patches and blood dialysis.

4. Professor Victor Flambaum, 48, Professor of Theoretical Physics at the University of New South Wales.

After working at the Novosibirsk Institute of Nuclear Physics in the USSR, Professor Flambaum came to Australia in 1991. He has produced important results in atomic physics and nuclear physics, particularly in the area of violation of fundamental symmetries of the nucleus, which have opened up new areas of research. In Australia he has developed a new statistical theory which is applicable to compound nuclei, complex excited atoms and atomic clusters.

5. Professor Bruce Kemp, 53, Senior Principal Research Fellow of the National Health and Medical Research Council and Deputy Director of St Vincent's Institute of Medical Research in Melbourne.

The addition and removal of phosphate from proteins – called protein phosphorylation – are reversible chemical reactions used extensively to regulate protein function in living cells. The reactions form an elaborate molecular communication system, responding to hormones, nerve impulses, nutrient abundance, toxins and ultraviolet light damage. The catalysts in these reactions are enzymes called protein kinases and phosphatases, of which there are about 2000 different forms. Professor Kemp has explored how protein kinases recognise the right proteins and specific sites of activity. This has unexpectedly revealed how many proteins are controlled by a remarkable self-regulatory mechanism.



3. Professor Julie Campbell, 53, Senior Principal Research Fellow of the National Health and Medical Research Council, Centre for Research in Vascular Biology at the University of Queensland.

Professor Campbell's research has focused on the cell biology of cardiovascular disease and

6. Professor Keith Nugent, 40, Head of the School of Physics at the University of Melbourne.

Information can be carried in a wave either by modulations in amplitude or

modulations in phase. The second can be very subtle or completely undetectable. Professor Nugent has looked at what we mean by phase and used the resulting ideas to find better ways of measuring it. He has obtained striking images with visible light, X-rays, electrons and neutrons. This work is of fundamental interest in physics and of practical value in palaeobotany, industrial inspection and other areas of science and technology.

7. Professor Mark Randolph, 48, Director of the Special Research Centre for Offshore Foundation Systems and Head of the Geomechanics Group at the University of Western Australia.

Professor Randolph is internationally recognised for his fundamental contributions to foundation and offshore engineering that have found wide application in engineering projects. He has developed simple and practical solutions to complex problems. Examples include finding expressions for the response of pile foundations to loading, working out how soil flows around pipelines, analysing drag anchors, and devising new designs for piled raft foundations. He has pioneered geotechnical centrifuge modelling in Australia.

Professor Peter Reeves, 65, Head of the Microbiology Department at the University of Sydney.

Bacteria have extensive diversity within species and a rate of evolutionary change which is very rapid in some aspects but remarkably slow in others. Since the early 1980s Professor Reeves has worked on the evolution and genetics of bacterial surface polysaccharides. He has also worked on the development of bacterial vaccines.

8. Dr Richard Robson, 62, Associate Professor in the School of Chemistry at the University of Melbourne.

The common theme of Dr Robson's chemistry has been the attempt to design organised molecular systems in order to achieve unusual structures or reactivity. Early efforts with a vacant site between two metal atoms have given way to larger metal-organic networks in one, two and three dimensions. This work is laying the foundations for the tailor-made materials of the future.

9. Professor Lesley Rogers, 56, Professor of Neuroscience and Animal Behaviour, University of New England.

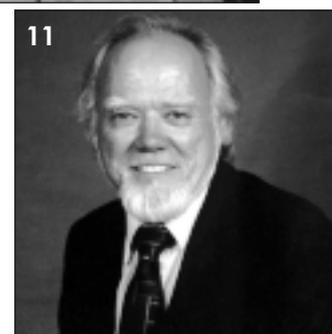
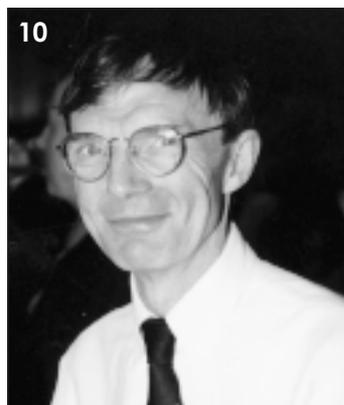
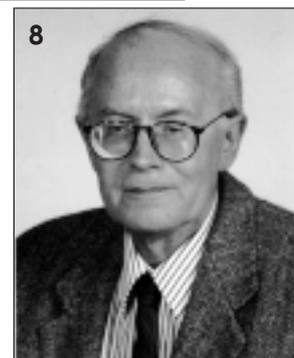
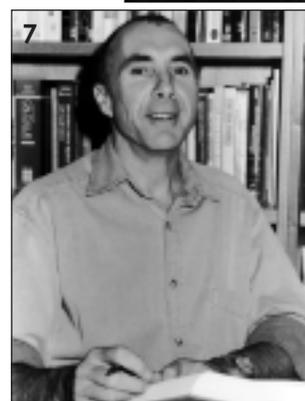
Professor Rogers has done outstanding research into brain development and behaviour. She has studied the evolution and development of hemispheric specialisation – which used to be considered a unique human characteristic – in amphibians, birds and primates. She has written a number of general scientific books as part of her strong commitment to communicating science to a wide audience.

10. Professor Joseph Sambrook, 60, Director of Research at the Peter MacCallum Cancer Institute in Melbourne.

Professor Sambrook is internationally renowned for his studies of DNA tumour viruses and the molecular biology of normal and cancerous cells. His group at Cold Spring Harbor in the USA worked out how SV40 and adenoviruses integrated themselves into the genome of the host cell. He has also made major contributions to understanding intracellular traffic, protein folding and the molecular genetics of human cancer.

11. Professor Curt Wentrup, 57, Professor of Organic Chemistry at the University of Queensland.

Professor Wentrup is one of the world's leading experts in the field of flash vacuum thermolysis, a means of studying chemical compounds. He has used this technique to characterise a wide variety of new compounds. He has contributed substantially to the knowledge of carbene and nitrene chemistry and is Australia's leading expert in this field.



New members of Council

At the annual general meeting on 5 May, the Academy elected five new members of its governing Council.

1. Professor Kurt Lambeck, formerly the Secretary (Physical Sciences), was elected Foreign Secretary. Professor Lambeck is Professor of Geophysics at the Australian National University.

Professor Lambeck has made outstanding contributions to the Earth sciences, particularly in the fields of geodesy and geophysics. His research has involved the study of the deformations of the Earth's surface and interior on a wide spectrum of length and time scales.

His early work led to pioneering contributions to the mapping and understanding of the Earth's gravity field, to the Earth's variable rotation, to the global tide deformations and to the orbital evolution of the Earth-moon

system. His most recent research is leading to a new understanding of past and present sea-level change.

2. Professor Bruce McKellar was elected Secretary (Physical Sciences). Professor McKellar is Professor of Theoretical Physics at the University of Melbourne.

One of his major interests is neutrino physics, particularly anomalies that may indicate physics beyond the standard model. He is also studying the minute breakdown of time reversal invariance recently observed in particle physics. At the same time he maintains an interest in a wide variety of problems in quantum phases, quantum chaos and the origin of the homochirality of biological molecules.

3. Dr Graeme Pearman was elected a member in the physical sciences. Dr Pearman is Chief of CSIRO Atmospheric Research in Aspendale, Victoria.

After early work measuring carbon dioxide fluxes in wheat crops, Dr Pearman developed a strong interest in the global carbon cycle and the chemistry and composition of the atmosphere, on which he has published many papers. He helped establish CSIRO's Climate Change Research Program.

He has pioneered research into the application of global transport modelling, the use of stable carbon isotopes, the extraction of fossil air from Antarctic ice cores, the extraction of carbon from tree rings, and the use of very precise measurements of oxygen.

4. Professor Cheryl Praeger was elected a member in the physical sciences. Professor Praeger is Professor of Mathematics at the University of Western Australia.

After studying at the University of Queensland and Oxford, Professor Praeger did research at the Australian National University before moving to the University of Western Australia. Her research interests are finite and infinite permutation groups, algorithms for group computations, finite group theory, algebraic graph theory, applications to algebraic number theory, applications to experimental design, design theory and finite geometry.

She has also contributed to science education, advising and teaching in Thailand and the Philippines, assisting curriculum development and promoting the participation of women in science.

5. Professor Marilyn Renfree was elected a member in the biological sciences. Professor Renfree is Head of the Department of Zoology at the University of Melbourne.

Professor Renfree has made major contributions to the understanding of marsupial reproduction and development. After early research into embryo-maternal relationships in the tammar wallaby, she studied the biology of other marsupials. Her major research interests have been the control of reproduction in female marsupials, the control of sexual differentiation, and the contraceptive effects of breastfeeding.



Mitigating interference

Just as light interferes with optical telescopes, so radio communications interfere with radio telescopes. Until recently, radioastronomy has been limited by bandwidth and other factors. But the large, sensitive telescopes of the future – such as the proposed square kilometre array – mean that interference can no longer be ignored or bypassed.

An Elizabeth and Frederick White Conference on radio frequency interference mitigation strategies was held in Sydney on 15 and 16 December 1999. The conference was sponsored by the Academy's Elizabeth and Frederick White Fund, and organised by Jon Bell and Peter Hall, from the CSIRO Australia Telescope, and Colin Jacka, from CSIRO Telecommunications and Industrial Physics.

The conference brought together experts on interference mitigation techniques from Australia and overseas and introduced many astronomers to useful new techniques. 'It saved us

going in directions that wouldn't have been profitable,' said Jon Bell.

The keynote speaker, Fred Harris from San Diego State University, described the key elements of signal processing that can be used in suppressing interference. Ron Ekers spoke on the future of radioastronomy and the options for dealing with human-generated interference.

Alan Young discussed the conflicts and common ground between radioastronomy and telecommunications. Doug Gray said that there was greater synergy between radioastronomy and sonar and radar arrays. Peter Hall gave an overview of how the square kilometre array could deal with interference.

Other topics were advanced technologies, experiences of mitigating interference, tools for handling astronomical data and how the various techniques could be applied to the square kilometre array.

For further information, go to www.atnf.csiro.au/SKA/intmit/atnf/conf/.

The human skeleton

Bone and its marrow are a remarkable composite of cells, matrix and mineral that fulfil a number of vital functions – giving structural support, serving as a home for blood formation and providing a reservoir of calcium and phosphate. A recent conference set out to transfer knowledge of bone and the skeleton from basic research to the clinic.

The Boden Research Conference, entitled *The human skeleton – from molecules to structure and function*, was held at Clare in South Australia from 26 to 29 March 2000. The conference was sponsored by an Academy fund set up by the late Alexander Boden. Seventy-four clinicians, academics and university and industry-based researchers attended the conference, 13 from overseas.

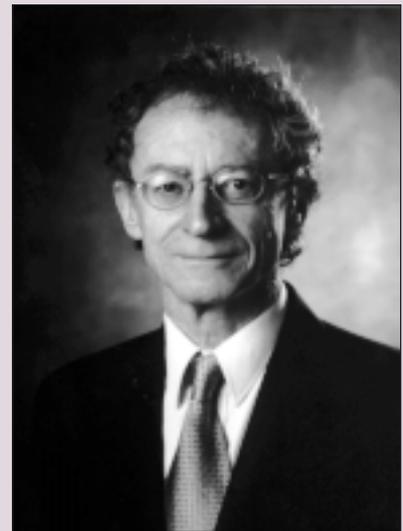
Speakers talked about bone physiology, bone formation and adaptation, bone growth, fractures, bone loss, osteoporosis and bone quality, osteoarthritis and rheumatoid arthritis, the genetics of bone disease and clinical cases. Participants came from orthopaedics, paediatrics, pathology, cell biology, dentistry, veterinary science, materials engineering and many other fields.

Following lectures, discussion was given energy by the diversity of the audience. There were also poster presentations of research.

The organisers, Dr Nick Fazzalari from the Institute of Medical and Veterinary Science in Adelaide and Dr David Findlay from the University of Adelaide, reported that the conference and related social events were the catalysts for cross-fertilisation of ideas which will benefit skeletal research and clinical practice for many years to come.

Fixing the foundations

A report summarising the proceedings of the Academy's symposium, *Fixing the foundations: A national symposium on the role of soil science in sustainable land and water management*, is now available. The symposium was held in Adelaide in November 1999 (see *AAS Newsletter* number 46). For a copy of the report email ac@science.org.au or download a PDF version from the Academy's website, www.science.org.au/soilrep.htm.



Dr Robin Batterham

Special election of Chief Scientist

On 5 May the Fellows of the Academy of Science elected the Chief Scientist, Dr Robin Batterham, to the Fellowship. He was elected by Special Election, which allows the election of a very small number of people who have made contributions to science in ways other than personal research.

Dr Batterham's career has straddled laboratory research and industrial development. He studied chemical engineering at the University of Melbourne. He was Chief of the CSIRO Division of Mineral Engineering from 1984 to 1988. He has held senior technology development positions in the mining company, Rio Tinto Ltd. He is currently Managing Director, Research and Technology Support, of Comalco and Chief Technologist of Rio Tinto.

Since 1990 he has played an important role in the Cooperative Research Centres program.

The President of the Academy, Professor Brian Anderson, said, 'Dr Batterham has brought to the position of Chief Scientist erudition, energy, acuity and skill, and has exhibited his breadth of understanding of the two worlds in which he has worked. He is also an organist of distinction.'

Honours to Fellows

Three Fellows of the Academy were elected Fellows of the Royal Society in May: **Professor Warren Ewens**, Professor of Biology at the University of Pennsylvania, **Professor Peter Hall**, Professor of Statistics in the Centre for Mathematics and its Applications at the Australian National University, and **Professor T John Martin**, Director of St Vincent's Institute of Medical Research in the University of Melbourne.

The US National Academy of Sciences has awarded its 2000 Gilbert Morgan Smith Medal to **Dr Shirley Jeffrey**, Chief Research Scientist at CSIRO Marine Research in Hobart. The medal is awarded for excellence in published research on marine or freshwater algae. While she was in Washington to receive the award Dr Jeffrey was also elected a Foreign Associate of the US Academy.

The Paul Ehrlich Foundation in Germany has awarded its Paul Ehrlich and Ludwig Darmstaedter Prize 2000 to **Professor John Kerr**, an Emeritus Professor of the University of Queensland, for his seminal work in the field of cell death by apoptosis. The prize was shared with Professor H R Horvitz.

Australia's Information Future: Securing the infrastructure for research and innovation

Date: 16 August 2000

Venue: AGSO Building,
Symonston ACT

Hosted by: Coalition for Innovation in Scholarly Communication, with support from the National Academies Forum, the Australian Research Council and the Australian Vice-Chancellors' Committee

Registration: \$125, including GST

For more information:
www.naf.org.au/infofuture.htm

Young researchers to travel overseas

In recognition of the need to help young researchers establish international networks, the Academy recently began a program to support young Australian researchers to visit Europe and the United States. Of the 59 applications that were received, 10 were approved for travel to the United States, and a further 10 were selected for travel to Europe. The scheme has been funded by the Department of Industry, Science and Resources as part of its Technology Diffusion Program.

Further information about the participants is available from the Academy's website at www.science.org.au/internat/yar2000.htm.

Women scientists

The Academy has received a grant from the Department of Health and Aged Care to interview seven outstanding Australian women scientists. Condensed transcripts of the interviews will be added to the Academy's *Video Histories of Australian Scientists* website, www.science.org.au/educatio/vhas.htm.

The project is a result of the Outstanding Older Women Scientists Forum organised by Ann Moyal and held in Canberra in September 1999 as part of the International Year of Older Persons. The Minister for Aged Care, Mrs Bronwyn Bishop, expressed an interest in interviewing not only older women scientists aged in their 80s and 90s, but also younger women.

Victorian group activities

The Victorian Group of the Academy has two important events planned for July and August. On 19 July they will welcome new Victorian Fellows at a dinner at University House at the University of Melbourne. And on 8 August they will hold the combined dinner of the Academies, again at University House. This will feature Professor David Yencken speaking on 'Cassandra or Nostradamus: The Environmental Debate'. For more information contact Professor Geoffrey Opat, phone (03) 8344 5121 or fax (03) 9349 4912.

Echidna featured

The Academy's latest Caughley Fellow, Dr Peggy Rismiller, has produced a cover story for the American Society of Mammologists' prestigious *Journal of Mammalogy*. Dr Rismiller, who studies echidnas on Kangaroo Island in South Australia (see *AAS Newsletter* number 45), had submitted an article with Michael McKelvey on the reproduction rates of echidnas. The journal's cover photograph shows an echidna on the move.

Batchelor dies

One of the Academy's Corresponding Members, Professor George Batchelor, died on 30 March 2000. Professor Batchelor was Emeritus Professor of Applied Mathematics at the University of Cambridge.

Closing dates

Calls for preliminary proposals:

Senior

David Craig Medal, Hannan Medal, Ian Wark Medal and Lecture, Jaeger Medal, Haddon King Medal, Lyle Medal 31 July

Junior

Gottschalk Medal, Fenner Medal, Pawsey Medal, Moran Medal 31 July

Selby Fellowship 30 August

For more information see www.science.org.au/awards/awards.htm

Japan and Korea Postdoctoral Fellowships and Awards 1 August

Scientific visits to Japan, Korea, Taiwan and China 1 September

Scientific visits to Europe 2 October

Scientific visits to North America 1 November

For more information see www.science.org.au/internat

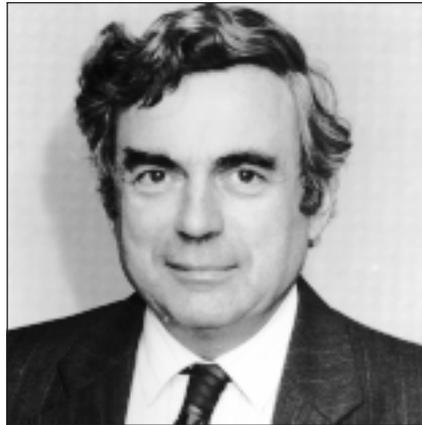
Death of Michael Pitman

The Academy's former Foreign Secretary, Professor Michael Pitman, died on 30 March 2000.

Michael was born in the UK on the 7 February 1933. He received his schooling at Colstons Boys School, Bristol, where he excelled in science and gained an open scholarship to Cambridge University and Sidney Sussex College. His scholarship was actually in the physical sciences, but in his last two terms at school Michael studied botany to fill in time. It changed his future dramatically. Michael was academically gifted, receiving Class 1 Honours in all subjects.

At the beginning of his time as a postgraduate student, Michael and Maureen were married, the start of a very happy relationship and successful partnership. Brigit and Adrian were born at Cambridge. Michael obtained a PhD under the supervision of the eminent plant physiologist, Professor G E Briggs and was awarded a Junior Fellowship at St Johns College Cambridge. At Cambridge he met a strong Australian contingent of future scientific leaders in Australia and the interaction with them no doubt influenced his decision to apply successfully for a lectureship at Adelaide University where Bob Robertson was Professor of Botany. After four years at Adelaide and at the age of 33, Michael was appointed Professor of Biology at the University of Sydney.

At Adelaide and Sydney, Michael expanded his research on salt and ion transport in plants begun at Cambridge. Mechanisms at the cellular and membrane levels were related to the plant as a whole. His research transformed plant mineral nutrition by extending the principles that were worked out in giant cells of algae to the leaves and roots of common plants. Michael became one of the founders of modern mineral nutrition physiology, advancing the field far from its early preoccupation with practical problems to a deep understanding of the underlying mechanisms. He inspired a generation of research students through his simple, elegant experiments and clear formal analysis. But his research interests ranged from elegant fundamental research to distinctly applied research.



Michael Pitman

For example, his group at Sydney University was responsible for elucidating the cause of death of Norfolk Island pines on Sydney's beaches. The cause of the damage was traced to the synergistic effect of detergents from the sewage outfalls and the salt spray.

A particular research interest of Michael's was the response of a plant to salinity, which had agricultural and environmental application. Michael's outstanding research achievements were recognised by election to Fellowship of the Australian Academy of Science in 1981 and the award of a Doctor of Science by Cambridge University.

Michael was an energetic editor of *The Web of Life*, the Academy of Science sponsored and published textbook that elevated the teaching of biology throughout the nation. Michael regarded this involvement as possibly his most important contribution to science in Australia.

In 1983 Michael was appointed Director of the CSIRO Institute of Biological Sciences. The institute consisted of eight divisions in the areas of plant and environmental science with particular links to agriculture. The directorship of the Institute provided Michael with the opportunity to promote his research philosophy. His own experience and achievements made him well aware of the importance of creative individuals, but he was convinced that more could be achieved by building disciplinary and interdisciplinary teams. Michael firmly believed that could only be achieved by discussion and persuasion rather than by directive. Michael's personality, patience, ability to listen to the points

of view of others before making up his mind on issues or research priorities was well suited to this approach.

I appointed Michael as my deputy in 1986. He had responsibility for a range of activities that included human resources policies. He foresaw the need for a new approach to human resource management in a time of diminishing resources and many of the changes that were implemented owe their evolution to Michael's initiatives. I relied on his wise counsel and valued his courtesy and above all his loyalty. It was indeed a pleasure to work with him.

In 1988, Michael was appointed a member of the newly formed Australian Research Council. The then Minister of Science, Barry Jones, thought highly of Michael's qualities and requested that CSIRO second Michael to the Department of Industry, Technology and Commerce as Chief Science Advisor and as his personal advisor. Michael played an important role in ensuring that research and development and science awareness were recognised as essential components in policy development.

Working with the Minister, Barry Jones, he made a significant input to the Prime Minister's Science Statement of May 1989 that led to the establishment of the Prime Minister's Science Council and the Cooperative Research Centres Program.

In 1992 Michael was appointed Chief Scientist in the Department of the Prime Minister and Cabinet, Executive Officer of the Prime Minister's Science and Engineering Council and Chair of the Cooperative Research Centres Committee.

Throughout his career Michael worked hard to retain his networks and friendships throughout Australia and overseas. He also clearly recognised the importance to Australia of strengthening our international links in science and technology. He was thrilled with his election as Foreign Secretary of the Australian Academy of Science in 1997. Michael was an outstanding Foreign Secretary establishing in particular much better relationships with France – he was honoured by the French Government with the award of Chevalier de l'ordre national du Merite – and improving the rapport with several countries of South-East Asia.

Keith Boardman

Whither suitcase science – the need for major national research facilities

On 6 April 2000 the Academy of Science held a forum to examine the rewards and challenges of operating major research facilities in Australia. Such facilities include telescopes, particle accelerators, supercomputers and data banks.

The forum concentrated on the experience of the directors of major national research facilities funded by the Federal Government in its 1995–96 round. Speakers came from the Australian Proteome Analysis Facility, the Australian National Seismic Imaging Resource, the Australia Telescope, the Australian Genome Research Facility, Airborne Research Australia, the National Plasma Fusion Research Facility, and the Australian Synchrotron Research Program.

There was a lively debate on ways in which Australia might more effectively use existing facilities and develop a program for additional facilities.

Recurring points made by the participants included:

- major facilities should be seen as incubators of Australian expertise and should not be expected to operate at full capacity at first

- the need to provide equitable and efficient access for Australian researchers by funding the operating costs of facilities, not just the capital cost
- the desirability of merit-based access
- the need to maintain a critical mass of researchers within the host institution
- the need to recognise different rates of depreciation
- the need for Australian researchers to learn to share facilities
- the urgent need for a government program for major facilities.

The forum was part of a study currently being undertaken by the Academy to assess the deficiencies in the supply of and access to cutting edge facilities in Australia. The study, chaired by the Academy's Secretary (Science Policy), Professor John White, will assess best Australian and international practice, define the threshold needs for a major national facility, and examine the governance and operating structures needed to run facilities in different disciplines.

At an early stage the study identified issues needing further work:

- the need for an advice framework to identify emerging needs
- the desirability of different sources of funding and ownership of projects
- the need to examine the responsibilities of different government agencies
- the need for **both** capital and operating costs. Australia must avoid a result whereby a facility is funded but without sufficient funds for users.

It has also become apparent to the Academy that the goals for funding major facilities need clarification. Is the goal to grow the nation's science capability, encourage innovation or foster start-up companies? The assumption is all three but a business plan needs to clearly show the facility's core business. How have the original goals been altered as a result of the need to cover operating expenses?

The study is continuing. A summary from the April forum is available by contacting nr@science.org.au.

Search for Dome souvenirs

On 5 May Michael Caton, who starred as Darryl Kerrigan in the film *The Castle*, launched a search for souvenirs that feature the Academy's Dome. The search is being held to draw attention to the scientific and architectural importance of the Dome, which is being renovated. Michael Caton is pictured holding a miniature beer mug and the Academy's groundsman, Merv Lane, is holding a tray, both of which Merv has donated to the Academy.

The collection will be on display at the Canberra Museum and Gallery in April and May 2001. Please send any Dome souvenirs for the display to Dome Souvenir Search, Australian Academy of Science, GPO Box 783, Canberra ACT 2601. More information about the souvenir search is at www.science.org.au/dome/souvenir.htm.

