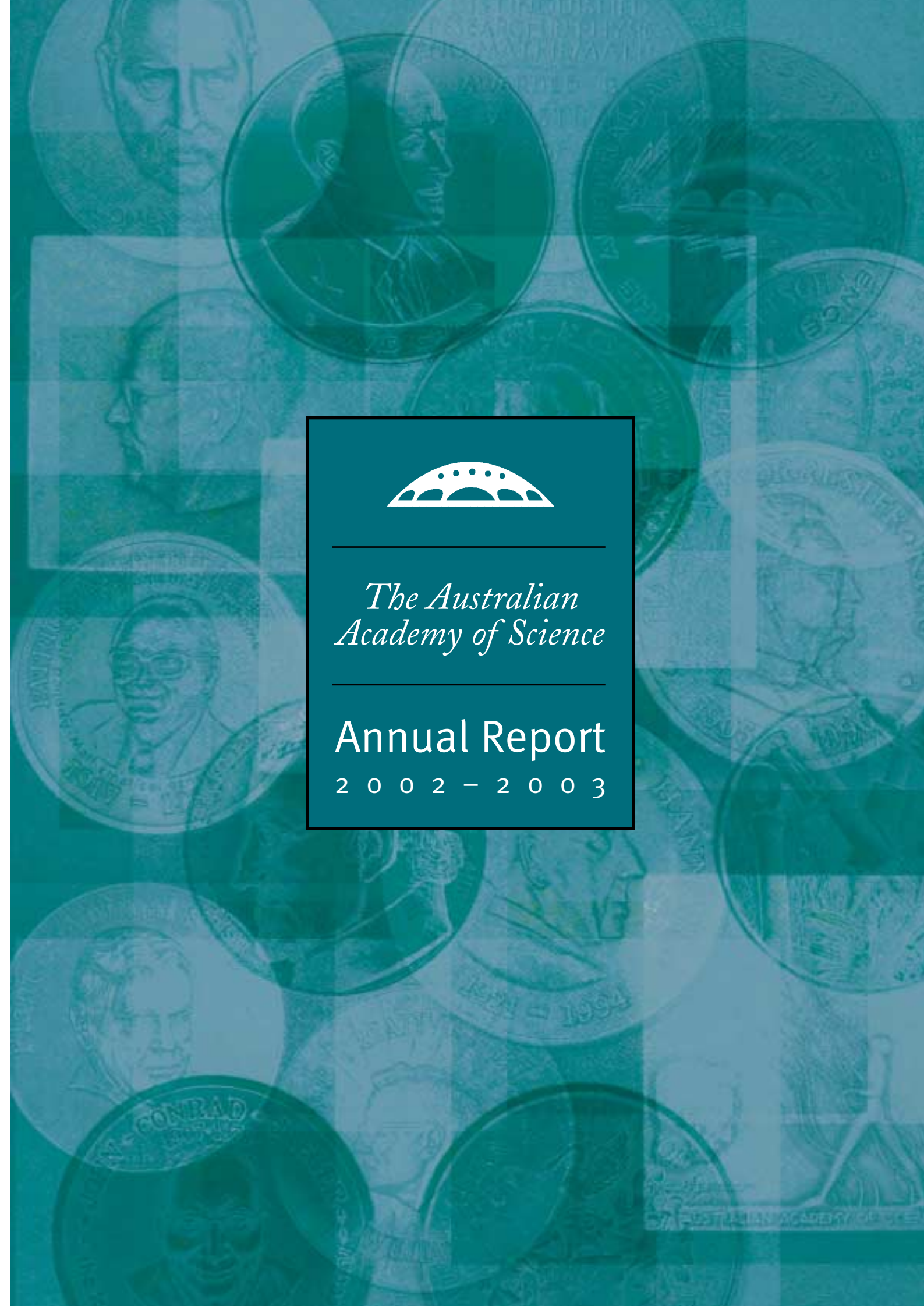

The Australian Academy of Science

Annual Report

2002–2003

THE AUSTRALIAN ACADEMY OF SCIENCE

The Australian Academy of Science is an independent, not-for-profit organisation of approximately 350 of Australia's leading scientists. It recognises research excellence, advises government, organises scientific conferences, publishes school textbooks and scientific journals, conducts international scientific relations, and fosters science education and the public awareness of science and technology.

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This report is also available at www.science.org.au/academy/anrep.pdf.

Cover: A selection of the Academy's medals, awarded for distinguished research.

Report of the Council

For the year

1 May 2002 – 30 April 2003

Contents

President's foreword

In my first year as President I have seen many developments in Australian science policy: the national research priorities were set, a major review of higher education has been carried out, and there has been extensive and highly publicised policy activity surrounding the regulation of stem cell research. I acknowledge the very considerable contributions of John White as the Academy's spokesperson on stem cell research. There have also been lower profile but vitally important activities in the 'science and security' area.

The Academy played a major role in keeping on track the process of setting national research priorities in 2002. I particularly thank Michael Barber for his contributions to setting in place a framework and consultative process for determining national research priorities. Once the framework was set, the Academy hosted a workshop for leading younger scientists to come up with some research priorities for Australia. Their submissions on Healthy, Wealthy and Wise, and a tool-kit for science, were widely commended - and indeed did not look very different from the final set of priorities that emerged from Cabinet.

I chaired the expert advisory body that advised Cabinet on priorities and I assure you that a recurring theme was that basic research should not be overlooked in the rush to identify thematic priorities.

At our AGM on 1 May, Council will be proposing that, given the globalisation of science, it is time to recognise the contributions of some outstanding Australian scientists resident abroad. The proposition will be put that, from the year 2005, up to two expatriates on the Physical Sciences side and up to two on the Biological Sciences side might be elected by Ordinary Election to the Fellowship, in addition to the existing quota of 16 permanent residents of Australia. There are some persuasive arguments for the Academy to forge closer links with the expatriate scientific community.

We are looking forward to our inaugural symposium on Frontiers of Science, to be held in late July at the Shine Dome in Canberra. The aim of the symposium, which we hope will become an annual event, is to bring together the very best young Australian scientists to discuss emerging technologies, new opportunities and exciting advances in their fields. The presentations will be to their peers, across many disciplines, and may lead to innovative collaborations and ideas.

Brian Anderson, right, hands the President's gavel to Jim Peacock at the 2002 AGM.

I would like to thank outgoing Councillors Graeme Pearman, Cheryl Praeger and Marilyn Renfree for their contributions to many Academy activities over the past three years. I warmly welcome our incoming Fellows and Councillors Julie Campbell, Peter Hall, Dave Kemp and Bob Watts. John Shine, who filled a casual vacancy, will commence his four- year term as Secretary (Biological Sciences) in May. Thanks also to Bob Frater, who filled a casual vacancy as an ordinary member (Physical Sciences).

Jim Peacock
AC PresAA FRS FTSE

April 2003

Council and administration

The Academy's affairs are conducted by an elected Council of seventeen Fellows. To ensure that Academy business is managed effectively between Council meetings, the Executive Committee has delegated authority. The Committee consists of the President, Secretary (Physical Sciences), Secretary (Biological Sciences), Secretary (Science Policy), Secretary (Education and Public Awareness), Foreign Secretary and Treasurer.

Council members

Dr Jim Peacock – President

Professor Bruce McKellar – Secretary (Physical Sciences) and Vice-President

Professor John Shine – Secretary (Biological Sciences) and Vice-President

Professor Michael Barber – Secretary (Science Policy)

Professor John McKenzie – Secretary (Education and Public Awareness)

Professor Kurt Lambeck – Foreign Secretary

Professor Ian McDougall – Treasurer

Ordinary members
(Physical Sciences)

Dr Bob Frater

Professor Lew Mander

Dr Graeme Pearman

Professor David Pegg

Professor Cheryl Praeger

Ordinary members
(Biological Sciences)

Professor James Angus

Professor Suzanne Cory

Professor David Kemp

Professor Marilyn Renfree

Professor Andrew Smith

More information on Council members is available at www.science.org.au/academy/council/officers.htm.

From 1 May 2002 to 30 April 2003, there were five Council meetings.

Council member	Number of attendances	Out of a possible
Professor James Angus	4	5
Professor Michael Barber	5	5
Professor Suzanne Cory	4	5
Dr Bob Frater	3	3
Professor David Kemp	5	5
Professor Kurt Lambeck	4	5
Professor Ian McDougall	5	5
Professor Bruce McKellar	5	5
Professor John McKenzie	4	5
Professor Lew Mander	5	5
Dr Jim Peacock	5	5
Dr Graeme Pearman	1	5
Professor David Pegg	4	5
Professor Cheryl Praeger	4	5
Professor Marilyn Renfree	4	5
Professor John Shine	5	5
Professor Andrew Smith	3	5

The Fellowship

The Academy Fellowship is made up of 354 of Australia's leading research scientists, elected for their personal contributions to science. Fellows occupy senior positions in universities, the CSIRO and industry.

The Fellowship, 30 April 2003:

A full listing of the Fellowship is available at www.science.org.au/academy/fellows/fellow.htm.

Ada, Gordon L
Adams, Jerry M
Anderson, Brian D O
Anderson, Jan M
Anderson, John R
Andrews, Thomas J
Angus, James A
Angyal, Stephen J
Appleby, Cyril A
Archer, Michael
Armstrong, Bruce K
Austin, Colin R
Baddeley, Adrian J
Barber, Michael N
Bartlett, Perry
Basten, Antony
Batterham, Robin J
Baxter, Rodney J
Beckwith, Athelstan L J
Bedding, Robin A
Bennett, Martin A
Bennett, Maxwell R
Bergersen, Fraser J
Bilger, Robert
Birch, L Charles
Bishop, Peter O
Blanden, Robert V
Blevin, William R
Boardman, N Keith
Boger, David V
Bond, Alan M
Boyden, Stephen V
Brennan, Maxwell H
Brent, Richard P
Brown, Gavin
Brown, Ronald D
Bruce, Michael I
Buchdahl, Hans A
Budd, William F
Burdon, Jeremy J
Burger, Henry G
Burgess, Antony W
Burke, David J
Burnstock, Geoffrey
Campbell, Julie H
Campbell, Kenton S W
Canty, Allan J
Carver, John H
Cavill, George W K
Chalmers, John P
Chappell, Bruce W
Chappell, John M A
Christiansen, W N
Clarebrough, Leo M
Clark, Graeme M
Clark, Robert, G
Clarke, Adrienne E
Cockburn, Andrew
Cole, Andrew R H
Cole, Keith D
Colman, Peter M
Coltheart, Max
Compston, William
Cory, Suzanne Y
Costa, Marcello
Costin, Alec B
Cowan, Ian R
Cowley, John M
Cowling, Michael G
Cowman, Alan, F
Cox, Graeme B
Craig, David P
Crompton, Robert W
Crossley, Maxwell
Crozier, Ross
Curtis, David R
Dance, Ian G
Dancer, E Norman
Day, Maxwell F C
Day, Ross H
de Kretser, David M
Delbourgo, Robert
Dennis, Elizabeth S
Denton, Derek
Dewar, Robert L
Doddrell, David M
Doherty, Peter C
Dopita, Michael A
Dracoulis, George
Drummond, Peter
Dunn, Ashley R
Ekers, Ronald D
Elliott, William H
Ellis, Graeme R A
Esler, Murray D
Evans, Denis J
Evans, Lloyd T
Evans, Robin J
Ewens, Warren J
Farquhar, Graham D
Fenner, Frank J
Field, Leslie D
Figgis, Brian N
Flambaum, Victor V
Fletcher, Neville H
Fraser, R D Bruce
Frater, Robert H
Freeman, Hans C
Freeman, Kenneth C
Furness, John B
Gage, Peter W
Gandevia, Simon C
Gani, Joseph M
Gascoigne, Ben
Gibbs, Adrian J
Gibson, Frank W E
Gilbert, Robert G
Gleadow, Andrew J W
Goodnow, Christopher C
Goodwin, Graham C
Graham, Robert M
Graves, Jennifer A M
Green, David H
Green, Martin A
Griffiths, Ross W
Grimshaw, Roger H J

Groves, David
Gunning, Brian E S
Guttmann, Anthony J
Hales, Anton L
Hall, Peter G
Hamann, Sefton D
Haneman, Dan
Hannaford, Peter
Hardham, Adrienne R
Hatch, Marshall D
Head, Alan K
Healy, Thomas W
Heyde, Christopher C
Hirst, G David S
Hobbs, Bruce E
Holloway, Bruce W
Holman, Mollie E
Holt, Patrick
Horridge, G Adrian
Hughes, Terence P
Hunter, Robert J
Hurst, C Angas
Hush, Noel S
Hutchinson, John E
Hyde, Bruce G
Hynes, Michael
Imberger, J
Israelachvili, Jacob N
Jacobsen, John V
Jameson, Graeme J
Jeffrey, Shirley W
Johnstone, Brian M
Jones, The Hon. Barry O
Kelly, G Maxwell
Kemp, Bruce E
Kemp, David J
Kennett, Brian L N
Kerr, Allen
Kerr, John F R
Kivshar, Yuri S
Klein, Anthony G
Korner, Paul I
Kuchel, Philip W
Ladiges, Pauline Y
Lambeck, Kurt
Lance, James W
Larkins, Francis P
Law, Phillip G
Le Couteur, Kenneth J
Lehrer, Gustav I
Letham, David S
Levick, William R
Lindoy, Leonard F
Linnane, Anthony W
Lovering, John F
Lumbers, Eugenie R
Lyons, Lawrence E
McCarthy, Ian E
McCloskey, D Ian
McComb, Arthur J
McCormick, Paul G
McCracken, Kenneth G
McDougall, Ian
McDougall, Trevor J
McElhinny, Michael W
McEwan, Angus D
McFadden, Phillip L
McIntosh, Alan G R
McIntosh, Robert A
McKay, Brendan D
Mackay, Ian R
McKellar, Bruce H J
McKenzie, John A
McLachlan, Elspeth M
McLeod, James G
Mai, Yiu-Wing
Main, Albert R
Manchester, Richard N
Mander, Lewis M
Marcelja, Stjepan
Mark, Richard F
Marshall, Barry J
Martin, Raymond L
Martin, T John
Masters, Colin L
Mathieson, Alexander M
Mayo, Oliver
Melrose, Donald B
Mendelsohn, Frederick
Metcalf, Donald
Meyer, Richard E
Milburn, Gerard J
Miller, Jacques F A P
Mills, Bernard Y
Minnett, Harry C
Mitchell, Graham F
Moodie, Alexander F
Moore, John B
Moran, William
Morrison, James D
Morton, Donald C
Mould, Jeremy R
Myers, Rupert H
Napper, Donald H
Newton, John O
Nichol, Lawrence W
Nicola, Nicos A
Ninham, Barry W
Norrish, Keith
Nossal, Sir Gustav
Nugent, Keith A
O'Reilly, Suzanne Y
Orlowska, Maria
Osborne, Michael R
Osmond, C Barry
Paddon-Row, Michael N
Paltridge, Garth W
Passioura, John
Pate, John S
Paterson, Mervyn S
Peacock, W James
Pearman, Graeme I
Pegg, David T
Pettigrew, John D
Phan-Thien, Nhan
Pickett-Heaps, Jeremy D
Pittard, A James
Porter, Robert
Potts, Renfrey B
Poulos, Harry G
Praeger, Cheryl E
Quirk, James P
Radom, Leo
Randolph, Mark
Redman, Stephen J
Reeves, Peter R
Reid, Allen F
Renfree, Marilyn B
Rickards, Rodney W
Ritchie, Ian M
Rizzardo, Ezio
Robinson, Brian J
Robinson, Derek W
Robson, Richard
Rogers, Colin
Rogers, George E
Rogers, Lesley J
Ross, Ian G
Rubinstein, Hyam
Runnegar, Bruce N

Sambrook, Joseph F
Sara, Vicki R
Sargeson, Alan M
Seneta, Eugene
Sharman, Geoffrey B
Shine, John
Shine, Richard
Short, Roger V
Shortman, Kenneth D
Simon, Leon
Slatyer, Ralph O
Sloan, Ian H
Smith, F Andrew
Smith, Sally
Snyder, Allan W
Solomon, David H
Speed, Terence P
Sprent, John F A
Sridhar, Tamarapu
Srinivasan, Mandyam V
Stalker, Raymond J
Stanley, Fiona
Stanton, Richard L
Stephenson, D George
Sternhell, Sever
Stokes, Robert H
Stone, Jonathan
Strasser, Andreas
Street, Robert
Street, Ross H
Sullivan, Colin E
Summons, R E
Sutherland, Grant R
Sutherland, Robert L
Swan, John M
Symons, Robert H
Szekeres, George
Tanner, Roger I
Taylor, S Ross
Thomas, Anthony W
Thompson, Arthur M
Thompson, Colin J
Trudinger, Neil S
Truswell, Elizabeth M
Tuck, Ernest O
Tucker, Rodney S
Turner, J Stewart
Tyerman, Stephen
Tyndale-Biscoe, C Hugh
Underwood, Antony J
Vaux, David
Veevers, John J
von Itzstein, Mark
Wake, R Gerard
Walker, N Alan
Wall, Gordon E
Wallace, Henry R
Wardrop, Alan B
Watts, Robert O
Weigold, Erich
Weiss, Donald E
Wentrup, Curt
White, Guy K
White, John W
Whitten, Maxwell J
Whitten, Wesley K
Wild, J Paul
Wild, S Bruce
Williams, James F
Williams, James S
Williams, Robyn
Williamson, Richard
Williamson, Robert
Wiskich, Joseph T
Womersley, Hugh B S
Woodall, Roy
Worner, Howard K
Young, John A

New Fellows

We congratulate the following scientists who were elected to Fellowship on 27 March 2003.

More information on each of the sixteen new Fellows is available at www.science.org.au/academy/fellows/2003.htm.

Professor Perry Bartlett

- Professor, Department of Physiology and Pharmacology, School of Biomedical Sciences, University of Queensland

Professor Robert Bilger

- Professor of Mechanical Engineering, School of Aerospace and Mechatronic Engineering, University of Sydney

Professor Ross Crozier

- Professor (Personal Chair), School of Tropical Biology, James Cook University, Queensland

Professor Peter Drummond

- Professor of Theoretical Physics, University of Queensland

Professor David Groves

- Professor (Personal Chair) of Geology and Director, Centre for Global Metallogeny, School of Earth and Environmental Sciences, University of Western Australia

Professor Michael Hynes

- Professor, Department of Genetics, University of Melbourne

Professor Frederick Mendelsohn

- Director, Howard Florey Institute of Experimental Physiology and Medicine, University of Melbourne

Professor Maria Orlowska

- Professor of Information Systems, Head of Information Systems Division and Deputy Head of School of Information Technology and Electrical Engineering, University of Queensland

Professor Hyam Rubinstein

- Professor and Head of Department of Mathematics and Statistics, University of Melbourne

Professor Richard Shine

- Professor in Evolutionary Biology (Personal Chair), University of Sydney

Dr Andreas Strasser

- Principal Research Fellow, Walter and Eliza Hall Institute of Medical Research, Melbourne

Professor Stephen Tyerman

- Professor and Head of Discipline of Viticulture, Department of Horticulture, Viticulture and Oenology, University of Adelaide

Dr David Vaux

- Principal Research Fellow, Walter and Eliza Hall Institute of Medical Research, Melbourne

Professor Mark von Itzstein

- Professor and Director, Centre for Biomolecular Science and Drug Discovery, Griffith University, Queensland

Professor S Bruce Wild

- Professor, Research School of Chemistry, Australian National University, Canberra

Professor James S Williams

- Professor and Director, Research School of Physical Sciences and Engineering, Australian National University, Canberra

Honours awarded to Fellows during the year

Dr Robin Batterham

- Elected to the Swiss Academy of Engineering Sciences as a Corresponding Member

Professor David Boger

- Victoria Prize
- Clunies Ross National Science and Technology Award 2003

Professor Ron Brown

- Member of the Order of Australia (AM)

Professor Keith Cole

- Awarded an honorary life membership by the Scientific Committee on Solar-Terrestrial Physics

Professor Suzanne Cory

- Royal Medal of the Royal Society of London
- Elected to the French Academy of Science as an Associate Foreign Member

Professor Robert Delbourgo

- Harrie Massey Medal of the Institute of Physics (London)

Professor David Doddrell

- Clunies Ross National Science and Technology Award 2003

Professor Ron Ekers

- Federation Fellowship 2002

Professor Frank Fenner

- Prime Minister's Prize for Science 2002
- ACT Australian of the Year

Professor Graham Goodwin

- Elected to the Royal Society of London Fellowship

Professor Chris Heyde

- Member of the Order of Australia (AM)

Professor Terence Hughes

- Federation Fellowship 2002

Professor Angas Hurst

- Member of the Order of Australia (AM)

Professor Bruce Kemp

- Elected to the Royal Society of London Fellowship
- Federation Fellowship 2003

Professor John Kerr

- Charles IV Prize awarded by Charles University of Prague and Municipal Authorities of the City of Prague

Professor Yuri Kivshar

- Federation Fellowship 2002

Professor Alan McIntosh

- Moyal Medal

Dr Richard Manchester

- Federation Fellowship 2003

Professor Barry Marshall

- West Australian Premier's Prize for Achievement in Science
- Keio Medical Science Prize (Keio University, Japan)

Professor Colin Masters

- Laureate Professor, University of Melbourne

Professor Gerard Milburn

- Federation Fellowship 2003

Professor Suzanne O'Reilly

- Elected to the Norwegian Academy of Science and Letters as a Foreign Member

Dr Jim Peacock

- University of Sydney doctor of agricultural science, *honoris causa*

Professor Marilyn Renfree

- Laureate Professor, University of Melbourne
- Federation Fellowship 2003

Professor Ian Ritchie

- Murdoch University doctor of the university, *honoris causa*

Professor David Solomon

- R K Murphy Medal

Professor Fiona Stanley

- Australian of the Year 2003

Professor George Szekeres

- Member of the Order of Australia (AM)

Professor Rod Tucker

- Federation Fellowship 2002
- Laureate Professor, University of Melbourne

Professor Howard Worner

- Benjamin F Fairless Award

Deaths since 1 May 2002

We regret to record the following deaths:

Professor Archibald K McIntyre, 20 July 2002

Sir Geoffrey Badger AO FTSE, 23 September 2002

Professor Ian W B Thornton, 1 October 2002

Professor Bernhard H Neumann FRS, 21 October 2002

Obituary notices

Samuel Warren Carey

Died 20 March 2002, elected to Fellowship 1989

Samuel Warren Carey was born near Campbelltown, New South Wales on 1 November 1911, the fifth child of Tasman George and Hannah Elspeth Carey. After primary schooling at Campbelltown and secondary education at Canterbury High School, he entered the University of Sydney in 1929, during the Depression years, enrolling in chemistry, physics and mathematics, and taking geology as a fourth subject. At Sydney, he came under the influence of the retired Sir T W Edgeworth David. Carey graduated with first class honours in geology in 1932 and received scholarships allowing him to pursue a Master of Science degree, which was conferred in 1934 for work in the Werrie Basin of northern New South Wales. He was a member of the Sydney University Regiment and active in the Rovers. He founded the Students' Geological Society and was its first president.

From academia, he joined Oil Search in Papua New Guinea and explored many areas where white men had not penetrated. He was an outstanding field geologist, concerned for the welfare of staff, local people and equipment. He showed in this period his dedication to the small details that made the exploration effort successful. His activities in New Guinea convinced him of the dynamic nature of the Earth and stirred his lifelong interest in tectonics. In 1938 he submitted his Doctor of Science thesis ('Tectonic evolution of New Guinea and Melanesia'), which earned him the degree from the University of Sydney. The drama of the transport of this thesis overseas for examination is a story in itself. In June 1940, he married Austral Robson.

Extended memoirs of deceased Fellows are published in *Historical Records of Australian Science* and are available at www.science.org.au/academy/memoirs.

In 1942, events in New Guinea led to his joining the Army and he was soon placed in commando unit Z-Force, based in Cairns. He returned to Port Moresby to recruit and train personnel for work behind enemy lines, and prepared for a raid on Rabaul. Here, again, his attention to detail came to the fore. He was involved in the famous limpet mining of ships in Townsville Harbour, written up, *inter alia*, in R McKie's *The Heroes*.

After the Second World War, Carey was appointed Government Geologist of Tasmania. He retained this position until 1946 when he was appointed Foundation Professor of Geology at the University of Tasmania, a position he held until retirement on 31 December 1976. It was from this position that he made his name.

This small university, in an isolated state with a small population, developed an outstanding reputation and a large geology student body, due almost entirely to the drive of Carey and a few well-chosen staff. Initially, Carey gave all the first year lectures and had a very high recruitment to second year because of his teaching. Many distinguished geologists were attracted to the discipline through Carey's approach. He was the god-professor who had a vision for his department, rather than simply managing it.

The good working relationships he established between the University of Tasmania, government instrumentalities and industry led to the development of research projects for many students who went on to higher degrees. His interest in Papua New Guinea remained and in the 1960s his postgraduate students conducted complementary research projects covering a large area of the region.

During this time, Carey showed Lewis Weeks maps of anticlines extending into the offshore Gippsland Basin; this led Weeks to recommend that BHP take up acreage for hydrocarbon exploration.

Upon retirement, Carey was made an Officer of the Order of Australia (AO) in 1977. He remained very active in science and was recognised by many awards, nationally and internationally.

Carey is known internationally as a controversial extrovert, who expounded vigorously his belief in Earth expansion as an explanation for continental drift. He thought broadly and saw geology as the great integrating science. He used this philosophy to collate a vast amount of knowledge into his theories, which commonly were controversial and not fully accepted internationally. They have stimulated a large professional interest and study. Many of his ideas are now mainstream and are used by scientists who may not even realise the source of a concept they employ daily. In addition he made major contributions to our understanding of deposition of sediments in glacial marine environments.

He convened international symposia at the University of Tasmania, each dedicated to the resolution of a geological debate best addressed by assembling the various schools of thought relevant to the topic. The most influential was the Continental Drift Symposium of 1956, which influenced many in the field and helped cement his international reputation. He will be remembered as one who initiated ideas, stimulated students at all levels, and produced an impressive community of Earth scientists, many from leading overseas universities. All speak glowingly of the influence of Carey on their careers.

While concerned mainly with large-scale geological features, Carey never lost sight of the human dimension and was an active participant in Legacy, and spoke to any small group of people who wanted a talk on geology, weather, or any area of science in which he felt qualified to speak.

He pursued enthusiastically the promotion of science through personal involvement with organisations such as the Geological Society of Australia, the Royal Society of Tasmania, and the Australian and New Zealand Association for the Advancement of Science. He was the Tasmanian representative on the ANZAAS executive in the late 1940s and played a major role in organising the 1949 Hobart Congress. He gave the presidential address to Section C at the 1963 Congress and was Vice-President for the 1965 Congress in Hobart. He will be long remembered for his performance in his tectonics lecture in the Physics Lecture Theatre at that meeting. He was President of ANZAAS for the 1970 Port Moresby Congress and was awarded the ANZAAS Medal in 1998.

He had a stormy relationship with the Australian Academy of Science. He was made a Fellow by Special Election in 1989.

He is survived by wife Austral, their four children Alice (Tegwen), Harley, Robin and David, seven grandchildren and two great-grandchildren.

Patrick G Quilty
Maxwell R Banks

Louis Walter Davies

Died 28 September 2001, elected to Fellowship 1976

Emeritus Professor Lou Davies was a scientist, researcher and inventor who was equally at home in the laboratory, the lecture theatre, the board room, the corridors of power and the farm. His career produced bridges between industry and academia. His influence had lasting effects on Australian technology and on the careers of other scientists and engineers. His death in Sydney on 28 September 2001, though preceded by a period of serious illness, saw the passing of a man of great fitness and energy. Even in his seventies, he set a pace which would have done credit to a much younger man.

Lou Davies was born in Sydney on 27 August 1923, the son of Louis Walter and Madge Davies of Lindfield, New South Wales. The family then moved to Aberdeen in the Hunter Valley and Lou's primary education was at the local school there, where he was said to be already showing a talent for mathematics and science. His secondary education was at the Sydney Church of England Grammar School (Shore), which he later served as a member of Council for 23 years and its chairman for 4 years. He entered the University of Sydney in 1941 as a science and

engineering student, but his student life was soon redirected to the war effort. He joined the RAAF in 1942, trained as a navigator at Parkes and flew 52 operational sorties in Beauforts, plus a number of operations in Dakotas to the north of Australia.

He had met June Fleming of 'Kelvinside', near Aberdeen, during his school days and they married on 27 September 1945, marking the end of the war and Lou's return to the University of Sydney, from which he graduated with his BSc in 1948. The combination of his excellent academic results, his athletic prowess and his war service led to the award of a Rhodes Scholarship in 1948. This took him and June to Oxford, where Lou worked at the famous Clarendon Laboratory towards his DPhil degree. His research was in plasma physics, though later events led him in new directions. In 1951, after receiving his doctorate, he and June returned to Sydney, where he was appointed a Research Officer at the CSIRO Division of Radiophysics.

Though the Division became famous for its work on radioastronomy another research area was being developed, in which Lou played a pioneering role. At the Bell Telephone Laboratories, the transistor was invented just at the time he started his studies at Oxford and, by the time he joined CSIRO, its importance was becoming apparent. Lou became fascinated with the refining of germanium, which was then the principal material for making transistors. He spent a 6-week period at Bell Laboratories and, in 1954, set up a section in CSIRO which was to pioneer the manufacture of transistors in Australia. He was awarded a Commonwealth Fund Fellowship in 1958, which allowed him to return to Bell Labs and work for 12 months on semiconductor physics.

Not long after, he began an involvement with AWA Ltd which was to continue for 35 years. AWA was the largest Australian-owned electronics company and its chairman, Sir Lionel Hooke, approached Lou to join the company and lead it into the semiconductor era. He was appointed Chief Physicist in 1960. The company already had a strong design and development tradition in electronics and radio engineering, but Lou's presence added a new expertise in basic and applied physics. His Physical Laboratory was set up in AWA's Rydalmere plant, which manufactured vacuum tubes for radio use and television picture tubes. In an area adjacent to the laboratory, the company then set up a transistor manufacturing operation, which was able to make extensive use of the knowledge Lou had developed over the previous 6 years.

On a broader front, the Physical Laboratory worked on ideas and devices which were later to become mainstream technologies. These included surface acoustic wave devices, electrets, photovoltaics and optical fibres. In addition, Lou contributed to the company's knowledge in reliability physics, hazard analysis and safety engineering. At the time he joined AWA, the first integrated circuit had just been demonstrated and was to appear in a more practical form in 1961. Within 4 years of that event, the company set up an experimental integrated circuit manufacturing facility next door to the Physical Laboratory, drawing again on the lab staff's knowledge. In 1967 the first working integrated circuit was produced and the facility commenced commercial operations. Fifteen years later, as a result of management changes in the early 1980s, Lou was appointed General Manager of AWA Microelectronics.

In 1965, a new opportunity and challenge emerged, which was to expand Lou's influence on research and technology. Through an agreement between AWA's chairman and Sir Philip Baxter, the Vice-Chancellor of the University of New South Wales, he was appointed Visiting Professor at UNSW for two days a week and retained the position of Chief Physicist for three days a week. Though very demanding, the dual appointment placed Lou in a position which was rare in Australian experience and which continued to be supported by both organisations.

At UNSW, Lou established the Department of Solid State Electronics, within the School of Electrical Engineering, and remained its head until 1982. He was responsible for pioneering semiconductor research there and, as a result, UNSW became the strongest centre in the country for work in silicon devices and integrated circuit technology. This was recognised by a grant under the new Commonwealth Centres of Excellence program in 1982. From those foundations, the University built a reputation as one of the leading solar-cell research

establishments in the world. In addition, research in optical fibre communications, which Lou had promoted strongly at AWA, became another of UNSW's success stories, at the time that AWA was withdrawing support for it. In many ways his innovations, which the company failed to capitalise on, took on a new life in the university context.

In 1968, Lou took leave for a semester to be a visiting professor at Stanford University. In 1972 he was appointed Chief Scientist of AWA, with responsibilities for all R&D activities. He was appointed to the board of AWA Ltd in 1987 and remained a director until 1995.

Though the above activities would constitute more than a full career, Lou became involved in many others on a part-time or voluntary basis. He was appointed, in 1972, to the Australian Science and Technology Council which gave direct advice to the Prime Minister. He served on it for 8 years. The eminence of his reputation in science and technology led to his election as a Foundation Fellow of the Australian Academy of Technological Sciences and Engineering in 1975 and in the following year as a Fellow of the Australian Academy of Science. In 1978 he was made an Officer of the Order of Australia (AO) and was elected a Fellow of the Institution of Electrical and Electronic Engineers (USA), the largest institution of its kind in the world.

He served the Australian Academy of Science as a member of its Solar Energy Committee and as a member of Council from 1983 to 1986. He was a member of the Council of the Australian Academy of Technological Sciences and Engineering, its Vice-President for 2 years, and a member of two specialist committees, of which one (the Espie Committee) had an important influence on Australia's subsequent industrial R&D activities. He was elected Fellow of the Institute of Electrical and Electronics Engineers in 1981. He was a member of the Australian Industrial Research Group, the Council of the National Association of Testing Authorities, the Graduate Careers Council of Australia, the NSW Higher Education Board and the International Science and Technology Policy Advisory Committee of the Department of Science. He was also a member and sometime president of the Australian Club.

In the late 1980s his management activities expanded in new directions with his appointments to the boards of Ludowici & Son Ltd, of which he became chairman, Radio 2CH Pty Ltd, Alsafe Safety Industries Pty Ltd and the Australian Caption Centre. His research and other scholarly activities resulted in the publication of three books, 70 journal papers and the award of approximately 50 patents.

During the later part of his career, he and June bought a grazing property near Picton, New South Wales and they moved there from Roseville in 1986. Lou then applied his scientific mind to farm management, adopting new technologies, but still commuting regularly to Sydney for business activities and visits to the library and the patent office at the University of New South Wales.

When thinking about this remarkable man, it is clear that what he did reflected much more than his intellect, creativity and energy. He made friends with a wide range of people, who were charmed by his never-failing courtesy and generosity. They knew that his wisdom and judgment were to be trusted. Professor Lou Davies is survived by his mother (age 103), his wife June, their daughter Fiona, two sons Sandy and Gordon, and five grandchildren.

A memorial service was held in the Shore Chapel on 9 October 2001 and some of the information above was drawn from a eulogy presented by Sir Rupert Myers.

Graham Rigby

Henry Oliver Lancaster

Died 2 December 2001, elected to Fellowship 1961

Henry Oliver Lancaster was born in Sydney on 1 February 1913, but spent his early years in Kempsey, New South Wales, where his father, Dr Llewellyn Bentley Lancaster, had a medical practice. His father died when Oliver was almost nine, and his mother Edith Hulda Lancaster (nee Smith) who had been a nurse, returned to her profession in Sydney to help support her four children. Oliver, the second son, boarded in Kempsey throughout his primary school and intermediate high school years, in the company of his younger brother Richard, to whom he remained close all his life. Richard ('Rick') later edited 'Some recollections of Henry Oliver Lancaster' (1996), which is in the archives of the University of Sydney and the Australian Academy of Science.

After a year studying economics/arts at the University of Sydney, Lancaster enrolled in medicine in 1931 and graduated in 1937. In that year he worked as a Resident Medical Officer at Sydney Hospital, and in 1938-9 as a pathologist and Senior Medical Officer. During these 2 years he came in contact with John Carew Eccles, Director of the Kanematsu Memorial Institute of Pathology, who wrote him a strong reference (dated 11 December 1939); and with Bernard Katz, both of whom later became Nobel laureates.

Lancaster joined the Australian Imperial Force as a Medical Officer in 1940, and served as a pathologist in the Middle East and New Guinea. His first two (joint) papers on worm infestations in troops were published in the *Medical Journal of Australia* in 1944. (Over the years this journal was to publish some 50 papers of his, including those on the striking discovery of association of melanoma prevalence with latitude.) The same year, a secondment to the Australian New Guinea Administrative Unit awakened his interest in demography and sparked his return to the serious study of mathematics. He enrolled as an external student at the University of Sydney in 1945, studying under a kerosene lamp on tropical nights. In 1946 he appeared in the third-year honours mathematics class, still in the uniform of a major.

From 1946 to 1948, while on a temporary appointment to the School of Public Health and Tropical Medicine (SPHTM; affiliated with Sydney University) he took the opportunity to study advanced mathematics and read the work of the English and American medical statisticians/epidemiologists. He was awarded his BA in 1947. In 1948 he left to spend a year as Rockefeller Fellow in Medicine at the London School of Hygiene where he was influenced by the mathematical statistician Joseph O Irwin (1898-1982), and established a life-long friendship with Peter Armitage with whom he shared an office. Armitage became an outstanding medical statistician and author, and a president of the Royal Statistical Society.

After returning to work at the SPHTM, where he rose from Lecturer to Associate Professor in Medical Statistics, Lancaster was involved with statistical and epidemiological studies of disease in Australia, including diabetes, cancer and tuberculosis. This period saw his landmark discovery that 'ordinary' rubella infection of pregnant women (rather than a new highly virulent strain, as had been thought) was linked with congenital deafness of offspring. He was awarded a PhD in science in 1953 for a thesis entitled 'The application of chi-squared to discrete distributions'. This topic had characterised his research in mathematical statistics since his first publication in that area in 1949.

In 1959, Lancaster was appointed to the Foundation Chair of Mathematical Statistics at the University of Sydney, a position he held until his retirement in 1978. He was elected a Fellow of the Australian Academy of Science in 1961, and awarded its Thomas Ranken Lyle Medal for Physics and Mathematics in the same year. He was awarded an MD in 1967, and in his retirement returned to intensive writing on medical statistics, with a strong mathematical and historical flavour. His books from this period were *Expectations of Life* (1990), a massive study of world mortality; and *Quantitative Methods in Biological and Medical Sciences: A Historical Essay* (1994). Earlier books included *A Bibliography of Statistical Bibliographies* (1968), *The Chi-Squared Distribution* (1969), and *An Introduction to Medical Statistics* (1974).

He was instrumental in the founding of the Statistical Society of New South Wales in 1947, which with the Statistical Society of Canberra became the nucleus of the later (1962) Statistical Society of Australia; and he was the founding editor (1959-71) of its organ, the *Australian Journal of Statistics*. In 1972 he was made Honorary Life Member of the Society, and in 1980 was awarded its biennial Pitman Medal for distinction in research.

Lancaster was made an Officer of the Order of Australia (AO) in 1992 for services to science.

Five sons were born of his marriage in 1940 to his first wife Joyce Mellon. He died in a nursing home at Mona Vale, a beachside suburb of Sydney, in his sleep on a Sunday afternoon after watching a game of cricket on TV in the company of his youngest son Jon: a fitting end to a quintessential quiet Australian achiever.

Eugene Seneta

Archibald Keverall McIntyre

Died 20 July 2002, elected to Fellowship 1963

Archibald (Archie) Keverall McIntyre, Emeritus Professor of Physiology at Monash University, and one of the founders of modern neuroscience in Australia, died peacefully in St Vincent's Hospital, Launceston, Tasmania, on 20 July 2002.

He was born on 1 May 1913 in Edinburgh, Scotland, the second of four children of Dr W K (Bill) and Margaret (nee Edgeworth David) McIntyre. Bill had gone to Edinburgh to study medicine. In 1920 the family returned to Launceston, where Archie's father remained in medical practice for the rest of his life.

Archie's education began at home under the tutelage of his scholarly mother. He learned the three R's and a love of poetry before he commenced formal schooling at the age of eight. His parents then sent him to Sydney, to Barker College, from where he won a University Exhibition in 1929. In 1930 Archie enrolled at the University of Sydney as a BSc student. During his first year he discovered biology and, to follow his interest, he transferred to medicine. He became a Prosector in Anatomy in 1932 and it is reported that at times he brought home partially dissected body parts for further study. His experimental skills and practical aptitude in science led him to enrol in 1933 for a BSc in medical science. He graduated MBBS in 1936, being awarded the University Medal and sharing top place in the medical class.

Archie spent 1937 as a Resident Medical Officer at Royal Prince Alfred Hospital, and was awarded a Research Fellowship at the University of Sydney for the years 1938 to 1940. He invented a technique of measuring eye movements, using an electro-oculogram, and in 1939 published his first scientific paper in the *Journal of Physiology* on 'The quick phase of nystagmus'.

At the outbreak of the Second World War Archie joined the Royal Australian Air Force and became involved in a number of air combat research projects. He developed a method for detecting air-sickness prone pilot-recruits. He worked with Frank Cotton on the production of a G (gravity) suit that would prevent pilots from blacking out while pulling out of a steep dive. Testing of the suits utilised a human centrifuge. Archie often used himself as a guinea pig. His aviation medicine work led him to travel to the USA to visit centrifuge laboratories there and to Britain, where he worked in the Physiological Aviation Medicine Unit, near Farnborough, led by Sir Bryan Matthews. There he worked on the development and testing of an ejection seat. Some of this was quite dangerous as it involved determining the amount of explosive necessary for effective ejection without injury to the pilot. Some subjects suffered back injuries, but again Archie didn't expect others to do something he wasn't prepared to do himself.

After the war, Archie was awarded a Rockefeller Fellowship, and from 1946 to 1948 moved with his family to New York where he worked with David L Lloyd on spinal reflexes. He then obtained a Nuffield Scholarship to work in Cambridge, England, again with Bryan Matthews. While in

Cambridge he was offered a senior lectureship in Jack Eccles' department in Dunedin, New Zealand. Archie's experience, gained from the work in New York and Cambridge, plus his knowledge of microelectrode techniques acquired from Bernard Katz at University College, allowed him to set up one of the world's first laboratories for recording intracellular events in mammalian motoneurons. Together with Jack Coombs and James Brock, Eccles adopted this approach and began the work which eventually brought him the Nobel Prize in 1963.

With the appointment of Eccles to the Chair of Physiology in the John Curtin School of Medical Research in 1951, Archie was appointed Head of Department at Otago in 1952, a post he filled with great distinction for the next 9 years. He built up a substantial research department as well as stimulating many students to embark on careers in physiological research. A number of Archie's students and colleagues eventually became international figures in their own right.

During a sabbatical in 1959-1960, Archie worked with Cuy Hunt in Salt Lake City, Utah and produced a series of three landmark papers on the functioning of cutaneous sense organs. These provided the foundation for his subsequent work which established his place as a world authority on sensory receptors.

In 1961, Archie accepted the Chair of Physiology at the newly established Monash University. He took up the challenge of building a department and used his experience in research plus his understanding of people to recruit key staff. He emphasised the importance of practical classes, and made sure that students were aware that present-day scientific knowledge stood on the shoulders of what had been achieved in the past. In just a few years, Monash had one of the most successful and most highly regarded departments of physiology in the world.

Archie McIntyre was elected to Fellowship of the Australian Academy of Science in 1963. From 1968-1974 he was a member of Council and he served as Secretary (Biological Sciences) from 1970 to 1974. He was a founding member of the Australian Physiological and Pharmacological Society and was one of the founders of the Australian Neuroscience Society. He served on the Australian and New Zealand Association for the Advancement of Science committees and was a member of both the Australian Research Grants Committee and National Health and Medical Research Council research granting agencies. He served on the Program Committee of the International Union of Physiological Sciences and was Chair of the National Committee for Physiological Sciences.

Archie retired in 1978, when he and his wife Anne moved to Launceston, Tasmania. Over the years he remained in touch with scientific colleagues and up to about 1990 made regular visits to Monash, where he continued to pursue his research interests in sense organs.

Archie had always been interested in wine. In retirement he planted a small vineyard of about 50 vines, which soon made him self-sufficient in what others considered a highly-respectable drop!

Archie is survived by Anne and his three children, Michael, Margaret and Richard.

Richard F Mark
Robert Porter
Uwe Proske

Geoffrey Ivan Opat

Died 7 March 2002, elected to Fellowship 1994

Geoffrey Ivan Opat, Professor of Experimental Physics at the University of Melbourne, died suddenly at home on 7 March 2002, at the age of 66. He was one of Australia's most versatile and highly respected physicists, scholars and teachers.

Geoffrey Opat was born in Melbourne on 16 November 1935, the son of Sam and Leah Opat. Sam was an immigrant from Poland and Leah was the Australian-born daughter of Swiss and Russian parents. Geoffrey completed his secondary education by being dux of Brighton Grammar School. He then entered the University of Melbourne, graduating as an MSc in 1958 and a PhD in physics in 1961. His PhD thesis, on theoretical investigations in photonuclear physics, contained results that are still being cited to this day.

He spent the following 3 years as a Fulbright Fellow at the University of Pennsylvania, working with Professor Henry Primakoff, one of the leading theoretical physicists of the day. His work there, on the theory of radiative muon capture in hydrogen, has also stood the test of time and was only recently the subject of experimental verification.

Following the sudden death of his father, also at an early age, in 1964, he returned to Australia and was appointed Senior Lecturer in Physics at the University of Melbourne. Although his training was in theoretical physics, he was the founder of Australia's first Experimental High Energy Physics group. Working initially on antiproton-neutron interactions at the Brookhaven National Laboratory in the USA, this group flourished and produced some measurements that are still the best available for low energy antiprotons.

Geoff Opat was appointed to the Chair of Experimental Physics at Melbourne in 1973. Continuing initially with the work on particle physics, he soon diversified his research activities with a very successful fundamental experiment using a slow neutron beam, together with his life-long friend and colleague, Tony Klein. Thus began an extremely fruitful and long-lasting collaboration that continued for the next 25 years and gave rise to numerous publications in the most prestigious international journals. Their best known work was in neutron optics, in particular the initial experiment demonstrating that the wavefunction of the neutron changes sign when rotated by 360°, and their experimental verifications of the Aharonov-Casher and Scalar Aharonov-Bohm Effects, carried out with collaborators at the University of Missouri. It led to the joint award of the Walter Boas Medal of the Australian Institute of Physics in 1990 and to their election as Fellows of the Australian Academy of Science in 1994.

During a sabbatical year at the University of British Columbia in 1976, Geoff Opat joined the experimental program at the neighbouring TRIUMF laboratory, contributing to a search for the decay of muons to electrons and photons. This experiment reignited interest in the search for muon number violation. Upon his return from Vancouver, he began a program of experimental work in one of his other favourite areas of study, gravitation. Together with a talented group of students he studied the effects of gravity and inertia on the electrical properties of metals.

He also commenced to broaden the neutron optics work in the direction of optics, with atomic and molecular beams. Later, from 1995 onwards, he continued this work in collaboration with Peter Hannaford, initially at CSIRO and later at Swinburne University. Several groundbreaking investigations were carried out into optical elements for atomic beams and resulted in many highly cited publications.

Geoffrey Opat had an enormous influence on the teaching of tertiary-level physics in Melbourne, in Australia, and in several neighbouring countries that sought out his advice. With a broad as well as profound knowledge of all the major branches of physics, he had initially reformed and later kept under constant review the curricula in the School of Physics of the University of Melbourne. His insistence on the highest educational standards, during times when mass education became the norm, led to some of the most rigorous and yet most successful university physics courses.

He also had a strong influence on physics teaching in high schools, through his membership of the examining bodies and other government-appointed committees in Victoria, and through contacts with individual high school teachers and the teaching profession in general. In fact, his enthusiasm for teaching physics at all levels, from kindergarten to postgraduate, and his enormously creative ideas in many different areas of research have been the hallmarks of a remarkable career of service to the physics profession.

At the end of 2001, he formally retired from his Chair, becoming a Professorial Fellow in the School of Physics, but continued on with his research and most of his teaching activities without missing a beat. In 2002 he was elected an Honorary Fellow of the Australian Institute of Physics and a Life Member of the Australian Optical Society, of which he was President in 1989.

As further community service activities, Geoffrey Opat ran a highly successful program of enrichment activities for senior high school students; gave many public lectures and was a frequent participant in the in-service teaching program for high school teachers at the University of Melbourne. He was highly regarded as the convener of the Victorian chapter of the Australian Academy of Science and, until recently, was a board member of the Museum of Victoria. He also chaired the Research Committee of the Victorian College of the Arts.

For this, as well as his outstanding service to scientific research, Geoff was appointed an Officer of the Order of Australia (AO) on Australia Day 2002, only a few weeks before he died. This high honour pleased him enormously. Here is what he wrote in reply to people who sent their congratulations on that occasion:

> As you know, I have spent much of my life in a labour-of-love, trying to understand a little more about the world, trying to let others know about it, and hopefully interesting them in it. Most people do not have the good fortune to spend a life working at what they love. To be recognised for it as well is an added pleasure. I have every intention of continuing my pursuits into the future.

Unfortunately, he didn't get the chance to do so.

He leaves behind his devoted wife Diana, his constant companion and supporter for over 40 years; daughters Andrea and Vicky and sons Stephen and David. In recent years his ten grandchildren were his greatest delight, the most uncritical audience for his jokes and the most eager pupils for all the science that he would teach them at every single opportunity.

As a much loved, larger-than-life character, his sudden death was a profound shock and his passing is mourned by his professional colleagues, his many current and former students in Australia and throughout the world, and by a very large circle of family and friends.

Anthony G Klein

Charles William Shoppee

Died 20 October 1994, elected to Fellowship 1958

Charles Shoppee was born on 4 February 1904, at Crouch End (a northern suburb of London), the elder son of Joseph William and Emma Elizabeth Shoppee (nee Hawkswell, of York). His father was descended from the noble French family of Chappuis, and could trace his ancestry back to 1109. The male members of the family were generally pillars of the church or lawyers - often Clerk of the Parliament at Lyons, although Louis Chappuis was created Marquis de Mirebel by letters patent of Louis XIV of France in 1746 and presumably paid the penalty in 1792. One of the female members of the family was distinguished by her descendants - being the great-grandmother of Armand Jean du Plessis, Cardinal Duc de Richelieu, and the great-great-grandmother of the Duc de Villars, Marshal of France. His father was a man of varied intellectual attainments, interested in French, German and Italian medieval history, and well acquainted with medieval architecture - he had visited every cathedral in England and Wales several times. Thus, Charles grew up in a stimulating environment.

At age 10, Charles went to the Stationers' Company's School, where he flourished. He became captain of football and cricket, sergeant-major of the OTG, school organist, head prefect, and school captain. On leaving school in 1921, he went to Imperial College, where he obtained the Associate of the Royal College of Science (ARCS) in 1923, and majored in chemistry with first class honours. In his year were H J Emeleus and R P Linstead, both to be elected to the Royal Society later, as was Charles. During the year 1923-24, he became a research student of Sir Jocelyn Thorpe, FRS. In 1924, Christopher Ingold, FRS, was elected to the Chair of Organic Chemistry at the University of Leeds and invited Shoppee to accompany him. Shoppee played soccer for the University of Leeds and in 1926 his team won the Christie Cup, in competition with the Universities of Manchester and Liverpool, for the first time in 15 years; he was elected captain in 1928. In 1926 he was awarded a Senior Research Studentship of the Royal Commission for the Exhibition of 1851 and decided to hold the award at Leeds instead of going to Europe. In the summer of 1929, he became a Demonstrator in Organic Chemistry at Leeds, and on the strength of this appointment was married on 18 July 1929 to Eileen West. Eileen Shoppee was from Leeds and in her youth was a fine tennis player - of Yorkshire County standing, while Shoppee himself was still playing competitive tennis in the Langland tournament in Swansea two decades later.

In 1930, Ingold left Leeds for University College, London, but Shoppee remained, obtaining the DSc degree (London) in 1931, and was promoted to Assistant Lecturer in 1936. He made several attempts to move from Leeds during the period 1931-1938, but junior academic posts were in short supply following the financial crisis of 1930 and the subsequent Depression. In the spring of 1939, he received offers of a Leverhulme Research Fellowship at the University of Oxford for two years, and a Rockefeller Research Fellowship for one year at any university that he cared to select. He accepted the Rockefeller invitation and elected to work with Tadeus Reichstein in Basel, where he combined his Ingoldian heritage of mechanistic organic chemistry with his freshly acquired skills in steroid chemistry to excellent effect.

On 3 September 1939, he listened, with dismay but without surprise, to Neville Chamberlain's broadcast declaring war on Germany and at once wrote to the Vice-Chancellor of the University of Leeds offering to resign his Research Fellowship and return home, but was instructed to continue his work, unless he received other instructions from the British Consulate-General in Basel. During the winter of 1939 and the spring of 1940 he worked with Reichstein on the structures of the adreno-cortical steroid hormones and completed some of his best experimental work. At Whitsuntide in 1940, with war news getting worse and worse, the family attempted to return to England, but their French visas never came through, and they were compelled to remain in Switzerland for 6 years.

In 1944, Shoppee was appointed, *in absentia*, to a Readership in Chemistry in the University of London, tenable at the Royal Cancer Hospital, now the Royal Marsden Hospital. After a nightmarish journey from Basel to London, taking three days and zigzagging across the Channel in a very small steamer, 'The Isle of Thanet', he took up his Readership in May 1945 and the family was able to celebrate VE Day in London. At the Royal Cancer Hospital, he worked on the steroid constituents from human Bantu livers, but could isolate only cholesterol and its oxidation and dehydration products. In 1948, he was appointed to the Chair of Chemistry in the University of Wales at the University College, Swansea, where he continued the application of reaction mechanism to the determination of configuration of steroids with considerable success. During this period, he published more than 65 articles and original papers, the value of which was recognised in 1956 by his election to the Royal Society (London). However, the damp climate of Wales affected his wife's health and he was advised by former colleagues in Harley Street to seek a warmer and sunnier climate for her. He therefore accepted an invitation to the Chair of Organic Chemistry at the University of Sydney at the end of 1956, following the resignation of Arthur Birch, who left Sydney for Manchester. The Sydney sunshine restored his wife's health, and they began to enjoy their new environment. The pursuit of structural and mechanistic understanding, using steroid chemistry as a vehicle, remained the major theme of his continuing research over the next three decades, much of which is described in two seminal series published in the *Journal of the Chemical Society*: 'Walden inversion and steroids' (70 papers) and 'Steroids' (40 papers). Shoppee also published an additional 140 papers and two books on steroids.

The early part of Shoppee's tenure at the University of Sydney coincided with the relocation of the School of Chemistry from the rather ramshackle accommodation in the Science Road of the University to the modern building in Western Avenue, where it remains to this day. More importantly, his tenure coincided with the period of expansion and flowering of Australian universities to which he made major contributions. Shoppee continued to apply reaction mechanistic concepts and new techniques to structure determination in natural products, mainly within the context of steroid chemistry, a major part of which was pursued in collaboration with Associate Professor Ruth E Lack.

Shoppee was elected a Fellow of the Australian Academy of Science in 1958 (member of Council 1959-62 and Vice-President 1961-62). While Shoppee never sought administrative positions within the University of Sydney, he was throughout his tenure the head of the Department of Organic Chemistry and worked conscientiously and successfully on behalf of his department – with the invaluable help of Ern Ritchie, FAA, who was to succeed him as Professor of Organic Chemistry in 1969. Shoppee also served a period as Dean of the Faculty of Science (1966-1967) and, while this position was far less central than it is at present, he rendered distinguished service for the faculty in this capacity.

In 1967 he learnt about the Woodward-Hoffman Rules, and recognised that some of his early work with Ingold at Leeds in 1928 involved the thermal ground-state cycloaddition of a pentadienyl cation. A paper to this effect appeared in 1969, the year of his retirement, thereby closing the circle on a remarkable career. He was compulsorily retired at the age of 65, but was then offered the Foundation Welch Professorship of Chemistry at Texas Technological University (Lubboch, Texas) which he took up in January 1970 for a period of 5 years. He retired from the Welch Chair in 1975 and returned with his wife to Australia to be closer to their daughter, Adrienne Horrigan, her husband William, and their four grandchildren. After a period as an honorary professorial fellow at Macquarie University (1976-1979) he moved to Melbourne to be closer to family, following the death of his beloved Eileen. Shoppee was then appointed honorary visiting professor at La Trobe University in 1980 and maintained his research interests into his middle eighties, working at the bench up until the age of 87.

We should place Shoppee's scientific achievements into context. Contemporary organic chemists enjoy the enormous benefits of spectroscopic techniques and separation methods that only became available towards the end of his career. Without these aids, most modern practitioners would not know where to begin, and yet it was a field in which Shoppee excelled, especially the assignment of stereochemistry. Problems that could now be solved in a few minutes by a first year undergraduate using nuclear magnetic resonance (NMR) spectroscopy, would have taken Shoppee and his colleagues several months, even longer. The availability of reagents was extremely limited and very few were commercially available. From a modern perspective, it is difficult to understand how it was possible to isolate and deduce structures of organic molecules, especially those as complex as the adrenocortical steroid hormones, before the advent of NMR spectroscopy in the late 50s. And yet chemical and some limited physical methods were sufficient for Shoppee and his co-workers until the arrival of the first NMR spectrometer (a Varian A60) at Sydney in 1962. The advent was almost too late for Shoppee, but a turning point for those of us who followed. In 1998, the University of Wales at Swansea launched the 'C W Shoppee Memorial' appeal to fund scholarships for entering chemistry students. Students from all over the world are eligible, reflecting the very international nature of the career pursued by Shoppee.

Lewis N Mander

Science policy

Overview

The past year (1 May 2002 to 30 April 2003) has been a particularly active period in Australian science policy. The national research priorities were set; a major review of higher education has been carried out, and there has been extensive and highly publicised policy activity surrounding the regulation of stem cell research. There have also been lower profile but vitally important activities in the 'science and security' area. The Academy, under the direction of Professor Michael Barber, Secretary, Science Policy, working closely with the Academy's Executive Secretary, Professor Sue Serjeantson, has played a high-profile role in these policy debates. Academy President, Dr Jim Peacock, is an *ex officio* member of PMSEIC, the Prime Minister's Science, Engineering and Innovation Council.

The Academy is well positioned to respond quickly to requests from government and also to carry out longer-term science policy studies funded under the Australian Research Council's Learned Academies Special Projects Scheme. By canvassing different policy options, this longer-term research provides the resources for influencing the Australian science policy agenda. The Academy has now subscribed to the full set of OECD science and innovation statistics, further enhancing our capacity to draw international comparisons of science and innovation investment and outcomes.

The Academy successfully obtained two Special Projects grants this year. One grant is for work on a strategy for the Earth sciences, carried out under the auspices of the National Committee for the Earth Sciences. The other grant, for benchmarking Australia's performance in nanotechnology, is being carried out by the Academy's Secretariat, under the overall direction of Professor Barber. The nanotechnology work has been facilitated by the appointment of a dedicated research assistant. These new grants augment an existing award for continued work on research infrastructure, with a special emphasis on Major National Research Facilities.

Media releases and reports issued by the Academy are available at www.science.org.au/academy/media/contents.htm.

Over the past year the Academy has produced a wide range of submissions, statements and reports and delivered public lectures and presentations. These are summarised below, organised around major science policy themes. In a number of these policy areas the Academy has worked closely with the other learned academies, demonstrating how each academy brings to bear its own, very distinct, capabilities.

Science policy outcomes achieved during the last 12 months include the removal of the external earnings target for CSIRO, ANSTO and AIMS. This was announced on 13 September by the Minister for Science, the Hon. Peter McGauran MP, following publication of the Chief Scientist's review of these external earnings targets. The Academy had made a submission to the Chief Scientist in December 2001 arguing in favour of this change in policy (the submission is available at www.science.org.au/academy/media/earnings.htm). The Chief Scientist's report cited this submission, observing that 'the Australian Academy of Science noted in its submission that the targets policy had influenced commercial decisions in favour of a "fee for service" structure rather than seeking a greater share of future income streams from royalty or licensing arrangements or by taking equity positions.' This change in policy was a positive step forward for Australian public sector research.

Contributions to national strategies and priorities

National research priorities

The Academy, in liaison with the other learned academies, directly assisted the Commonwealth government's taskforce in the process of setting the national research priorities. Several contributions were made to this priority-setting process:

- The Academy hosted a National Priorities Scoping Workshop for key policy-makers on 29 May 2002. The workshop was attended by the Chief Scientist, Dr Robin Batterham, together with 20 of the most senior science policy experts in Australia. A transcript of the proceedings is available at www.science.org.au/proceedings/priorities/workshop.rtf.
- The Academy also organised a forum for policy-makers from 26-27 June. Fifteen speakers addressed research priority-setting issues. The Minister for Science, Peter McGauran, gave an informal speech on the research priority challenge at the forum dinner. As with the scoping workshop, a transcript of the proceedings is available on the Academy's website – providing a useful resource to all the stakeholders in the priority-setting process. The full text of talks and presentation slides are available at www.science.org.au/proceedings/priorities.
- Professor Michael Barber's Telstra address at the National Press Club on 26 June sought to reinforce the message that research excellence, judged on an international basis, is a pre-requisite for meeting our national research priorities. He argued that

  > it should not be a view in Australia that the Australian scientific community is too small to be an international player in this globalised world. If you go to almost any scientific conference anywhere in the world, you will find Australians and often they are giving plenary addresses...across the whole breadth of global science, Australian scientists are welcome, in many cases as the leaders of their fields...This international presence just might be Australia's highest priority in research. Already one-third of all Australian scientific publications have at least one overseas co-author. Science, particularly at the leading edge, is an international activity...The international presence of Australian scientists should be an invaluable 'fifth column' for Australia, giving early warning of emerging technologies and picking up signals of novel applications.

  The full address is available at www.science.org.au/academy/media/26june02.htm.
- The Academy's High Flyers' Workshop, held on 8 August, brought together 18 up-and-coming researchers to provide their own perspectives on national research priorities. The workshop identified the following as key priority areas: a 'healthy country', in which Australia's resources are used sustainably; a 'healthy people' – finding new ways to improve people's health and to reduce the impact of disease; 'creating new industries'; and 'smart tools for industry and research'. The report from this workshop provided one of the Academy's submissions on suggested research priorities (available at www.dest.gov.au/priorities/priorities_sub/pdf66p.pdf).
- Other submissions recommending specific research priorities were made by the following National Committees: Astronomy, Crystallography, Earth Sciences, and Mathematics.
- Dr Jim Peacock accepted an invitation to chair the committee responsible for recommending the set of specific research priorities to Federal Cabinet.

In December, the Academy welcomed the announcement of the national research priorities in a media release, with Professor Barber commenting that

> the priorities provide great opportunities for exciting, fundamental science at a world-class level and will further enhance Australia's presence as an important player on the international stage. The research community will be delighted that the government has recognised that science is now at the centre of government policy-making, and can make a vital contribution to the quality of all our lives.

Professor Barber went on to commend the government for the widespread consultation process used to define the priorities. The full media release is available at www.science.org.au/academy/media/5december02.htm.

The Academy will continue to support subsequent activities related to the national research priorities when appropriate. On 4 April Dr Jim Peacock welcomed 35 mid-career scientists to the Academy's High Flyers' Think Tank on the topic 'Safeguarding Australia', which is one of the research priorities. Participants were nominated by senior scientists and social scientists and

were joined on the day by some Fellows of the Academy and other senior specialists. The purpose of the Think Tank was to encourage researchers from a broad range of disciplines to engage in thinking about novel applications of existing science and technology and in identifying gaps in knowledge that might be addressed when applying science (including social science) and technology to safeguarding the nation.

The Academy is convinced that think tanks such as this, focused on particular challenging and contemporary issues, encourage young researchers to think creatively about the applications of their research and can spark enduring new collaborations and multidisciplinary problem-solving. Break-out sessions were grouped around chemical and biological hazards; communications; services and infrastructure; and understanding human behaviour.

Mandyam Srinivasan (left) and Thomas Barlow at the High Flyers' Think Tank.

Dr Phil McFadden, facilitator of the plenary session, reminded participants of the prescient words of Benjamin Franklin:

> They, who would give up an essential liberty for temporary security, deserve neither liberty nor security.

Raconteurs Dr Bob Godfree, Dr Christine O'Keefe, Mr Greg Scott and Dr Mark Thompson impressed the plenary session with their summaries of the group reports. Discussion focused on the vulnerability of the nation to emerging or spreading diseases in plants, animals and humans, to natural hazards, to inadvertent or deliberate human acts, and how science and social science could help prevent and respond to those threats.

Regulatory issues

The Academy was asked to comment on the progress and effectiveness of the National Biotechnology Strategy in order to inform the mid-term review of this program. In its submission the Academy stressed a concern about the current regulatory regime:

> the Academy cautions that working scientists in public research institutions have raised concerns that any move to the full-cost recovery of licence fees for contained recombinant DNA experiments, and increasing demands for detailed information by the Office of the Gene Technology Regulator, may compromise the nation's capacity to undertake cutting edge research in a timely manner. The Academy supports the principle of regulation in this area, but recommends that the direct and indirect compliance costs should be assessed for adverse impacts before any such move takes place.

Human stem cell debate

On many occasions during the past year the Academy repeated its opposition to cloning 'whole human beings' on safety and ethical grounds. Professor John White, spokesperson for the Academy on human stem cell research, outlined the position of the Academy in the 2002 cloning debate. He said:

> The Academy is opposed to cloning whole human beings. But Australia must not close the door on research into human embryonic stem cells. It is difficult to legislate effectively in an area of rapidly developing technology. Legislation can set limits on certain research practices, such as prohibiting the cloning of whole human beings, but should not regulate the details of research in human stem cells. We need research in both embryonic and adult stem cells. The work goes hand-in-hand.

On 16 June Professor Sue Serjeantson accompanied a delegation from the Coalition for the Advancement of Medical Research of Australia (CAMRA) to Parliament House in Canberra. The delegation was lobbying for approval of the draft Bill on Research Involving Embryos and Prohibition of Human Cloning. It was made up of patient advocacy groups, the Australasian Spinal Research Trust, Motor Neurone Disease Association and Juvenile Diabetes Research Foundation. Members of the delegation met with many Members of Parliament and their advisors.

Professor John White, Professor John Shine and Professor Sue Serjeantson gave evidence to the Senate Community Affairs Legislation Committee, the membership of which was much augmented by many interested Senators, on the Research Involving Embryos and Prohibition of Human Cloning Bill 2002 in Canberra on 19 September. The Academy's submission to the Senate inquiry is available at www.science.org.au/academy/media/21june02.htm.

Climate change and environmental sustainability

Following initial discussions between the Academy, the Australian Greenhouse Office (AGO) and the Australian Academy of Technological Sciences and Engineering, the AGO asked the four learned academies to organise a conference on 'Living with Climate Change'. The conference was funded by the AGO and conducted under the auspices of the National Academies Forum from 18-19 December. The conference brought together business leaders, scientists, government officials and representatives of the wider community to discuss how best to adapt to the impacts of climate change. Its main aim was to provide advice to the AGO for incorporation into the forward strategy for dealing with climate change and to launch a sustained debate on this critical issue. The conference was opened by the Minister for the Environment and Heritage, the Hon. Dr David Kemp MP. The National Academies Forum is pleased to have been involved in this important step towards policy formation.

Science and security work for PMSEIC

Professor Sue Serjeantson was invited to join the Prime Minister's Science, Engineering and Innovation Council's working group tasked with examining 'science and security' concerns. Among other things, the working group carried out a rapid 'stocktake' of the science bases' capacity to assist government departments and agencies in a national crisis. An edited version of the working group's report is available at www.dest.gov.au/science/pmseic. This work demonstrated the critical importance of the science base to Australia's national security.

Earth sciences strategy

The National Committee for Earth Sciences has started work on developing a 10-year strategy for Australian Earth sciences research. This work has been funded by a grant to the Academy from the Australian Research Council's Learned Academies Special Projects Scheme. The strategy aims to ensure that the Earth sciences remain relevant to Australia, and will highlight the economic, environmental and social benefits that arise from Earth sciences research. The Academy's Science Policy Advisor is assisting the Committee by providing the economic statistics input.

In its submission on the national research priorities, the National Committee for the Earth Sciences stressed the importance of improving the integration of Earth sciences research with that of other disciplines: '...it is not good enough just to understand the geological (including soil and water system): this knowledge must be thoroughly integrated with the social, political, and industrial systems and, in particular, with the agricultural system.'

One immediate outcome from the more holistic approach initiated by this Committee has been to mobilise wider activity in support of the Australian Bureau of Statistics, in their efforts to produce environmental national accounts in line with new United Nations guidelines. These experimental statistics seek to quantify the aggregate annual changes to the value of Australia's natural assets. The changes are caused by the combined impact of environmental degradation (eg, salinity, soil acidification) and by the extraction of minerals, oil and gas, offset by the addition of new reserves generated by geological exploration. These environmental national

accounts are of particular relevance to the national research priorities. Following a presentation by the Academy's Science Policy Advisor on these experimental ABS estimates, and on the benefits of assisting the ABS in further developing them, those members of the Committee involved in drawing up an action agenda for the minerals industry are now liaising with the ABS.

Nanotechnology benchmarking project

Another high-profile science policy project commenced during the year. This is an exercise to benchmark Australia's current and future international standing in nanotechnology research. This work, funded under the Australian Research Council's Learned Academies Special Projects Scheme, is being carried out under the overall direction of Professor Michael Barber. It will provide policy-makers with essential information on how leading international researchers view Australia's research capability in different aspects of nanotechnology, and it will also pilot a more general peer-assessment methodology particularly suitable for assessing research performance in emerging areas of science and technology. This approach was initially developed in the United States under the auspices of the Committee on Science, Engineering and Public Policy (COSEPUP), which brings together experts from the National Academy of Sciences and some of the other US academies. The Academy's team will be liaising with COSEPUP staff throughout this project.

Funding and infrastructure policy

Review of Higher Education

The Academy provided three submissions relevant to the Commonwealth Government's comprehensive Review of Higher Education. On 28 June the Academy provided comments on the Review's discussion paper, 'Higher education at the crossroads'. Its next submission, on 13 September, focused on the issue of funding arrangements and put forward an alternative lower risk funding proposal. The full submission is available at www.science.org.au/academy/media/13september02.htm.

Part of the Review of Higher Education involved a Productivity Commission study into university resourcing, which was based on making limited international comparisons. In October the Academy provided a submission in response to a draft report circulated by the Commission. It stressed that

> whilst there is ample data readily available on the nature, extent and sources of funding of the R&D performed within universities this dimension is not made explicit in the report and these data are not drawn upon. Indeed, it is striking that whilst a chapter is devoted to commercial activities no chapter is devoted to R&D activities.

Research infrastructure

The submission to the Productivity Commission drew upon a longer-term study being carried out by the Academy. This study is developing recommendations for research infrastructure funding – and for Major National Research Facilities (MNFRs) in particular. This is a continuation of the Australian Research Council's Learned Academies Special Projects Scheme grant for such work. A discussion paper, 'Providing the machinery of science: Defining a whole-of-government strategy for securing access to critical research facilities', was circulated in August. This paper was prepared by the Academy in order to generate debate within government, particularly in relation to enhancing Australian science's global impact, and it continues to provide an input to the development of government policy options.

The Academy has prepared a report making specific recommendations for changes to research infrastructure funding by the Commonwealth government. The report highlights the negative impact of the current *ad hoc* approach to MNRF funding, which amplifies uncertainty over future funding availability and generates problems for the long-term sustainability of MNRFs. Reducing this uncertainty by announcing a regular series of MNRF bidding rounds would be highly beneficial in fostering long-term strategic planning in existing and potential MNRFs.

MNRF workshop participants.

Given these concerns, the directors or senior representatives of Australia's 15 MNRFs joined members of the Academy's steering group on research infrastructure for a workshop in Canberra on 12 December. The aims of the workshop were to improve cooperation between the facilities and to develop the case for more coherent MNRF funding. A subsidiary aim was to provide feedback to the Commonwealth Department of Education, Science and Training on how to improve future bidding rounds.

The workshop, chaired by Dr Phil McFadden, Chief Scientist, Geoscience Australia, began with an introductory talk by the Academy's Secretary (Science Policy), Professor Michael Barber. Then each facility's representative described the management challenges they face, including changes in government funding guidelines, complex partnership arrangements and whether to own equipment or pay to use equipment at another institution. Discussion then centred on ways to solve these problems together.

The workshop participants concluded that the main source of the difficulties encountered in the last bidding round was the *ad hoc* nature of the MNRF program. They also felt that the onus is now on the research community to work with government officials to build a shared understanding of the impediments and opportunities associated with building and maintaining MNRFs in Australia.

More workshop activities are being planned in order for participants to identify ways in which the MNRFs can cooperate, and how the image and profile of the MNRFs can be improved so that they can become a key part of Australia's research infrastructure.

Linkages and commercialisation

Business commitment to R&D

The Academy's submission to the House of Representatives Committee on Science and Innovation's Inquiry into Business Commitment to R&D applauded the government's earlier decision not to implement a proposal that R&D projects should demonstrate *both* innovativeness *and* a high level of technical risk in order to be eligible to receive the R&D tax concession. This point had been made by the Academy to the Senate Inquiry on Taxation Laws Amendment (Research and Development) Bill 2001, by Dr Bob Frater, Professor Martin Green and Professor Sue Serjeantson at public hearings held in Sydney on 6 October. The submission also identified shortcomings in the capacity to manage R&D investment risks as an explanation of the low level of Australian business commitment to R&D relative to that in other developed economies.

Professor Michael Barber, Professor Sue Serjeantson and the Academy's Science Policy Advisor, Dr Mark Matthews, were called as witnesses to give evidence at the Committee's public hearings on 16 September. The Academy was honoured to be invited to be the first to give evidence on the first day of public hearings held by the new House Committee on Science and Innovation, chaired by Mr Gary Nairn MP. The Academy's submission, and additional points made during the public hearings, were subsequently referred to by the Chair of this Committee when examining other witnesses. (The submission and transcript are available at www.aph.gov.au/house/committee/scin/randd/subs/sub045.pdf.)

National Committees for Science

As a result of a meeting of National Committee chairs in April 2002, changes have been made to the structure of the Committees and to the way Committee members are appointed. Guidelines for National Committees have been developed and are available at www.science.org.au/natcoms/guidelines.htm. Based on the new guidelines, each Committee will identify the activities that will be undertaken in the forthcoming year.

The main changes to the structure of the National Committees are as follows:

- The number of Committees has been reduced from 30 to 22.
- Some Committees have been merged:

  the new National Committee for Biomedical Sciences resulted from the merger of the former National Committees for Physiology, Pharmacology, Biochemistry and Molecular Biology, Biophysics and Microbiology;

  the new National Committee for Plant and Animal Sciences resulted from the merger of the former National Committees for Plant Sciences and Animal Sciences;

  the new National Committee for Climate, Atmospheric and Oceanic Research and Global Change resulted from the merger of the former National Committees for Atmospheric and Oceanic Sciences and Climate and Global Change.
- The National Committee for the Environment has been disbanded and replaced by the National Committee for Sustainability. The National Committees for Bioinformatics and Electron Microscopy have been disbanded.
- Each Committee will consist of eight members.

A full list of National Committees and members is available at www.science.org.au/natcoms/.

The process of appointment to a Committee is as follows. Nominations for Committee members are sought by the Academy from Committee chairs and from the relevant corresponding scientific societies. The nominations are then considered by the Academy's Executive Committee, which is responsible for appointing Committee chairs and members.

The Academy appoints delegations to the business meetings of the International Council for Science's bodies, after advice from the National Committees.

Committee reports

Reports have been received from the following Committees:

Antarctic Research

Chair: Dr Ian Allison

Membership of the Committee has changed considerably since the Academy's review of National Committees. It now has greater representation from the university sector. However, because this is such a multidisciplinary Committee, and because we need to maintain close contact with other national Antarctic bodies and with the activities of the relevant ICSU-affiliated international scientific body (the Scientific Committee on Antarctic Research), a number of additional *ex officio* and *ad hoc* members are included in the membership. The contribution of these members will be very important for the work of this Committee.

No formal meeting of the Committee was held during the reporting period. However, members attending the XXVII meeting of the Scientific Committee on Antarctic Research (SCAR), held in Shanghai from 13-16 July, met informally with the Australian representatives on SCAR sub-committees and panels before these meetings, in order to brief the delegate and alternate delegate on issues important to Australia.

Australian scientists continue to play lead and active roles in the international programs of SCAR. Following recommendations of a review committee, SCAR underwent a major organisational restructure at the XXVII meeting. The previous structure of disciplinary working groups and groups of specialists was transformed into a new structure of multidisciplinary Standing Scientific Groups, with major scientific research programs. The new process for establishing and reviewing SCAR international programs is more rigorous than in the past and involves more interaction with delegates. Australia is well represented in the executives of the Standing Scientific Groups, and in the development of those major new programs relevant to the priorities of Australia's national Antarctic program.

Biomedical Sciences

Chair: Professor Philip Kuchel

The new National Committee for Biomedical Sciences encompasses the academic interests of five former National Committees: Biochemistry and Molecular Biology, Biophysics, Microbiology, Pharmacology, and Physiology. These Committees were merged in late 2002. The newly formed Committee has not yet met but has discussed some issues by email.

Two Australians were voted into two positions at a meeting of the International Union for Pure and Applied Biophysics held in Buenos Aires from 27 April to 2 May 2002. Dr Frances Separovic was elected as a member of Council and Professor Cris dos Remedios, who attended the General Assembly as Australia's delegate, was elected to one of the two positions of Vice-President.

An International Union of Microbiological Sciences Congress Assembly was held in Paris from 27 July to 1 August. The former National Committee for Microbiology selected three delegates to attend.

Chemistry

Chair: Professor Frank Larkins

At its 2002 meeting, under the chairmanship of Professor David Black, the Committee identified two major areas of concern: conquering the problems of antibiotic resistance, and teaching chemistry to young children.

The Committee was unable to find financial and organisational support for a workshop on antibiotic resistance. And in regard to primary school education, it became clear that the Academy and the Royal Australian Chemical Institute (RACI) were both engaged in different variations of this theme, and it was decided to cooperate with these existing activities.

There was continued liaison with the National Committees for Mathematics and Physics, to emphasise to government and the public the importance of education in the enabling sciences, and to highlight current deficiencies.

The Committee made submissions to government in regard to the Higher Education Review and the national research priorities.

Under the chairmanship of Professor Frank Larkins, the Committee had a teleconference in January, followed by a meeting in Canberra in February. Professor Leiv Sydnes, President-elect of the International Union for Pure and Applied Chemistry, attended this meeting and briefed members on the International Union's activities. Other business included the proposed Review of Trends in the Chemical Sciences in Australia and a symposium planned for later in 2003 on the role of the enabling sciences in achieving national research priority outcomes.

Crystallography

Chair: Professor John White

The Committee exists to focus the views of Australian crystallographers on Australia's participation in the International Union of Crystallography and, in Australia, to promote the disciplines associated with structure policies and determination using diffraction methods.

The Committee works closely with the Society of Crystallographers in Australia and New Zealand and the membership of the two organisations intersects. The Committee has always had representatives from the electron diffraction and microscopy community, as well as from major government scientific agencies participating in structural work. Australia's participation in the international crystallographic community has been strong. The Committee has initiated and facilitated this participation since its inception.

At the Committee's January meeting in Melbourne, it was decided that a review of Australian crystallography be undertaken. The review will look at the evolution of crystallography in Australia over the past 10 years, its present condition in terms of numbers of practising 'crystallographers' (interpreted broadly – those using diffraction methods), and their contribution to international science and to national activities.

Earth Sciences

Dr Phil McFadden

The Committee is currently engaged in the process of developing a strategic plan for the Earth sciences in Australia. The Committee, re-formed at the beginning of 2002 to undertake this process, acquired funding through an Australian Research Council grant and through contributions from Earth science organisations. It developed and distributed a background paper outlining the issues facing Earth sciences, and then sought and received submissions. Committee members provided submissions to the National Research Priorities Task Force and the strategic plan will be delivered within the context of the now enunciated national research priorities. The Committee is working towards delivering the strategic plan towards the middle of 2003.

Members of the National Committee for Earth Sciences at the March meeting.

The Committee met in Canberra in December, January, February and March.

Geography

Chair: Professor David Gillieson

The Committee continues to be the primary forum for the active exchange of views for those Australian organisations involved in the discipline of geography. This can be seen by the consistent attendance at committee meetings of members and delegates from corresponding societies such as the Geographical Society of NSW, the Royal Geographical Societies of Queensland and South Australia, the Australian Geography Teachers' Association, the Institute of Australian Geographers and the Australian Mapping Sciences Institute.

It is now also actively engaging with the New Zealand National Committee for Geography, the New Zealand Geographical Society and the New Zealand Geography Teachers' Association.

The Committee met in September and reported that it had, in collaboration with the New Zealand National Committee for Geography, formally repeated its offer to host the 2006 Regional Congress of the International Geographical Union (IGU) at the Cairns Convention Centre and James Cook University, Cairns. This offer was gratefully accepted by the IGU executive after the Israeli National Committee withdrew its offer, due to ongoing conflict in the region. An organising committee has been formed and has established the provisional theme of 'Beyond Global Cities: Regional Geographies in a Changing World'.

The Committee selected Dr Glenn Banks of the Australian Defence Force Academy to attend IGU's General Assembly in Durban, South Africa, August 2002.

The previous chair of the Committee, Associate Professor Elspeth Young, died while overseas in August. Dr Young gave exemplary service to the Committee and to the discipline of geography. She will be greatly missed.

History and Philosophy of Science

Chair: Professor Rod Home

As part of the Committee's ongoing project to promote Sino-Australian cooperation, a three-person delegation led by Professor Home represented Australia at the second Sino-Australian Symposium in History and Philosophy of Science, held in conjunction with the annual Taiwanese National Conference on the History of Science, in Taiwan in April 2002. During the Symposium, discussions were renewed with Taiwanese scholars on ways and means of initiating teaching in the history of Chinese science in Australian universities, and ways in which Australian historians of science might contribute to the development of the subject in Taiwan.

The Committee met in July and reaffirmed its view that the history and philosophy of science could play a significant role in bridging the gap in understanding between the scientific community and the general public and that the Committee could serve as a useful point of contact between the Academy and those working in the history and philosophy of science in Australia. Committee members had also identified opportunities for inter-Academy collaboration and joint activities.

In August the Committee presented the Academy with a set of recommendations, *Preserving the Records of Modern Science*, developed by the Commission on Bibliography and Documentation of the Division of History of Science, International Union of the History and Philosophy of Science (UHPS). The recommendations were endorsed by the Academy and are available at www.science.org.au\policy\iuhps.htm.

Mathematics

Chair: Professor Peter Hall

The Committee did not meet during the reporting period but email discussions were held. It is represented, through its chair, on the Australian Mathematical Sciences Council, on the steering committee of the Australian Mathematical Society and on the board of the Australian Mathematical Sciences Institute. Meetings were held with these groups during the year.

The Committee made several submissions to government on behalf of the mathematical sciences. These included the submission to the Review of Higher Education (available at wwwmaths.anu.edu.au/other/ncm/review.html); the submission on national research priorities (wwwmaths.anu.edu.au/other/ncm/taskforce3.html); and the priority nomination, National Research Priorities Taskforce (wwwmaths.anu.edu.au/other/ncm/taskforce2.html).

In August, the Committee's representatives, Professor Derek Robinson, Professor Ian Sloan and Professor Alf van der Poorten attended a meeting of the International Mathematical Union in Shanghai.

Medicine

Chair: Professor Henry Burger

The Committee aims to monitor those issues affecting the welfare and future of Australian medical research, both basic and clinical, and to respond to such issues when they are deemed appropriate for Academy input. The Committee did not meet in 2002 but discussed matters by email.

Nutrition

Chair: Professor Mark L Wahlqvist

Professor Wahlqvist is also President of the International Union of Nutritional Sciences which acts as a reference body to the United Nations Standing Committee on Nutrition, and is a key member of the International Council for Science (ICSU).

In Australia, the National Committee for Nutrition has a leadership role in the Federation of Australian Nutrition Organisations, representing all science-based food and nutrition organisations in Australia. The Federation held its annual meeting in December, in conjunction with the annual scientific meeting of the Nutrition Society of Australia.

Food Standards Australia and New Zealand (FSANZ) superceded ANZFA in July and has a shared interest with the Committee in evidence-based nutrition, to underpin the food regulatory system, especially as health claims are progressively regulated. In December, Professor Wahlqvist participated in the FSANZ Fellows Symposium in Canberra.

Physics

Chair: Professor Anthony Thomas

The Committee did not meet in 2002 but there was a considerable exchange of email.

A teleconference was held in April 2003. Discussions revolved around further collaboration between the Australian Institute of Physics and the Committee; plans for Australian activities for 'World Year of Physics' in 2005 (an International Union of Pure and Applied Physics initiative); and plans for a face-to-face meeting in September or October 2003.

The General Assembly of the International Union of Pure and Applied Physics was held in Berlin in October. The delegation consisted of Professor Robert Dewar, Associate Professor John O'Connor (President, Australian Institute of Physics) and Professor Anthony Thomas (Leader).

Plant and animal sciences

Chair: Professor Andrew Cockburn

As the National Committee for Plant Sciences and the National Committee for Animal Sciences were both affiliated with the International Union of Biological Sciences, a new system of membership was devised to give the new Committee a greater connection to the scientific societies in Australia.

The following Committee structure was decided upon:

- chair (preferably to rotate between the animal and plant sciences)
- deputy chair (representing the opposite group to the chair)
- a representative from each of the following scientific societies: Australian Entomological Society, Australian Systematic Botany Society, Australian and New Zealand Society of Comparative Physiologists and Biochemists, Australian Society of Plant Scientists, Genetics Society of Australia, and Ecological Society of Australia.

Psychology

Chair: Professor J Michael Innes

The Committee did not meet during the year but matters were discussed by email. One of the matters discussed was the criteria that should be formally adopted for nomination of future membership of the Committee and advice to the chair regarding the role a National Committee should take and the importance of maintaining, if possible, a separate National Committee for the discipline. The relationship between the work of the Committee and the national body, the Australian Psychological Society, was also discussed, particularly the importance of representing fully the scientific discipline of psychology in relation to the profession.

A General Assembly of the International Union of Psychological Science was held in Singapore in July, during the International Congress of Applied Psychology. Professor Innes and Professor Paul Martin, the President of the Australian Psychological Society, were both present as delegates.

Quaternary Research

Chair: Professor John Dodson

The Committee did not meet in 2002 but some items from the International Union for Quaternary Research (INQUA) concerning international memberships were dealt with by email. The Committee will be very active in 2003, preparing its bid for the 2007 INQUA Congress for Australia.

Radio Science

Chair: Dr Phil Wilkinson

The Committee's annual meeting was held in Sydney in February. It was also attended by Professor Kristian Schlegel, President of the International Union for Radio Science (URSI).

The Committee's electronic mailing list currently has 612 members. (To join the list go to www.ips.gov.au/mailman/listinfo, then click on 'ncrs-general'.) The Committee's website, www.ips.gov.au/IPSHosted/NCRS/, includes proceedings of meetings held in early 2002. It also has links to the Workshop on the Applications of Radio Science (WARS00 and WARS02) conference proceedings. The site has also been registered and archived with Pandora, the electronic archiving facility operated by the National Library of Australia.

The URSI General Assembly was held in Maastricht in August. There were 36 Australian delegates and they presented 32 papers. Members of the Committee were the national delegates to the URSI Commission Business Meetings held during the URSI General Assembly. A full report on the URSI General Assembly is available at www.ursi.org.

During 2002, Dr Le Nguyen Binh, the Australian delegate to URSI Commission D, liaised with several institutions in Vietnam responsible for research, operations and education in the specialised fields of the URSI Commissions.

Space Science

Chair: Professor Peter L Dyson

The Committee continues to provide a contact point with national space organisations of other countries, as a means of providing information on opportunities for collaboration. Committee members and other Australian scientists have key positions in international organisations concerned with space science.

The most significant space science initiative within Australia during the past year was the successful launch of FedSat on 14 December from the National Space Development Agency of

Japan's Tanegashima Space Centre by the HIIA-4 rocket. This is an outstanding achievement, being the first Australian satellite launched since 1967. All onboard systems are functioning well and payloads tested.

During the latter part of 2002 the Committee prepared and submitted Australia's report 'Australian Space Research 2000-2002' to the Committee on Space Research (COSPAR). It is available at www.science.org.au/natcoms/cospar.pdf.

In 2002 Professor Dyson attended the 34th COSPAR Scientific Assembly. It was held as part of the 2nd World Space Congress in Houston, Texas, USA, from 10-19 October 2002.

COSPAR holds scientific assemblies every two years. At the Houston meeting 44 papers of the 4000 papers delivered had Australian authors and another 18 papers had Australia as a source of data or a region of study – which means Australia's contribution was just over 1 per cent. Given Australia's small population and lack of both a government space program and a large aerospace industry, this was a good result.

Spectroscopy

Chair: Professor Gerard Milburn

The new chair took over late in 2002 and the Committee was reconstituted. The broad role is to promote spectroscopy nationally and to establish strong international links in the field of optical spectroscopy as one of the federal government's listed priority areas. Strong international links have been established through the Frew Fellowship scheme and through the series of Australian Spectroscopy (or ACOLS) Conferences. These links are a major reason why laser spectroscopy is currently one of the strongest areas of research in physics in Australia.

There is no relevant international scientific union for spectroscopy. The National Committee for Spectroscopy has strong interactions with the international spectroscopy community through a series of international conferences, especially the International Conferences on Laser Spectroscopy. This interaction has resulted in the past chairman of the Committee, Professor Peter Hannaford, successfully bidding to bring the 16th International Conference on Laser Spectroscopy to Australia (Palm Cove, 13-18 July 2003).

One International Scientific Union relevant to the spectroscopy community is the Atomic Molecular and Optical Physics Section of the International Union of Pure and Applied Physics (IUPAP), and Professor Hannaford has recently been elected as a Member of this Section.

Theoretical and Applied Mechanics

Chair: Professor Mark Bush

The Committee did not meet in 2002 but conducted discussions by email. It initiated an Australasian bid for the 2008 International Congress for Theoretical and Applied Mechanics. A steering committee was established, consisting of three representatives of the Committee, representatives from various corresponding scientific societies (eg, Australian Mathematics Society, Australian Fracture Group, Institute of Engineers (Aust)) and several prominent individuals representing the breadth of the discipline. Several bid cities were considered, with Adelaide being the final agreed location. Australian Mathematics Society member Dr Jim Denier is the bid chairman. The final decision on the bid city is to be made by the International Union of Theoretical and Applied Mechanics at the International Congress in Poland in 2004.

Theory of Machines and Mechanisms

Chair: Dr Ross McAree

The Committee did not meet in 2002 but members conducted ongoing email correspondence, with the objective of building a vision for its role and purpose and to formulate an operating strategy.

The Committee was restructured in September 2002 and is rebuilding its strategy for promoting research and development in its area of interest. To this end, the Committee has sought to broaden its contacts through greater participation in the permanent and technical committees of its parent body, the International Federation on the Theory of Machines and Mechanisms.

In order to foster and broaden contacts within Australia, the Committee will organise biennial national congresses, with the first meeting to be held in Sydney later in 2003.

The Committee is saddened to report the death of its Foundation Chair, Professor Kenneth Hunt, in August 2002. Professor Hunt chaired the Committee from 1973 to 1983.

International Council for Science

The International Council for Science (ICSU) is a non-government organisation that promotes scientific activity and brings together scientists from different disciplines and different countries. The Academy adheres, on Australia's behalf, to the International Council for Science, its 25 discipline-based unions, nine program committees and two associates.

The 27th General Assembly of the Council, and associated meetings, were held in Rio de Janeiro in September. Dr Graeme Pearman reported to the Assembly on the recommendations for the Council's Committee on Scientific Planning and Review. This Committee was created in 1998 to advise the executive board of the Council on priorities for scientific initiatives and to review activities of the council's scientific interdisciplinary bodies. Its report is available at www.icsu.org/. Professor Sue Serjeantson also attended the General Assembly in Rio. The next General Assembly will be held in China in 2005.

International scientific meetings held in Australia at the invitation of the Academy

The Academy, as the adhering body on behalf of Australia to ICSU, is often asked to endorse bids to host international scientific meetings in Australia. The Academy has recently issued a set of guidelines with respect to bids for international conferences. These are available at www.science.org.au/internat/guidelines.htm.

International Union of Geodesy and Geophysics

The Academy, on behalf of the Australian research community, has invited the International Union of Geodesy and Geophysics to hold its 2007 General Assembly in Australia. The outcome of Australia's bid to host this event will be known in July 2003.

Intergovernmental Panel on Climate Change

In July the Academy hosted a roundtable discussion with the Chairman of the Intergovernmental Panel on Climate Change (IPCC), Dr Rajendra Pachauri, during his visit to Canberra. Dr John Zillman from the Bureau of Meteorology chaired the meeting, while Professor Graham Farquhar and Professor Sue Serjeantson represented the Academy. Dr Pachauri gave an overview of recent IPCC activities, including the IPCC Third Assessment Report – Climate Change 2001.

Delegates

The Academy appoints delegates to the business meetings of ICSU's bodies, after advice from the National Committees. Delegates for 2002 are listed here:

International Union for Pure and Applied Biophysics (IUPAB) 30 April-5 May 2002, Buenos Aires	Professor C G dos Remedios
International Union of Crystallography XIX General Assembly and Congress (IUC) 6-15 August 2002, Geneva	Professor J W White, Professor M A Spackman, Dr M Guss
International Federation of Societies for Electron Microscopy (IFSEM) 1-6 September 2002, Durban	Dr A Spargo, Dr A Hyatt
International Mathematical Union (IMU) 17-18 August 2002, Shanghai	Professor D Robinson, Professor I Sloan, Professor Alf van der Poorten
International Union of Pure and Applied Physics (IUPAP) 9-12 October 2002, Berlin	Professor A W Thomas, Professor R Dewar, Professor J O'Connor
International Union of Radio Science (URSI) 22-29 August 2002, Maastricht	Dr P Wilkinson, Dr P Fisk, Dr G James, Professor R Braun, Dr Le Nguyen Bihn, Professor K Flynn, Dr D Noon, Professor P Dyson, Professor B Fraser, Professor R Norris, Dr K Joyner
Committee on Space Research (COSPAR) 10-19 October 2002, Houston	Professor P Dyson
International Geographical Union (IGU) 4-7 August 2002, Durban	Dr G Banks
International Union of Theoretical and Applied Mechanics 15-18 August 2002, Cambridge	Professor R I Tanner
International Union of Psychological Sciences (IUPsyS) 7-12 July 2002, Singapore	Professor J M Innes, Professor P Martin

Inter-Academy Panel on International Issues

The IAP, a global network of the world's national science academies, was launched in 1993. Its primary goal is to help member academies work together to advise citizens and public officials on the scientific aspects of critical global issues. It is particularly interested in assisting young and small academies to achieve these goals. The Academy is on the Council of this body. Current IAP programs are concerned with capacity building of academies in the developing world; science education; science in the media; and mother and child health. The Foreign Secretary, Professor Kurt Lambeck, represented the Academy at the IAP Executive Committee in Beijing in November.

Bilateral activities

Bilateral activities provide opportunities for Academy officials and government officials to meet with senior international researchers and research funders, to discuss international science and technology policy and practices, and to promote Australian research and technology.

Meetings between Academy representatives and their international counterparts provide an opportunity to discuss the operation of a particular program and make necessary modifications to ensure a program is meeting its objective.

The Academy's bilateral activities are funded as part of the Commonwealth Department of Education, Science and Training's International Science and Technology Networks, a component of the Innovation Access Program.

Asia

Thailand

The Academy hosted Ms Dusadee Siamhan and Ms Mayures Ua-malachat, Policy Officers from Thailand's National Center for Genetic Engineering and Biotechnology (BIOTEC), in August. The officers spent a day at the Academy learning about its daily activities, particularly those relating to international programs.

From left: Nancy Pritchard, Mayures Ua-Malachat, Dussadee Siamhan and Amanda Kemmerer.

Japan

A delegation from the Japan Society for the Promotion of Science, headed by Mr A Fukuda, Chief of the Postdoctoral Fellowship Program, visited the Academy in March to discuss the Academy-administered postdoctoral fellowships with Australia. Mr Fukuda met the Chair of the Asia and Postdoctoral Exchange Committees, Professor Brian Kennett. He also met with a group of Australian researchers who had returned to Australia after completing their fellowships in Japan, to get their feedback on the program.

Europe

Polish Academy of Sciences

Professor Mariusz Ziólkowski, Director of the Institute of Archaeology at Warsaw University, visited the Academy in May 2002 on behalf of the Polish Academy of Sciences. Professor Ziólkowski met with Nancy Pritchard, the Academy's International Programs Officer, to discuss potential activities between the Academies. Possible areas of common interest between both countries are marine biology and climate change (Poland has the Artowskiy Research Station in Antarctica), and the management of national parks.

Embassy of France

The Academy and the Embassy of France, through the office of the French Science and Technology Attaché, Mr Alain Moulet, have a strong working relationship. The French Embassy has for many years supported the visit of one Australian researcher to France, last year it was able to extend this support to 15 additional Australian researchers.

The Academy and the French Embassy co-hosted a seminar in November by members of the delegation on French-Australian Scientific Cooperation of Agriculture, Land, Water and Environment, who were visiting Australia to meet with major scientific organisations involved in these areas of research.

Embassy of Italy

The Academy and the Embassy of Italy, through the office of the Italian Science and Technology Attaché, Dr Nicola Sasanelli, have a close working relationship. Dr Sasanelli and the International Programs Officer met in June to discuss the Academy's exchange program with Europe. As a result of these discussions, the Embassy of Italy decided to support the visit of an Australian researcher to Italy in early 2003.

Germany

The Foreign Secretary met with members of the German delegation of the Federal Ministry of Education and Research (BMBF) and leading German researchers in the field of geosciences in December. The delegation was visiting Australia on a fact-finding mission related to possible joint activities between Germany and Australia in the area of geosciences.

Scotland

Professor Rona MacKie, International Convenor of the Royal Society of Edinburgh visited the Academy in December 2002 and met with the Foreign Secretary and members of Council. Professor MacKie also met separately with Academy officers to explore the possibility of developing stronger links between the scientific communities of Scotland and Australia.

Professor MacKie was accompanied by her husband, Nobel Laureate Professor Sir James Black, FRS. The Academy arranged for Professor MacKie and Sir James to present lectures at the Canberra Hospital.

From left: Bruce McKellar, Rona MacKie, Kurt Lambeck and Ian McDougall.

United States

Academy President, Dr Jim Peacock, hosted a lunch for US Senator Barbara Mikulski in August. Senator Mikulski is a member of several Senate Appropriations Subcommittees and has a special interest in research and education. The lunch was attended by senior officers from Australia's major research organisations.

The Academy has received funding from the Commonwealth Department of Education, Science and Training to organise two USA-Australia bilateral workshops for early-career researchers. The first workshop, on quantum information science, was held in Sydney from 7-10 January and was convened by Professor Bob Clark. The Federal Minister for Science, Peter McGauran, met the workshop participants – 27 from the US and 37 from Australia.

The second workshop, on nanotechnology, is scheduled for mid 2003 and will be held in the US. The US National Science Foundation (NSF) is a joint supporter of the workshops.

Dr Christopher Loretz, Director of the Tokyo Regional Office of the NSF, met with Professor Sue Serjeantson and the International Programs Officer in February to discuss plans for a summer program in Australia for US graduate students in science and engineering. The aim of the program, initiated in discussions with Dr Rita Colwell during her visit to Canberra in August, is to provide students with first-hand research experience in Australia and to offer them an introduction to the science and science policy infrastructure of Australia.

South Africa

Dr Bhadra Rancho, former South African High Commissioner to Australia, visited the Academy in July. He met with Dr Graeme Pearman, Chair of the former National Committee for Climate and Global Change, and Professor Serjeantson. Dr Ranchod and Dr Pearman discussed the World Summit on Sustainable Development, which was held in Johannesburg in August.

Other international activities

The Sir Mark Oliphant International Frontiers of Science and Technology Conference Series

The objective of this conference series, launched in 2001, is to provide financial support for the staging of strategically significant international conferences in Australia on high priority, cutting edge, multi-disciplinary themes. The Academy, the Academy of Technological Sciences and Engineering, and the Institution of Engineers, Australia, organise the conferences.

'Photonic Crystals Down Under', the inaugural conference, was opened by the Federal Minister for Science, the Hon. Peter McGauran MP, on 19 August at the Australian National University. The conference was supported by the Academy through funding provided by the Commonwealth Department of Education, Science and Training. The Academy will also support the conference 'Insect Sensory Systems Inspiring Robotic Applications', to be held in July 2003.

In addition, the Academy of Technological Sciences and Engineering (ATSE) will be supporting the conferences 'Scaling Down to a Nano-material World: Key Challenges Facing 21st Century Scientists and Engineers' and 'Proteomics: Progress, Partnerships and New Directions', to be held in December 2003 and January 2004.

Forum for European-Australian Science and Technology Cooperation

The Academy, together with diplomatic missions representing members of the EU in Australia, and in association with major Australian science and technology organisations, was involved in the establishment of the Forum for European-Australian Science and Technology Cooperation (FEAST). The aim of the FEAST initiative is to highlight and improve bilateral and multilateral cooperation between Europe and Australia.

Professor Neville Fletcher is the representative of both the Australian Academy of Science and the Academy of Technological Sciences and Engineering on the Board of the Forum for European-Australian Science and Technology (FEAST). FEAST has held monthly meetings at the Embassy of Spain, the Embassy of Greece and the office of the European Commission. It organised a stand displaying Australian-European activities at the November launch in Brussels of the 6th Framework Program. FEAST is also organising a major conference to be held in June 2003, 'Networking for Excellence', to be held at the Academy's Shine Dome.

Science, Engineering and Technology Network (SETnet)

The Academy is an ongoing supporter of SETnet, which aims to provide an informal network for foreign governments, Australian researchers and those involved in science policy to exchange information and ideas. During the year SETnet organised a series of lectures with Australian scientists who are conducting leading-edge research. The Academy hosted a SETnet meeting in June, with presenters from the four learned academies discussing Australia's national research priorities. Professor John White spoke on behalf of the Academy.

Support for international collaborations

The objectives of the Academy's program of international scientific and technological collaborations are to improve Australian access to science and technology and to increase awareness of Australian research.

The Academy's program gives Australian researchers the opportunity to collaborate with foreign colleagues, to widen research perspectives and experience, to exchange ideas, to be recognised in the international arena, to gain information and knowledge of techniques that will stimulate and advance Australian research, and to be involved in large international projects.

Full details of all programs are available at www.science.org.au/internat/exchange/contscix.htm.

The Academy's international programs are structured into four sections: short-term visits to Europe, North America and Asia, and long-term postdoctoral fellowships. The programs support collaborative research between professional Australian scientists and technologists and their colleagues in Europe, Korea, China, Japan, Taiwan, United States of America, Canada and Mexico. The Academy also administers postdoctoral fellowships with Japan and Korea. The programs provide funds for living and travelling costs.

The programs are funded as part of the Commonwealth Department of Education, Science and Training's International Science and Technology Networks (ISTN), a component of the Innovation Access Program.

The following researchers were selected in 2002:

Europe

Researcher	Project	Host institution
Dr Leanne Armand University of Tasmania	CADO (Coring Adelie Diatom Oozes).	Dr X Crosta Université de Bordeaux, France
Dr Graham Baldwin University of Melbourne	Definition of progastrin residues essential for stimulation of cell migration.	Dr F Hollande Université Montpellier, France
Dr Carole Burrow University of Queensland	Acanthodian micro-remains from the Early Devonian of Saudi Arabia.	Dr H Lelievre Muséum National d'Histoire Naturelle, France
Professor David Day University of Western Australia	Nitric oxide and programmed cell death in plants.	Dr J F Morot-Gaudry Institut National de la Recherche Agronomique, France
Dr Kevin Downard University of Sydney	High-resolution mass spectrometry of immune complexes.	Professor P Derrick University of Warwick, UK
Professor Ken Freeman Australian National University	Extragalactic planetary nebulae	Professor O Gerhard Universität Basel, Switzerland
Dr John Gallant CSIRO Land and Water, Canberra	Characterisation of the environmental impact of agriculture at catchment scale.	Professor L Bresson Institut National Agronomique Paris-Grignon, France
Dr Georg Gottwald University of Sydney	Timescale separation in geophysical fluid dynamics.	Dr S Reich Imperial College London, UK
Dr Mark Humphrey Australian National University	Switchable NLO-active organometallic architectures.	Dr C Lapinte Universtié de Rennes, France
Dr Vadim Kamenetsky University of Tasmania	A new hot spot in cold suboceanic mantle belt at the Earth's equator: a study of rocks from the Romanche Fracture Zone (Atlantic Ocean).	Professor A Sobolev Max-Planck-Institute for Chemistry, Germany
Dr Cameron Kepert University of Sydney	Nanoporous magnetic materials.	Dr M Kurmoo Institut de Physique et Chimie des Matériaux de Strasbourg, France
Dr Sagiv Kolkovski CSIRO Fisheries, Western Australia	Development of microparticulated diets as replacement for live food for fish larvae.	Dr L Conceicao Universidade do Algrave, Portugal
Professor Eddie Leonardi University of New South Wales	Numerical modelling of solid/liquid phase change: transitions and interfaces.	Dr J F Baumard Université de Limoges, France
Dr Andrew McDonagh University of New South Wales	Electrochemical switching hyper-Raleigh scattering experiments.	Professor A Persoons University of Leuven, Belgium

Researcher	Project	Host institution
Dr David Miller James Cook University, Qld	Conservation of function of key homeobox genes in nervous system development using microarray and transgenic technology.	Professor H Reichert Universität Basel, Switzerland
Dr Dragomir Neshev Australian National University	Optical signal processing by spatial soliton arrays and nonlinear periodic structures.	Professor C Denz Westfälische Wilhelms - Universitat Münster, Germany
Dr Mark Peoples CSIRO Plant Industry, Canberra	Development of French-Australasian collaboration in the study and efficient management of nitrogen in agroecosystems.	Dr J J Drevon Institut National de la Recherche Agronomique, France
Dr Sergei Pisarevsky University of Western Australia	Mesoproterozoic palaeomagnetism of southern Sweden.	Associate Professor G Bylund Lund University, Sweden
Dr Burkard Polster Monash University, Victoria	Charting an atlas of sporadic links between finite geometries.	Professor H Van Maldeghem Universiteit Gent, Belgium
Dr Zdenko Rengel University of Western Australia	Measuring calcium fluxes into intact roots using microelectrodes.	Dr P Hinsinger Institut National de la Recherche Agronomique, France
Dr John Roberts University of New South Wales	Integrable maps over finite fields.	Dr F Vivaldi University of London, UK
Professor Claude Sammut University of New South Wales	Design of artificial intelligence in legged robots.	Professor P Blazevic Université de Versailles, France
Associate Professor Igor Shparlinski Macquarie University, NSW	Number theoretic pseudorandom number generators	Professor R Brent Oxford University, UK
Dr Robert Stamps University of Western Australia	High frequency dynamics in magnetic nanostructures.	Professor F Nizzoli University of Ferrara, Italy
Dr Martin Steinbauer CRC for Sustainable Production Forestry and CSIRO Entomology, Canberra	Role of primary metabolites on the surface of leaves upon the host selection behaviour of autumn gum moth.	Dr S Derridj Institut National de la Recherche Agronomique, France
Dr Heiko Timmers Australian Defence Force Academy, University of New South Wales, Canberra	Interactions of energetic ions in nanometer-scale materials technology.	Professor H Whitlow Lund University, Sweden
Dr Christopher Tisdell| University of Queensland	On the existence of solutions to difference equations.	Professor J Mawhin Université de Louvain, Belgium
Dr Erik Wapstra Macquarie University, NSW	Sexual and natural selection on MHC genotype in the sand lizard.	Associate Professor Olsson University of Gotenburg, Sweden
Dr Edeline Wentrup-Byrne Queensland University of Technology	Novel bioabsorbable, biocompatible membrane scaffolds for tissue engineering.	Professor F Schue Université Montpellier II, France
Dr Yao-zhong Zhang University of Queensland	Quantum groups and boundary integrable field theory.	Professor W Corrigan University of York, UK

Asia

China Exchange

Researcher	Project	Host institution in China
Dr Zheng Li University of Wollongong, NSW	Bilateral control of internet operators with variable time delay.	Professor Y Wang Chinese Academy of Sciences
Dr Jill Slay University of South Australia	Development of a culturally appropriate multimedia online learning environment for the teaching of tertiary mathematics and computing.	Professor X S Gao Chinese Academy of Sciences
Dr Susan Turner Queensland Museum	Early vertebrates in China and a new IGCP project on Chinese terranes.	Prof Z Min Chinese Academy of Sciences
Associate Professor Jingling Xue University of New South Wales	Compiler techniques for IA-64.	Professor Z Zhang Chinese Academy of Sciences
Dr Grant Zhu Central Queensland University	Collaborative research on *Stevia* for commercial production in Australia - Visiting *Stevia* production base in northeast China aiming to introduce this cash crop to Australia.	Dr N Zhu Chinese Academy of Sciences

Korea Exchange

Researcher	Project	Host institution in Korea
Dr Jorge Beltramini University of Queensland	Preparation and catalytic application of metal-supported mesoporous materials.	Dr S Y Jeong Korea Institute of Chemical Technology
Dr David Burgner Children's Hospital Medical Centre, University of Western Australia	An international collaborative study of genetic determinants of susceptibility and outcome in Kawasaki disease.	Professor Y Yun Seoul National University Children's Hospital
Dr Christopher Davis University of Melbourne	How data format affects interpretation, judgment and prediction.	Associate Professor J S Lim Sang Myung University

Taiwan Exchange

Researcher	Project	Host institution in Taiwan
Associate Professor Robert Flower Royal North Shore Hospital, Sydney	Variant antigens of the MNS blood group system: production and evaluation of monospecific polyclonal antibodies for phenotyping of red blood cells.	Dr M Lin Mackay Memorial Hospital
Dr Daphne Huang National Research Centre for Environmental Toxicology, Brisbane	1. The relationship of arsenic species in human samples and the genetic polymorphisms of glutathione S-transferases M1, T1 and P1. 2. The relationship between trace metal exposure and the incidence of diabetes.	Professor H I Chiou Taipei Medical University
Associate Professor Richard Huggins La Trobe University, Victoria	A non-parametric seasonal decomposition of population size of an open population using capture-recapture data.	Professor A Chao National Tsing Hua University
Dr Hemanshu Pota Australian Defence Force Academy, University of New South Wales, Canberra	Sensor and actuator placement for acoustical noise control in 3D environments.	Professor J Hu National Chiao-tung University
Dr Chi-hsiang Wang CSIRO Manufacturing and Infrastructure Technology (CMIT), Melbourne	Modelling and experimental validation of bi-axial beam-column hysteresis under dynamic loads.	Dr S Y Chang National Center for Research on Earthquake Engineering

Japan Society for the Promotion of Science bilateral programs

Researcher	Project	Host institution in Japan
Dr Sharon Allen University of Tasmania	A volcanological study on voluminous submarine pumiceous mass-flow deposits: characteristics and implications.	Professor K Kurokawa Niigata University
Dr Besim Ben-Nissan University of Technology, Sydney	Nanomechanics in biomaterials.	Professor G Pezzotti Kyoto Institute of Technology
Dr Walter Dunlap Australian Institute of Marine Science, Queensland	Marine biotechnlogy for anti-aging research: regulation of coenzyme Q redox balance by UV-extremophilic bacteria of the Great Barrier Reef.	Associate Professor Y Yamamoto University of Tokyo
Dr Gilles Guillemin St Vincent's Hospital, Sydney	Study of the ACMSDase expression in human astrocytes and microglia. Quinolinic acid effects on the human astrocyte gene expression.	Professor S I Fukuoka Kyoto University

Researcher	Project	Host institution in Japan
Professor Goen Ho Murdoch University, WA	Sustainable sanitation: collaborative research through exchanges and joint projects in eco-sanitation, including urine separation, technologies and management of black water and grey water.	Associate Professor O Takikawa Hokkaido University
Dr Joseph Hoh University of Sydney	Analysis of post-tetanic potentiation of skeletal muscle by synchrotron radiation.	Professor S Matsui Kyoto University
Dr Simon Lawson Queensland Forestry Research Institute	Assessing the risk posed by pine wilt disease to commercial *Pinus* species in Australia.	Dr M Yamaguchi Jikei University
Dr Robert Moon University of New South Wales	Mapping crack tip stress fields in graded composites.	Dr I Okochi Forestry and Forest Products Research Institute
Dr Ahmed Regina CSIRO Plant Industry, Canberra	Wheat genes in rice: production of novel starches by expression of starch branching enzyme IIb of wheat in amylose extender (ae) rice mutant.	Professor G Pezzotti Kyoto Institute of Technology
Dr Alan Richardson CSIRO Plant Industry, Canberra	Manipulation of the phytate composition of plants and its effect on the bio-availability of mineral nutrients: Implications for human and animal nutrition.	Dr Y Nakamura Akita Prefectural University Dr T Mimura Nara-Women's University
Dr Andrei Rode Australian National University	Femtosecond laser-induced 3D microstructuring of transparent dielectrics.	Professor H Misawa University of Tokushima
Dr Virginia Shepherd University of New South Wales	The role of the cell wall and cytoskeleton in plant responses to environmental stress.	Professor T Shimmen Himeji Institute of Technology
Professor Istvan Toth University of Queensland	A novel liposaccharide-based system for drug/peptide delivery through the blood-brain-barrier.	Professor Y Okada Kobe Gakuin University

Japan Society for the Promotion of Science Invitation Fellowship – short term

Researcher	Project	Host institution in Japan
Professor John Black University of New South Wales	Sustainable urban land-use, transport and environment: policies and system analysis.	Professor Y Hayashi Nagoya University
Dr Liang Cheng University of Western Australia	Stability of offshore pipeline due to wave-induced liquefaction.	Professor H Sekiguchi Kyoto University
Professor John Clement University of Melbourne	Quantitative 3D determination of age-related microstructural changes to the human teeth and jaws using very high resolution X-ray computer tomography.	Professor K Kawasaki Tsurumi University

Researcher	Project	Host institution in Japan
Professor Maxwell Crossley University of Sydney	Investigation of chemical models for aspects of photosynthesis - towards artificial photosynthesis.	Professor S Fukuzumi Osada University
Professor Clive Fraser University of Melbourne	High-resolution satellite imagery for geospatial information generation and topographic mapping.	Mr R Kojiroi Geographical Survey Institute
Professor Tony Milne University of New South Wales	Selection and validation of derived radar products from NASDA's Advanced Land Observing Satellite (ALOS) for terrestrial carbon and land cover analysis.	Dr T Ogawa National Space Development Agency of Japan
Professor Chris Rizos University of New South Wales	Development of an integrated GPS and pseudolite navigation system for high altitude platforms.	Dr M Harigae National Aerospace Laboratory
Dr Krishnakumar Shankar University of New South Wales	Simultaneous multi-directional digital speckle pattern interferometry.	Dr M Uchino Fukuoka Industrial Technology Center

Japan Society for the Promotion of Science Invitation Fellowship – long term

Researcher	Project	Host institution in Japan
Associate Professor Yurek Kulski Centre for Bioinformatics and Biological Computing, Murdoch University, WA	Comparative genome analysis of the major histocompatibility complex (MHC): structure, function, expression and evolution.	Professor H Inoko Tokai University

Japan Society for the Promotion of Science Postdoctoral Fellowship

Researcher	Project	Host institution in Japan
Dr Adil Asad University of Queensland	Role of boron in floral development in canola (*Brassica napus* L) and sunflower (*Helianthus annuus* L).	Dr T Matoh Kyoto University
Dr Jamie Case St George Hospital, Sydney	The effects of cytokines and chemokines on the transendothelial migration activity of bone marrow CD34 cells.	Professor C Shimazaki Kyoto Prefectural University of Medicine
Dr Gongfa Chen University of Southern Queensland	Non-linear finite element analysis of joint for advanced reinforced concrete structures.	Dr M Teshigawara Building Research Institute
Dr Alan Cornell University of Melbourne	Phenomenologies of extra-dimensional physics.	Professor T Tanaka Kyoto University

Researcher	Project	Host institution in Japan
Dr Daniel Dunkley Nagoya University, Japan	U-Pb geochronology of the Lutzow-Holm metamorphic complex, east Antarctica.	Professor Y Motoyoshi National Institute of Polar Research
Dr Timothy Farrell NSW Agriculture	Spikelet sterility in rice induced by low temperature and elevation CO2.	Dr M Okada National Agricultural Research Center for Tohoku Region
Dr Anthony Kiem University of Newcastle, NSW	Assessing the worth of climate variability insight for the Pacific-East Asian region.	Professor K Takeuchi Yamanashi University
Dr Mu Luo Curtin University of Technology, WA	Mapping complex fracture systems for a better reservoir characterisation.	Professor T Matsuoka Kyoto University
Dr Stephen McNabb Australian National University	The asymmetric synthesis of novel α-amino acids via environmentally benign radical reactions.	Professor T Naito Kobe Pharmaceutical University
Dr William McPhee University of Queensland	Synthesis and characterisation of high quality solid electrolyte with nano-domain/lattice interface.	Dr T Mori National Institute for Materials Science
Dr Jeremy Preston La Trobe University, Victoria	Identification of transcription factor genes and CIS regulatory elements involved in dormancy in *Arabidopsis*.	Dr Y Kamiya Institute of Physical and Chemical Research
Dr Mark Rogers Monash University, Victoria	Executive control of attention and cognition in schizophrenia and depression.	Professor N Kato University of Tokyo
Dr David Ross University of Adelaide	Gasification of wood biomass in a circulating fluidised bed gasifier.	Professor M Horio Tokyo University of Agriculture and Technology
Dr Scott Rowan University of Queensland	Comparative study of scramjet testing in a shock tunnel and in flight.	Dr K Itoh National Aerospace Laboratory
Dr Ilkunur Tulunay University of Sydney	Kloosterman sums and representations of finite groups of Lie type.	Professor K I Shinoda Sophia University
Dr Krishna Uprety University of Wollongong, NSW	Growth and characterisation of pure and heavily lead doped Bi2212 thin films. A study of vortex pinning behaviour in pure and heavily lead doped Bi2212 thin film.	Professor T Matsushita Kyushu Institute of Technology
Dr Stephanie Wallace NSW Environmental Protection Authority	The effects of wave and current climates on seagrass meadow restoration.	K Furukawa National Institute for Land and Infrastructure Management
Dr Stuart Yates University of Adelaide	Investigating properties of non-Abelian discrete magnetic Laplacians.	Professor T Sunada Tohoku University
Dr Renfu Shao University of Queensland	Sequencing mitochondrial genomes of hemipteroid species	Professor Masahito Fukunaga Fukuyama University

North America

Researcher	Project	Host institution
Dr Gavin Begg James Cook University, Qld	Evaluation of stock assessment models for data-poor pelagic fisheries.	Dr S Murawski National Marine Fisheries Service, USA
Dr Hubert Chanson University of Queensland	A basic study of mixing and dispersion in estuarine zones.	Dr S Gaskin McGill University, Canada
Dr Shin-ho Chung Australian National University	Theoretical investigations on ionic channels of excitable membranes.	Professor S Altman Yale University, USA
Associate Professor Geoffrey Dobson James Cook University, Qld	Role of adenosine and lignocaine to arrest, protect and preserve the heart during open-heart surgery.	Professor J Vinten-Johnson Emory University, USA
Dr William Foley Australian National University	Near-infrared spectroscopy for predicting herbivore foraging and range management.	Professor J Stuth Texas A&M University, USA
Associate Professor Robin Gasser University of Melbourne	Novel approaches for the control of parasites via functional genomics in *Caenorhabditis elegans.*	Associate Professor T Blackwell Harvard Medical School, USA
Dr Christopher Grof CSIRO Plant Industry, Queensland	Characterisation of novel sugarcane transporters using heterologous expression systems.	Dr J Ward University of Minnesota, USA
Dr Wieslaw Krolikowski Australian National University	Spatial structures and solitons in second harmonic generation.	Dr M Saffman University of Wisconsin-Madison, USA
Dr Prakash Lakshmanan Bureau of Sugar Experiment Stations, Queensland	Development of plastid transformation technology for biofactory and crop improvement research in sugarcane and other crops.	Professor H Daniell University of Central Florida, USA
Dr Geraint Lewis University of Sydney	Uncovering the hidden history of the universe.	Dr G Helou California Institute of Technology, USA
Dr Paul Norbury University of Melbourne	Morse theory methods in the study of minimal surfaces.	Professor J Hass University of California, USA
Dr Jairo Palta CSIRO Plant Industry, WA	Meeting the market for high-yielding wheat with large grain size and high protein content.	Dr R Trethowan CIMMYT, Mexico
Dr Jacqueline Phillips Murdoch University, WA	A molecular and functional analysis of the cellular mechanisms underlying altered neuronal function during hypertension.	Dr J Stern Wright State University, USA
Professor Peter Robinson University of Sydney	Quantitative brain dynamics.	Professor S Bressler Florida Atlantic University, USA
Dr Maitreyee Roy University of Sydney	Novel optical techniques for nano-metrology.	Dr C Grover National Research Council, Canada

Researcher	Project	Host institution
Associate Professor Paul Southgate James Cook University, Qld	Developing culture and pearl production methods for winged pearl oysters (*Pteria* spp.).	Dr H Colmenares Centro de Investigaciones Biologicas del Noroeste, Mexico
Dr Xiaolin Wang University of Wollongong, NSW	Fabrication and investigation of metal sheathed magnesium diboride superconducting wires using novel method and nano-particle inclusions.	Dr E Collings Ohio State University, USA
Dr Ying-ping Wang CSIRO Atmospheric Research, Melbourne	Evaluate and enhance Australian model-data fusion techniques by applying them to comprehensive data and process information collected for USA ecosystems.	Professor C Field Carnegie Institution of Washington, USA

Lectures and medals – 2003

Central to the purposes of the Academy is the encouragement of excellence in science. Awards for distinguished research are made to younger researchers, under the age of 40, and to senior researchers for contributions made during their working lives.

Senior award recipients

The Burnet Medal and Lecture for research in the biological sciences.

Awarded to Professor Barry Marshall, University of Western Australia, for research on the bacterium *Helicobacter pylori.*

The David Craig Medal for research in chemistry.

Awarded to Professor Michael Bruce, University of Adelaide, for research in organometallic chemistry.

The Haddon Forrester King Medal for research in mineral exploration.

Awarded to Professor Ken McCracken, consultant, for contributions to the exploration industry.

The Ian William Wark Medal and Lecture for applied research.

Awarded to Professor Graeme Jameson, University of Newcastle, for research in fluid and particle mechanics.

The Jaeger Medal for research in the Earth sciences.

Awarded to Professor Andrew Gleadow, University of Melbourne, for research in the development of fission track thermochronology as a tool for geological dating and thermal history analysis.

The Lyle Medal for research in mathematics or physics.

Awarded to Professor George Dracoulis, Australian National University, for research on the structure of atomic nuclei.

More information on awards is available at www.science.org.au/awards/awards.htm.

Junior award recipients

The Dorothy Hill Award for research by a female in the Earth sciences.

Awarded to Dr Katherine Trinajstic, University of Western Australia, for research in palaeontology.

The Fenner Medal for research in biology, excluding the biomedical sciences.

Awarded to Dr Andrew Young, CSIRO Plant Industry, for research in plant population genetics and work on the impacts of small population size on self-incompatible plants.

The Frederick White Prize for research in the physical, terrestrial and planetary sciences.

Awarded to Dr Leon Rotstayn, CSIRO Atmospheric Research, for his role in the development and advancement of global climate models.

The Gottschalk Medal for research in the medical sciences.

Awarded to Associate Professor Levon Khachigian, University of New South Wales, for research in the area of vascular biology.

The Moran Medal for research in statistics.

Awarded to Dr Nigel Bean, University of Adelaide, for research in applied probability.

The Pawsey Medal for research in physics.

Awarded to Dr Howard Wiseman, Griffith University, for research in theoretical and experimental quantum optics.

Research support and lectureships

The Academy provides funding for the support of individual research projects and for lectureships. The purpose of the lectureships is to enable distinguished researchers to communicate with Australian researchers and, through public lectures, to a broader audience.

The Fund for the Conservation of Endangered Vertebrate Species supports research on endangered Australian vertebrate species.

- Dr Alistair Glen, University of Sydney, for research on competitive and predatory effects of the red fox on the spotted-tailed quoll.
- Dr Andrea Taylor, Monash University, for research on genetic marker studies of the Leadbeater's possum.
- Professor Ross Crozier, James Cook University, for research on conservation genetics and ecology of the Gouldian finch.
- Dr Mark Eldridge, Macquarie University, for research on adaptive genetic variation in Australian island macropod populations.

The Maxwell Ralph Jacobs Awards support projects in forestry research.

- Mr Philip Alcorn, Australian National University, for attendance at the International Union of Forest Research Organisations' conference 'Uneven-aged Forest Management: Alternative Forms, Practices and Constraints'.
- Ms Natalie Kelly, University of Melbourne, for assistance with costs associated with studying the application of mathematical modelling techniques to the quantification of the comparison between young *Eucalyptus regnans* crowns.

The J G Russell Awards support young researchers in basic science.

- Dr Colin Clifford, University of Sydney, for research on face perception.
- Dr Darryn Bryant, University of Queensland, for research on mutagenesis and combinatorial algorithms for sequencing problematic genomic regions.
- Dr Kliti Grice, Curtin University, for research on stable carbon and hydrogen isotope signatures of chemical fossils to infer palaeoenvironmental change.

The Selby Fellowships are awarded to overseas scientists to visit scientific centres in Australia and to deliver lectures.

- Dr Leonard Smith, University of Oxford. Dr Smith visited Canberra, Melbourne, Brisbane, Sydney, Hobart, Perth and Darwin from 26 June-19 August 2002 and gave public lectures on 'Science as uncertainty: from fractals in forecasting to chaos in climate change' and collaborated with scientific colleagues at each of the venues.

The Kanagawa Museum of Natural History Award supports research on the Precambrian history of life in Western Australia.

- Dr Paul Hearty, James Cook University, for research on coastal sedimentary dynamics in the Shark Bay region.
- Dr Brendan Burns, University of New South Wales, for research on survival strategies and dynamics of stromatolite-associated microbial populations at Hamelin Pool.

The Lloyd Rees Lecture supports distinguished researchers in chemical physics.

- Professor David Cockayne, University of Oxford. Professor Cockayne delivered a lecture, 'Exploring the nanoworld – adventure or investment', at the Wark Laboratory Lecture Theatre, CSIRO Molecular Science and Forestry and Forest Products, Victoria on 26 September 2002.

Research conferences

The Academy supports research conferences which are organised by scientific societies to bring together researchers at the forefront of particular subjects to discuss the future of their field.

The Boden Research Conferences support researchers in the biological sciences.

- The Australian Society for Biophysics, the Australian Society of Plant Physiologists, and the Australian Society for Biochemistry and Molecular Biology; for a conference on 'Artificial Photosynthesis', held at the Manly Pacific Parkroyal, Sydney. 9-11 January, 2003.

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Science education and public awareness

The Academy this year formalised its long involvement in science education and public awareness by creating a new position of Secretary (Education and Public Awareness) on Council. The first person to hold this position is Professor John McKenzie, Dean of the Faculty of Science and Professor of Genetics at the University of Melbourne.

More information on science education is available at www.science.org.au/scied.

The Academy is committed to promoting science education, both as a contribution to informed citizenship and to encourage our young people to prepare themselves for careers based on science and technology. To this end, we have contributed to the formulation of policy for science education and prepared teaching resources for all levels of school science. The following is an overview of our current activities.

Primary Investigations

www.science.org.au/pi

Primary Investigations is the Academy's science and technology program for primary schools. The program is designed to stimulate hands-on, enquiry-based learning and consists of teacher resource books, student books, inservice training for teachers, a 'do-it-yourself ' inservice video and workbook, and a website.

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In 2001 the Australian Foundation for Science and the Commonwealth Department of Education, Science and Training provided funding for an evaluation of *Primary Investigations*. Dr Peter Aubusson from the University of Technology, Sydney, carried out the evaluation. Completed in July, the evaluation concluded that *Primary Investigations* has made a significant positive contribution to primary science education in Australia. The major recommendation is that the program be revised to further build on its success.

Nova: Science in the news

From left: Amy Pryor, Neville Fletcher, Don Aitkin (Chair of NRMA-ACT Road Safety Trust) and Maureen Swanage celebrating *Nova's* fifth birthday.

www.science.org.au/nova

In May 2002, the Academy celebrated the fifth anniversary of the launch of its educational website, *Nova: Science in the news. Nova* is held in high regard by teachers and students and continues to grow in popularity. A major drawcard regularly cited by users is the Academy's guarantee that information on the

site is accurate and up-to-date.

In November, the Academy completed the final *Nova* topic in a technology and innovation series funded by the National Innovation Awareness Strategy of the Commonwealth Department of Education, Science and Training.

The ten topics in the series (four of which were part-funded by the CRC for Advanced Composite Structures, the Defence Science and Technology Organisation, the National Standards Commission, and the Victorian Department of Innovation, Industry and Regional Development) illustrate the diversity of technical applications in Australia – from synchrotrons to hydrogen cars.

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Each *Nova* topic has key text,

John McKenzie, left, with teachers at Science at the Shine Dome, 2002.

supplementary information on Australian research and applications, a glossary of terms, activities, further reading and links to other websites. Professor John McKenzie presented an overview of the technology topics at the annual general meeting of the Australian Foundation for Science.

A new topic on the site is 'Driver fatigue – an accident waiting to happen'. This is the sixth topic in a series on road safety sponsored by the NRMA–ACT Road Safety Trust. Telstra is the principal sponsor of *Nova*.

Video biographies

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www.science.org.au/scientists

The Academy established this ongoing series of interviews with outstanding Australian scientists in 1993. In the interviews scientists talk about their early life, the development of their interest in science, their research work, and other aspects of their careers.

To date, 80 interviews have been completed. Edited transcripts of the interviews, together with accompanying teachers notes, are being added progressively to the Academy's website.

From left: Jim Peacock, Frank Fenner (winner of the 2002 Prime Minister's Science Prize) and Ruth Dircks at the award ceremony.

The project has been supported by Professor Frank Fenner, the Commonwealth Government, the National Council for the Centenary of Federation, the Mazda Foundation, and most recently by the Australian Research Council. The funding from the Australian Research Council enabled interviews with 20 outstanding young researchers to be filmed, and for edited transcripts of the interviews to be added to the Academy's website together with accompanying teachers notes. This project has now been completed.

All interviews in the series are available for purchase from the Academy or for loan through the National Film and Video Lending Service (www.acmi.net.au).

Ethnomathematics project

The Academy's contract with the US-based Pacific Resources for Education and Learning (PREL) to assist in developing an ethnomathematics digital library has continued this year. The digital library provides users with a readily accessible source of documents describing the mathematics created and used by indigenous cultures around the world.

The Academy's responsibility has involved locating documents which relate to Aboriginal mathematics. Initially, appropriate material available on the internet was selected and entered into PREL's database. The Academy is now working with the Australian Institute for Aboriginal and Torres Strait Islander Studies in the selection and digitising of relevant printed material from their library.

Support for young researchers and science teachers

Teachers and early-career researchers from around Australia attended special programs during the Academy's *Science at the Shine Dome* from 1 to 3 May 2002. They joined Academy Fellows at the New Fellows Seminar, awards presentation, annual dinner and the Annual Symposium, 'Transition to Sustainability'.

The Academy sponsored awards for a teacher from each state and territory to attend and, for the fifth year, the state, Catholic and independent school systems in every state and territory sponsored classroom science teachers and curriculum officers to attend. The teachers program included an education workshop at which Professor Barry Osmond was the guest speaker. The workshop also covered innovative teaching methods related to the Annual Symposium topic of sustainability.

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The Australian Research Council and the Academy each sponsored three awards enabling researchers aged 35 and under to attend *Science at the Shine Dome*. Research organisations also sponsored one or two of their best young researchers to attend. The early-career researchers' program included a workshop on career development which discussed media and communication skills, writing grant proposals and commercialising research.

Both the teachers and early-career researchers responded positively to participating in the events.

Science education assessment resources

The Academy has been actively involved in a number of national school science programs. Fellows of the Academy are involved in reviewing the scientific accuracy of this material.

The Collaborative Australian Secondary Science Project, managed by Curriculum Corporation, is developing a professional development program and a set of classroom resources which aim to change the way teachers teach junior secondary science. The project has been trialled in 28 schools across Australia.

The Science Education Assessment Resources Project is developing an online assessment resource bank which aims to improve the quality of science assessment for students up to Year 10.

The Primary Science Assessment Project is developing a set of performance assessment items in science for Year 6 students.

Prime Minister's Prize for Excellence in Science Teaching

The Academy was pleased that the importance of science education in primary and secondary schools was recognised in 2002 by the establishment of science teaching awards, presented in conjunction with the Prime Minister's Science Prize.

The symposium proceedings are available at www.science.org.au/proceedings.

An associate of the Academy, Ms Ruth Dircks, won the inaugural Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools. Ruth began her association with the Academy in 1981 during the production of the third edition of the Academy's landmark biology text, *The Web of Life*. She continued to work with the Academy as project director of two further Academy texts, *Disease and Society* and *Biology: The Common Threads*. In 1990 Ruth was awarded a Medal of the Order of Australia for her contributions to science education. She is currently teaching at Dungog High School in New South Wales.

Education policy

The Commonwealth government is conducting a review of teaching and teacher education and is particularly looking for strategies to attract and retain teachers of science, technology and mathematics. The Academy made a submission to the Department of Education, Science and Training in response to their discussion paper 'How to attract and retain teachers of science, technology and mathematics?'

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In the submission, Professor John McKenzie stated that professional, well-educated and excellently resourced and supported teachers of science, technology and mathematics are critical to a future that is secure, prosperous and sustainable.

The submission also made the point that a high-quality teaching workforce should be a national priority, with the presence of an inspiring, high-quality teacher in the classroom being the single most important factor in improving student achievement in, and enjoyment of, primary and secondary school. A key issue is the resourcing of teachers as professionals, including the physical conditions within school laboratories, technical support, appropriate class size, in-service training and the opportunity for professional development.

The Academy's submission made a number of proposals for attracting people to careers in teaching science, technology and mathematics, and retaining teachers. It also suggested national collaboration in curriculum resources, assessment and professional development. The submission expressed concern at the shortage of well-qualified teachers in the enabling sciences of mathematics, physics and chemistry.

The full submission is available at www.science.org.au/academy/media/4octobero2.

Population and Environment Research Fund

The Steering Committee of the Academy's Population and Environment Research Fund has accepted a review of population and environment research and opinion in Australia. Dr Colin Butler, a medical practitioner who has also completed a PhD at the National Centre for Epidemiology and Population Health at the Australian National University, conducted the review.

The paper will form the basis for discussion in an internet conference being conducted by the Academy. The National Academies Forum is funding the conference, which will seek to engage researchers from the various disciplines involved in the debate.

Geoff Garrett looks on as Jim Peacock signs the agreement with CSIRO.

The members of the Steering Committee are Dr Stephen Boyden, formerly of the Australian National University; Dr Doug Cocks, from CSIRO Sustainable Ecosystems; Professor Frank Fenner, from the Australian National University; Professor Tony McMichael, Director of the National Centre for Epidemiology and Population Health at the Australian National University; and Professor Henry Nix, from the Centre for Resource and Environmental Studies at the Australian National University.

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Public events

Annual Symposium 2002 – 'Transition to Sustainability'

The Academy's 2002 Annual Symposium – 'Transition to Sustainability' – was held on 3 May 2002 as part of the *Science at the Shine Dome* events. Convened by Dr Graeme Pearman, the symposium canvassed different views of sustainability and how it might come into being. The Chief Executive of the Cooperative Research Centre for Freshwater Ecology in Canberra, Professor Peter Cullen, explored how knowledge needed to be managed to gain acceptance of scientific solutions to problems of sustainability. An environmental economist with CSIRO Land and Water in Adelaide, Mr Mike Young, took an economic view of natural resources and suggested some policies to encourage sustainability. The Commonwealth government's Chief Scientist, Dr Robin Batterham, spoke about the importance of science, technology and scientific literacy to define the trade-offs that will bring about sustainability. At the end of the symposium, a blueprint for sustainability science was presented and aroused lively discussion.

Science lectures for senior citizens

Eight science lectures for senior citizens, funded by a grant from the ACT Office of Training and Adult Education, were run in conjunction with Woden Senior Citizens Club in Canberra. The lectures were very well received. Professor Neville Fletcher and Professor Ross Taylor featured as guest lecturers in the program.

National Science Week

The Academy was active during National Science Week in August. The Shine Dome was the venue for a number of activities for the Australian Science Festival and the Academy presented 'Australian Science Stories', highlighting the video biographies project with a selection of video interviews with scientists.

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National Youth Science Forum

The National Youth Science Forum again held the opening lectures of their two sessions in the Shine Dome. The Academy also provided expertise on the mock interview panels for the students and Professor Sue Serjeantson was the guest speaker at one of the dinners.

Historical Records of Australian Science

After having published *Historical Records of Australian Science* since 1980 (and its predecessor, *Records of the Australian Academy of Science*, since 1966), the Academy entered into a new arrangement with CSIRO Publishing in 2002.

Editorial responsibility remains with the Academy, through the editor of the journal, Professor Rod Home, and the Editorial Board. CSIRO Publishing is responsible for production, sales and distribution. In consultation with the Academy, CSIRO Publishing has redesigned the cover and layout of the journal.

After four years as Chairman of the Editorial Board, Professor Ross Day retired in 2002. The new Chairman is Professor David Curtis.

Australian Journals of Scientific Research

The signing of a new agreement with CSIRO to publish the Australian Journals of Scientific Research took place in Canberra on 11 December. Dr Geoff Garrett, CSIRO Chief Executive, and Dr Jim Peacock co-signed the agreement prior to a lunch for Academy Council members and other guests.

This agreement is the fourth such between CSIRO and the Academy. It will be effective for five years.

Dr Hugh Tyndale-Biscoe, the Chair of the Board of Standards of the Australian Journals of Scientific Research and the Academy's representative on the Board of CSIRO Publishing, saw the new agreement through to its signing. He retired from these positions at the end of 2002 and was replaced by Professor Marilyn Renfree.

Adolph Basser Library

Professor Frank Fenner has been a regular visitor to the library over the past year, spending a considerable amount of time sorting and rearranging his large manuscript collection, as well as that of his father, Charles Fenner. Now that these tasks have been completed Professor Fenner has started to update his history of the Academy. First published in 1979 to celebrate the Academy's 25th anniversary, and then updated in 1994, this new edition will be published at the end of 2004 to mark the Academy's golden jubilee year.

Bernhard Neumann, who died in October 2002, willed his correspondence to the library. The papers will be added to his already large collection, the contents of which are listed on the Academy's website (www.science.org.au/academy/basser/bass_lis.htm).