AUSTRALIAN ACADEMY OF SCIENCE

NEWSLETTER

July–September 1997 Number 37

Commonwealth environment powers inconsistent

In a submission to the Senate Inquiry into Commonwealth Environment Powers, the Academy of Science has argued that there is little apparent consistency and logic attached to the way the system is structured. The Senate Environment, Recreation, Communications and the Arts References Committee is examining, among other things, the most appropriate balance of powers and responsibilities between Commonwealth, state and local governments.

While the Academy recognised that the Australian federation is a dynamic institution and that relationships change with elections, the Commonwealth's powers in environmental protection and ecologically sustainable development should be explicit. Commonwealth activity was usually triggered by the need to make an urgent decision on a development rather than systematically applying national principles.

The submission, prepared by the National Committee for the Environment, suggested that different responsibilities be allocated to different tiers of government. One tier of government should have responsibility for the final decision. Where two levels of government had to be involved, a process for avoiding duplication of decision-making should be agreed.

The National Environment Protection Council, a council of governments, could help gain national agreement, national standards and protocols. The Interim Biogeographical Regionalisation of Australia (a set of data on 80 land regions and a smaller number of marine environments) and the Intergovernmental Agreement on the Environment could also help clarify the role of the Commonwealth.

The submission argued that terms such as *national interest* and *national significance* needed to be clearly defined. The listings on the Register of the National Estate should be reassessed against these definitions. 'It is felt that many listings are not truly of national significance, whereas some areas of national significance are not listed,' the submission stated.

Environmental impact assessments were almost always inadequate because of the lack of a requirement to assess the cumulative impacts of a number of developments and because there was little assessment of projects in operation. Meaningful and comprehensive monitoring of a project required sufficient time.

The submission stated that the Commonwealth Government should lead by example in its own operations and assist and reward the best performance by others. Also, the Commonwealth should replace its Expenditure Review Committee with a Sustainable Development Review Committee, so that economic decisions were assessed for ecological sustainability.

Zinkernagel signs Charter Book

The Nobel Laureate and Corresponding Member of the Academy, Professor Rolf Zinkernagel, pictured second from left, signed the Academy's Charter Book on 17 June 1997. Professor Zinkernagel was visiting Australia from Switzerland. He is pictured with his former colleagues from the John Curtin School of Medical Research at the Australian National University, Professor Frank Fenner, left, Professor Bob Blanden and Professor Gordon Ada.

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

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

Printed by Inprint, Brisbane.

ISSN 1031-9204

Print Post Approved PP 255003/00025

Stocker report welcomed

The Academy of Science welcomed the report, *Priority Matters*, issued by the Chief Scientist, Professor John Stocker, in June, because it points to the importance of science and technology for the future prosperity of this country.

In a news statement the Academy's Science Policy Secretary, Professor John White, said, 'Australia must either use technological innovation to create new industries or accept lower living standards as other economies move ahead of us.'

The Academy welcomed the emphasis on diversity of advice structures in the report. At the highest level, the Prime Minister's Science and Engineering Council, the Australian Science and Technology Council (ASTEC) and the Coordination Committee on Science and Technology would be brought together under the Chief Scientist; a Cabinet committee is proposed for science and technology. The Academy recommended that this be a separate committee of Cabinet with the Minister for Science and Technology as a member.

Diversity in departmental science and technology advisory structures would also be retained, as would the separate missions of the government research agencies, CSIRO, the Australian Nuclear Science and Technology Organisation and the Australian Institute of Marine Science.

The Academy welcomed the praise given to the Cooperative Research Centre scheme and endorsed Professor Stocker's emphasis on the 'legitimate place for public good centres such as the Antarctic Research Cooperative Research Centre'.

The report points out ways to improve Australia's priority setting for science and technology. It clearly states the need to identify goals for science and technology and to formulate an explicit industry policy.

Professor White said that new policy-development structures based on Professor Stocker's proposals were needed urgently. These structures offered the opportunity for the Academies, the Institution of Engineers and the Federation of Australian Scientific and Technological Societies to work on a coherent policy for science and industry.

The gaps recognised in the report could be seen as opportunities for policy development. Some examples are:

- *Higher education policy*. The serious need for concentrations of major research infrastructure is addressed and referred, with other concerns, to the West Committee's review of higher education. Professor White said, 'The Academy believes that it is vital for the West Committee to take notice of this important analysis. The resolution of these problems is of the greatest importance for basic science's contribution to Australia's future.'
- *Environment and sustainable development*. The economic and political necessity of a policy for sustainability in Australia is underlined and is the basis of a major recommendation.
- *Marine science*. Australia has taken on new responsibilities in this area. The Academy welcomed the emphasis on a need for much underlying research, as well as care in the collection and use of data. Professor Stocker recognised that research must not be limited to subjects with economic pay-offs, and research resources should not be cut because of efficiency gains.
- *International science and technology links*. The Academy welcomed the strong points made under this heading. Firstly, Australia does not have a monopoly of ideas. The recent work of Bourke and Butler, and the Academy's analysis of the decline in the impact of Australian science publications, point to the need for strong international links and collaboration between researchers.

  Secondly, the Stocker report emphasises the need for coordination of Australia's access to major international facilities. The Academy supported the examination of existing arrangements being undertaken by the Coordination Committee on Science and Technology.

Marine science plan

In 1995 the Prime Minister's Science and Engineering Council produced a report on science and technology for managing Australia's ocean territory. Since then, the Marine Science and Technology Working Group of the Commonwealth Department of Industry, Science and Tourism has produced a document entitled, *The proposed scope of Australia's marine science and technology plan*.

The Academy of Science and the Academy of Technological Sciences and Engineering have made a joint submission on the proposed plan. The Academies state that marine science and technology are a diverse but small part of the national effort, historically underdeveloped. They say the marine science plan needs to show how obstacles will be overcome so that marine science contributes to the achievement of policy goals, especially those of the oceans policy that is being prepared at the same time.

The Academies' submission addresses a number of issues:

- major work programs. This proposal would facilitate the recognition of opportunities and gaps across organisations.
- international links. As a small player, Australia has more to gain from joining international research programs than from going alone.
- coordination, advisory and evaluation mechanisms. States and universities must be embraced, the Academies could also be useful.
- infrastructure. The adequate description of Australia's large ocean territory will require a fleet of vessels with a range of capabilities.
- management of marine data. Data should have a unified national framework, wide accessibility and compatibility with international sources of data.
- funding. The plan should propose a broad-based scheme for marine science and technology grants, crossing over disciplines and covering real infrastructure costs.
- skills. The narrow structure of academic training will need to be broadened.
- international markets. Other countries have national strategies to aggressively market expertise around the world; Australia should not be too complacent.
- promotion. The public and governments will need to see a closer connection between hard science and real applications.

Forum on uni curriculum

The National Academies' Forum and the Higher Education Council held a seminar on the undergraduate curriculum in Canberra on 6 and 7 July 1997.

Participants came from the sciences, engineering, technology, the humanities and the social sciences. Professor Bruce McKellar, Dean of the Faculty of Science at the University of Melbourne, represented the Academy of Science at the seminar.

The discussion was wide-ranging and no conclusions were reached but a number of unifying themes emerged:

- the lack of a systematic approach to curriculum development and evaluation in the higher education system
- the extent to which the different courses offered in higher education institutions have, or have not, adapted to the dramatically increased proportion of the population undertaking higher education
- the need for an emphasis on learning rather than teaching and, in particular, the adoption of a problem-based or a contextual approach to the curriculum. This highlights the integration and use of knowledge rather than its compartmentalisation into disciplines.

Professor McKellar reported, 'It was generally regarded that the diversity of the group gave a useful depth to the discussion and that similar meetings should be held in the future.'

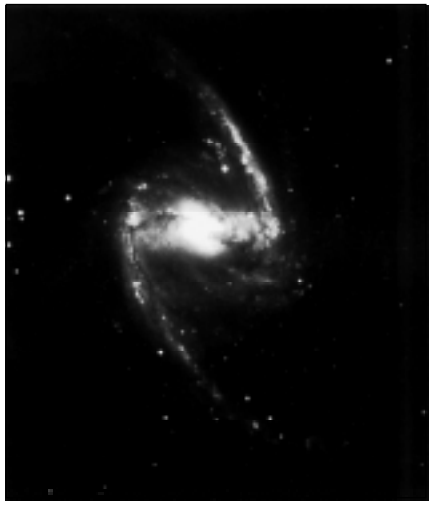
The National Academies' Forum is made up of the Australian Academy of Science, the Australian Academy of the Humanities, the Academy of the Social Sciences in Australia and the Australian Academy of Technological Sciences and Engineering.

Support for Gemini telescope

The President of the Academy, Sir Gustav Nossal, has written to the Minister for Employment, Education, Training and Youth Affairs, Senator Amanda Vanstone, to indicate the Academy's strong support for the proposal for Australia to join the International Gemini Project.

The project has been established by an international consortium which plans to build two eight-metre telescopes, one in Hawaii and the other in Chile.

Sir Gustav pointed out that for Australia to maintain its leading position in astronomy, Australian astronomers need access to world-class telescopes. The international project offered the chance to share capital and running costs. He said the opportunity was good value for money.



Astronomy today

The Academy's National Committee for Astronomy has produced a colourful and readable booklet, Astronomy today, describing the activities of Australian astronomers and how astronomy connects with other fields of science and technology. The booklet is illustrated with photographs of stars, galaxies and telescopes. Copies are available by emailing ***ns@science.org.au****.*

The photograph, by David Malin at the Anglo-Australian Observatory, shows the spiral galaxy NGC 1365.

The rewards and risks of research

In June 1997, CSIRO released a survey of public interest in science, showing that Australians have a strong interest in science.

The Academy's Science Policy Secretary, Professor John White, said that the comparison with public interest in sport was favourable, showing that people see the potential for future miracles and regard science highly, particularly in the medical field. 'On the other side, there was concern for the possibility of unintended consequences that might flow from the research,' he said.

'The Academy of Science shares the positive expectations and would wish to play its part in meeting the concerns by promoting informed discussion and presenting policy options.'

In 1974, when scientists' ability to manipulate genes was very limited, the Academy established a committee to explore the risks and to bring them to the attention of governments. The committee worked with colleagues overseas and consulted widely in Australia before recommending that the Federal Government should establish an official committee to monitor DNA work. This later became the Genetic Manipulation Advisory Committee, through which the Commonwealth oversees genetic research. Australia now has a leading position in genetic research and major investments are being made in it.

Professor White said that recent developments in the technology of cloning whole animals opened up many scientific and commercial opportunities but also a fresh round of concerns about the use of this technology. The Academy is gathering advice on the scientific basis, the technology and, to some extent, the ethical questions raised by these methods.

'There is no simple way of arriving at a balance between the risks and rewards of research such as this,' said Professor White. 'To do so requires hard work and the involvement of many different kinds of experts so that the public may have confidence in the way research and the exploitation of research are regulated. The Academy is willing to play its part in achieving this necessary goal.'

Challenge for 1998 Budget

Following the Federal Budget on 13 May 1997, the Academy of Science challenged the Federal Government to build next year on the steady-state 1997 Budget.

The Academy's science policy spokesman, Professor John White, said,

'The government, through its science and technology budget, has created anticipation of the positive changes that might flow from the reviews that it has begun. The positive qualities of the present budget are welcomed by the Academy but there is a sense that we are in a holding pattern. Whilst this is a relief to some, imaginative incentives for education, science and technology are awaited in the 1998 budget.'

Starting from the measures in the 1997 Budget, he said that the Academy would welcome developments:

- in higher education policy, such as a matching contribution by the government in the later years of this decade for the enormous private investment that will flow in from the Higher Education Contribution Scheme, overseas and local student fees, and other sources. This would facilitate the expected diversification of tertiary institutions and correct the very negative signals implied in the present forward estimates which show a continued decline. Additional support to the Australian Research Council and the National Health and Medical Research Council was applauded, but research support and infrastructure funds are urgently needed.
- in industry policy, such as strengthening the factor (f) and related schemes to encourage Australian industry to draw graduates from our excellent education system into productive contributions to the economy. Professor White said the Academy awaited the detailed figures on the replacement for the factor (f) scheme.
- in the Cooperative Research Centre program, to give long-term hope to those interested in the exploitation of Australian basic scientific ideas. The Academy expressed concern that the foreshadowed review of Cooperative Research Centres should not be solely directed to how much money can be harvested from them in the short term. Other aspects of the long-term public good of bringing closer cooperation between universities, government agencies and industry should receive due weight and be explicit in the terms of reference.
- in business, leading to a vigorous application of the newly created small business development fund.

The Academy welcomed the establishment of the Federation Fund as an inspiring idea which should not only contribute to the general good (as through the Australian Museum) but should also open the way for major initiatives in scientific infrastructure and national development.

Professor White also noted that there appeared to be a number of negative indications, such as those in the forward look at the health research budget. The changes between previous years, current allocations and forward estimates need to be clarified.

Taxing PhD scholarships

The Academy of Science has urged the Federal Government to amend legislation imposing tax on PhD scholarships. The Bill is currently before Parliament.

The Secretary, Science Policy, Professor John White, has written to the Treasurer, Mr Peter Costello, warning that taxing postgraduate scholarships would strike a damaging blow to the fragile process of recruiting students into research. Given that universities are already trying to adapt to 1996 Budget cuts and unfunded salary increases, the new tax would cause dismay in the whole scientific community.

'The psychological effect at this moment on the scientific community, including the students, would be out of all proportion to the funds recouped by the government,' Professor White wrote.

Lower secondary school science

The Academy is exploring practical ways of improving science education at the lower secondary school level. The first step has been a review of research literature conducted by Dr Richard Gunstone, from the Centre for Science, Mathematics and Technology Education at Monash University in Melbourne.

Now three state education departments are undertaking small-scale qualitative studies, each involving about 12 teachers. The departments – New South Wales, Queensland and Western Australia – are each paired with a science education faculty – the University of Western Sydney, Queensland University of Technology and Edith Cowan University, respectively.

The project is supported by a grant from the Australian Research Council.

Supported by the Australian Foundation for Science

Foundation membership

The Academy of Science has received pledges of $3 681 104, with contributors recognised through membership of the Australian Foundation for Science. To date, $2 621 604 has been received. The Foundation has 259 supporters, comprising 144 Fellows, 24 other individuals, 24 scientific societies, 20 corporations, 10 trade associations and 37 other institutions. Membership levels show 4 Patrons, 13 Governors, 17 Trustees, 73 Members, 132 Donors, 16 Sponsors and 4 Friends.

The Foundation welcomes the following new supporters:

Mr James Chan, Dr Richard Cotton, Dr Bill Denholm and Mrs P Denholm, Dr Pavel Grossman and Mrs A Grossman, Mrs Barbara Hardy, and Professor Robert Leckey and Mrs M Leckey.

Luke Mouatt, left, Aaron Densig and Lucas Morgan of Wallerawang Public School in New South Wales conduct a survey of the schoolyard ecosystem as part of Primary Investigations. *Photo by Bev Wren.*

Primary endorsement

The Victorian Board of Studies has welcomed the Academy's *Primary Investigations* program for primary schools. The Chief Executive Officer of the Board, Professor Sam Ball, said, 'It is a high quality resource which schools may consider as they plan to implement the Science Key Learning Area of the CSF (Curriculum and Standards Framework). It is the Board's view that *Primary Investigations*, used in conjunction with other resources, provides extremely worthwhile material for the implementation of the science component of the CSF.'

The Academy has prepared a supplement to *Primary Investigations* to help Victorian teachers who are using the program. The supplement shows how to meet all of the outcomes for levels 1 to 4 of the Science CSF, suggesting additional activities and how they can be integrated into the program. It is available free from the Academy, email **aas@science.org.au**.

The Academy has had numerous requests from rural and isolated schools for *Primary Investigations* training, but sending a trainer from a metropolitan area is often not feasible. There have also been requests for training for new teachers in schools where the rest of the teachers have already been trained.

To overcome these problems, a *Primary Investigations* do-it-yourself inservice workshop has been developed with funding from the Science and Technology Awareness Program of the Commonwealth Department of Industry, Science and Tourism. The workshop consists of a videotape and booklet with masters for overhead projection. The workshop covers the instructional model, cooperative learning, classroom organisation, equipment and assessment.

The booklet enables any teacher to act as facilitator. It gives step-by-step instructions on leading discussions, running a hands-on activity and arranging peer teaching. The video allows teachers to 'visit' schools, view children as they work and hear about classroom organisation and assessment from teachers who have used *Primary Investigations* successfully.

The workshop is available from the Academy for $24.95 until 30 September, then $29.95. Email **aas@science.org.au** or telephone toll-free 1800 67 3383.

Supported by the Australian Foundation for Science

New Fellows

At its Annual General Meeting in May, the Academy elected 13 new Fellows, bringing the Fellowship to just over 300. Election to the Fellowship recognises a career that has significantly advanced the world's store of scientific knowledge. Special election recognises conspicuous service to the cause of science. The new Fellows are listed below.

1. Dr Robin Bedding, Chief Research Scientist in the CSIRO Division of Entomology, Canberra

Dr Bedding, 56, has led the world in obtaining new information on the taxonomy, biology, physiology and ecology of nematodes (round worms). This knowledge has enabled him to use nematodes to control insect pests in Australia and overseas. His research on a parasite of the sirex wasp is estimated to have saved Australia's pine forests from damage worth between $1000 million and $4000 million in each rotation. His research and patents have led to the establishment of a new export industry.

2. Professor Ian Dance, Professor of Inorganic Chemistry at the University of New South Wales

Professor Dance, 57, is internationally recognised as one of the leading investigators of compounds in which a metal is combined with sulphur, selenium or tellurium (the chalcogen elements). In this important and growing area of chemistry he has not only developed essential synthetic strategies but has synthesised and characterised over half the known categories of compound.

3. Professor George Dracoulis, Head of the Department of Nuclear Physics at the Australian National University

Professor Dracoulis, 52, has made important contributions to the spectroscopy of very neutron-deficient nuclei and to the understanding of unusual nuclear states, particularly through the study of the interplay between single-particle and collective degrees of freedom. His group is among the world leaders in the field.

4. Professor Graham Goodwin, Dean of the Faculty of Engineering at the University of Newcastle

Professor Goodwin, 51, has had a major international impact on systems science and dynamical systems. Of particular significance is his capacity to link theoretical research with engineering applications. He made pioneering contributions to the convergence of adaptive controllers and to numerical issues in digital filtering and control.

5. Dr Adrienne Hardham, Senior Fellow in the Plant Cell Biology Group at the Australian National University

Dr Hardham, 43, is distinguished for her studies of the cytoskeletal basis of plant morphogenesis and host-pathogen interactions, focusing on properties of cell surface components. Her innovative cytological, immunological and molecular researches on the agents of infection of the dieback fungus have yielded significant new knowledge of infection processes used by this destructive plant pathogen.

6. Professor Philip Kuchel, Professor of Biochemistry at the University of Sydney

Professor Kuchel, 50, is one of Australia's leading theoretical and physical biochemists. He is distinguished for his work on the application of nuclear magnetic resonance spectroscopy to biological systems, particularly the human red blood cell. He has applied the technique to study membrane transport, the physical environment inside cells and the modelling of metabolic pathways. He discovered the split peak phenomenon which he used to obtain information on the kinetics of rapid transmembrane exchange processes in whole cells and in other studies.

7. Dr Trevor McDougall, Chief Research Scientist in the CSIRO Division of Oceanography, Hobart

Dr McDougall, 44, is the foremost world authority on many aspects of oceanic mixing. He has discovered four new oceanic mixing processes and has pioneered the concept of neutral surfaces along which strong lateral mixing occurs. Through his other discoveries, there has been a dramatic improvement in the ability of ocean models to simulate today's climate.

8. Dr Brendan McKay, Reader in Computer Science at the Australian National University

Dr McKay, 45, spans computer science and mathematics: he is a leader in the application of combinatorial methods to computer science and in the application of computers to mathematical problems. He is a master of the art of the computer generation and enumeration of combinatorial objects.

9. Professor Elspeth McLachlan, Senior Principal Research Fellow at the Prince of Wales Medical Research Institute in Sydney (pictured with postdoctoral research officer, Dr Martin Stebbing)

Professor McLachlan, 54, is a world authority on neural pathways within the autonomic nervous system. Her work has ranged from detailed analyses of transmission in autonomic ganglia to studies of the organisation of autonomic nervous pathways and their disorder in pathological states.

10. Professor Marilyn Renfree, Head of the Department of Zoology at the University of Melbourne

Professor Renfree, 50, has made a major contribution to the reproductive physiology and sexual development of marsupials. She demonstrated the nutritional and endocrine functions of the marsupial placenta and has led work on the control of birth in marsupials and on sex determination and differentiation. Her work has also contributed to the general understanding of these processes in other mammals.

11. Professor Colin Sullivan, Head of the Centre for Respiratory Failure and Sleep Disorders at Royal Prince Alfred Hospital in Sydney (pictured with PhD student, Grant Wilson)

Professor Sullivan, 51, is an international leader in the field of breathing disorders in sleep. He has characterised the basic physiology of breathing during sleep and recognised that arousal responses from sleep are crucial to surviving respiratory failure. He has promoted sleep disorder medicine and established the first diagnostic sleep laboratory for adults and children. He developed the technique of nasal continuous positive airway pressure to treat obstructive sleep apnoea; this treatment is now used throughout the world.

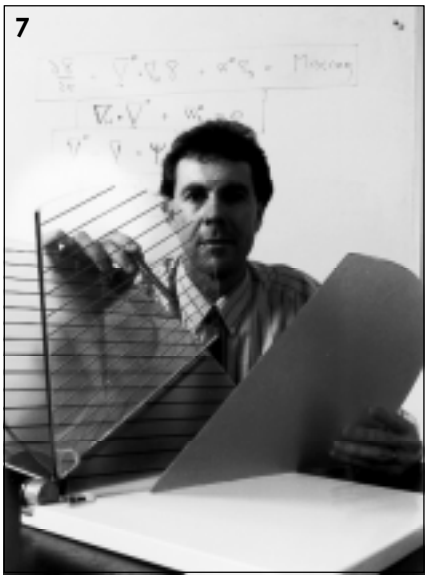
12. Professor Grant Sutherland, Director of the Department of Cytogenetics and Molecular Genetics at the Adelaide Children's Hospital.

Professor Sutherland, 50, has characterised fragile sites on human chromosomes. He is an active participant in the international Human Genome Project. His group has contributed significantly to the mapping of chromosome 16.

Special election

13. Emeritus Professor Sir Rupert Myers

In 1948 Rupert Myers gained the first PhD to be awarded in Australia. He was the Foundation Professor of Metallurgy and former Vice-Chancellor of the University of New South Wales. He has served on many state and federal government bodies including the Prime Minister's Science and Engineering Council. He is a former President of the Australian Academy of Technological Sciences and Engineering.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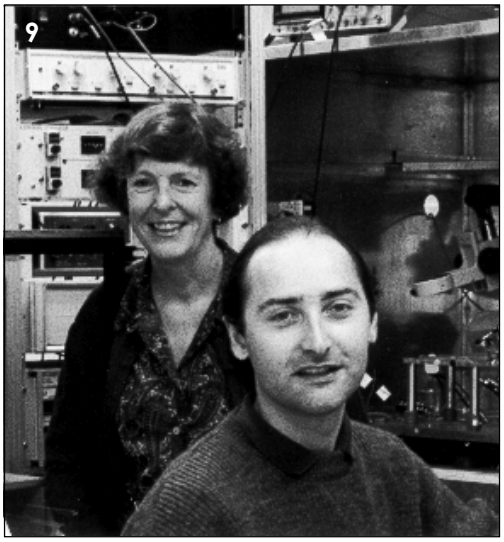
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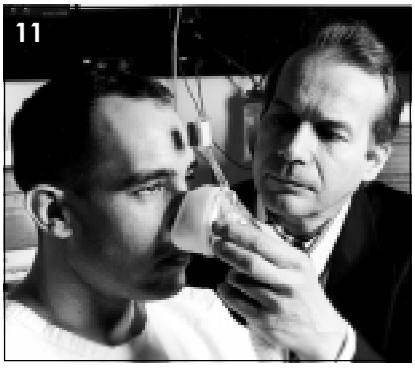
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Nova explores Mars

On 4 July 1997 the US spacecraft, *Mars Pathfinder*, landed on Mars. On the same day, the Academy of Science added the topic 'Life on Mars' to its *Nova: Science in the news* World Wide Web site (**http://www.science.org.au/nova/**).

Nova provides accurate and up-to-date information about scientific, health and environmental issues in the news. It is used by teachers, students and others interested in background to the latest research.

The Mars topic summarises the evidence for and against the existence of life on Mars and describes conditions on the planet, the Pathfinder mission, cyanobacteria and the search for extraterrestrial intelligence. It also provides student activities, references to articles in science journals and links to other authoritative, user-friendly Web sites.

There are 15 topics currently available on *Nova*. The three added most recently deal with malaria, gene technology and plants, and fibre optics and telecommunications.

If you would like to be notified by email when new topics are added, please register on the *Nova* home page. *Nova* is supported by the Science and Technology Awareness Program of the Commonwealth Department of Industry, Science and Tourism, BHP and the Australian Foundation for Science.

Supported by the Australian Foundation for Science

Science policy in Asia

A Fellow of the Academy and former Chief Scientist, Professor Michael Pitman, will address the Third Asian Science and Technology Congress in Chiang Mai in Thailand in October 1997. The congress, held under the auspices of the Federation of Asian Scientific Academies and Societies, will be on the subject of science and technology policies in Asian countries. The Academy of Science represents Australia in the federation.

Professor Pitman will also attend a conference on science management, technology transfer and human resource training at Hanoi University of Technology in Vietnam in October.

Queen's Trust awards for young science teachers

In 1998 the Academy of Science will hold a national symposium and education workshop on *The biological control of pest species*. The Queen's Trust for Young Australians is providing funding to enable a science teacher under the age of 28 from each state and territory to attend.

The symposium will feature top scientists from Australia and overseas, and will provide insight into current research of importance to Australia's environment. The education workshop will offer an introduction to teaching materials and strategies using Internet resources related to the topic.

Teachers will be selected competitively, based on their background and experience, their interest in developing curriculum materials, and their willingness to disseminate the knowledge they gain through local meetings, discussions, articles and reports. They will be chosen in consultation with the Australian Science Teachers Association.

The award covers travel, share accommodation and most meals, including the symposium dinner with Fellows of the Academy.

The President of the Science Teachers Association of Queensland, Paul Parkinson, has previously attended an Academy symposium and feels that the opportunity to hear about cutting-edge research and share teaching strategies with outstanding teachers from across Australia is a most rewarding experience.

'Science education in Australia needs dedicated and committed teachers who are appropriately skilled. The opportunity for young science teachers to attend such a gathering will indeed enrich science teaching,' he said.

Application forms will be available from 13 October 1997 and applications will close on 16 March 1998. For application forms, telephone Nancy Pritchard on (02) 6247 5777 or email: **ds@science.org.au**.

Selby Fellow's magic materials

Professor Colin Humphreys

The Academy's 1997 Selby Fellow was Professor Colin Humphreys, Goldsmiths' Professor of Materials Science at the University of Cambridge. He visited Australia from 24 June to 5 August 1997, giving talks in Sydney, Brisbane, Canberra, Adelaide and Perth.

Professor Humphreys is an internationally renowned materials scientist and popular public speaker. He is a Fellow of the Royal Academy of Engineering and Vice-Chairman of the UK Government's Technology Foresight Committee on Materials. The UK Institute of Physics elected him their 1997–98 Fellow in the Public Understanding of Physics.

In Australia he spoke on a range of topics including *From artificial hips to metals with a memory: the magic of modern materials; Astronomy and the Star of Bethlehem; The importance of nanostructures in metals, semiconductors and superconductors; Gallium nitride – the amazing blue light emitter*; and *New ways of determining the structure and bonding in crystals*.

The Selby Fellowship, endowed by the Selby Scientific Foundation, allows distinguished overseas scientists to undertake public lecture and seminar tours and to visit scientific centres in Australia.

Professor Humphreys said, 'I found the visit enormously stimulating and enjoyable. It was a great pleasure to speak to so many school pupils, the general public and other scientists. The Selby Fellowship is an excellent idea and I wish we had such a fellowship in the UK.'

Some of the participants in the master class on biodiversity held in Malaysia.

Master class success

The master class on new technologies for the measurement of biodiversity, held at the Universiti Putra Malaysia in April and May 1997, has successfully transferred knowledge of genetic techniques to Malaysian and ASEAN scientists.

The class was an activity of the Federation of Asian Societies and Academies of Science (see *AAS Newsletter* number 35). It was supported by the Crawford Fund for International Agricultural Research, Environment Australia, the Commonwealth Department of Industry, Science and Tourism and the Australian Academy of Science. The class was coordinated by Professor Bruce Holloway.

The master class consisted of 28 lectures, 55 hours of laboratory and computer work, and two field trips – one to a Malaysian national park and another to a plantation. The 15 participants were mid-career scientists from universities or government research bodies in Malaysia, the Philippines, Vietnam, Nepal, China, Sri Lanka, Indonesia and Thailand.

Participants were taught to understand and interpret DNA-based information, apply DNA data to analyse biodiversity, assess and survey biodiversity, use bioinformatics methods and create biodiversity databases. Participants also attended the Third Symposium on Trends in Biotechnology, held at the university in May, which featured a number of Australian speakers.

There was also a two-day class for decision makers – senior executives from universities, government organisations and industry. Participants isolated DNA, cut it with restriction enzymes, separated the fragments by electrophoresis and carried out a polymerase chain reaction. Representatives of the Malaysian government department concerned with the impact of modern society on Islam sought information on the role of biotechnology in the food industry.

Decision makers were impressed with the potential for bioinformatics demonstrated through the Australian National Genomic Information Service. As a result, a node of the service has been set up at Universiti Putra Malaysia with the financial support of the university and some commercial interests.

Scientists who participated in the master class have since begun research projects and presented courses in Thailand and Sri Lanka.

SCOPE promotes diversity

This year the Australian Government has introduced the National Heritage Trust and the National Vegetation Initiative, each of which have a strong element of concern for the well-being of Australia's biodiversity.

In 1996, the international Scientific Committee on Problems of the Environment (SCOPE) published *Functional Roles of Biodiversity – A Global Perspective*, edited by Hal Mooney *et al.* (ISBN 0-471-95601-5). This publication has utilised available information, most of which is observational, to elucidate the role of biodiversity in ecosystem functioning and stability. The conclusions are:

- The loss of genetic variability within a population of a species in a given area can reduce its flexibility to adjust to environmental change.
- Recent studies are confirming the proposition that the capacity of ecosystems to resist changing environmental conditions, as well as to rebound from unusual climatic or biotic events, is related positively to species numbers.
- The simplification of ecosystems in order to produce greater yield of individual products comes at the cost of the loss of ecosystem stability and of such free services as controlled nutrient delivery and pest control.
- Certain ecosystems, such as those found in arid regions and on islands, appear particularly vulnerable to human disruptions.
- Fragmentation and disturbance of ecosystems and landscapes have profound effects on the services provided, since they result in shifting the balance of the kinds of species present from large, long-lived species to small, short-lived ones.
- We have been more successful in simplifying than in reconstructing ecosystems.

SCOPE Newsletter 51 provides excerpts from the final chapters of the book and can be obtained through Rachel Douglas at the Academy (email: **ns@science.org.au**).

The SCOPE publication has already resulted in a popular book, *The work of nature – how the diversity of life sustains us*, by Yvonne Baskin. It would be wonderful to have such a book, emphasising Australian examples. Perhaps that may emerge through the National Heritage Trust.

Copyright and databases

The World Intellectual Property Organisation (WIPO) has proposed a treaty on the copyright of databases. Scientists fear that the proposed treaty would restrict their access to information (see AAS Newsletter *number 35). The International Council of Scientific Unions has become increasingly alarmed by the potential adverse effects of the new laws on the conduct of science and education.*

At issue is the protection of databases that require a substantial amount of time, effort or money to produce but that lack creativity in the selection, arrangement or presentation of the information. The creative elements of databases are already protected under copyright.

The Federal Attorney-General's Legal Practice, supported by the Academy of Science, held a workshop on the proposed treaty and its implications at the Academy on 18 April 1997. Excerpts from two talks by scientists are printed below. WIPO is due to consider the proposed treaty again in September 1997.

The implications for science

Dr Angus McEwan is a Fellow of the Academy and Senior Science Adviser to the CSIRO Division of Oceanography and the Bureau of Meteorology.

A revolution is happening in the way science is done and the change is making the pursuit of many kinds of science very vulnerable. Traditionally, once a scientist decides on a project, the expectation is that he or she will have to generate the data by embarking on an experiment or observation program. There may be data in archives and libraries, but usually in a processed or previously interpreted form. He or she may also be able to draw upon a compilation of past data, an historical database. His or her results are ultimately published and find their way to libraries and users, which include other researchers.

Increasingly, the data needed for science is more than any one scientific program can provide. Fortunately the ease with which large datasets can be accessed and analysed or used is improving as more data becomes available through electronic networks.

This has resulted over the last decade or two in a fundamental and dramatic paradigm shift. The projects have become *based* upon access to external datasets and data from an individual project can be easily added to these datasets through dedicated data centres or compilers.

One result is that science has become far more useful or applicable to real problems, because:

- it can draw upon a vastly increased information resource
- it can be used to integrate data of different types, for example, in environmental studies combining topography dynamics and biology.

This fundamental change in how science is done has gone largely unremarked. Science has assumed that the old principles and motivations still apply. One contributes freely one's work to open scrutiny and access. One has reciprocal free rights to the work of others.

Ironically, as science enters an era of unprecedented usefulness, it is threatened with being manacled by commerce. The loser is the world at large.

Providing no profit is made directly from someone else's work and it is not deteriorated by usage, then the use of data is *fair use*. This is a fundamental precept. Unfortunately, as databases get bigger, they also become more valuable. The difference between the old scientific ethos and the commercial, investment-recovery ethos of the rest of the world comes into sharper contrast.

Unless some special provisions are inserted in the treaty to permit the principles of fair use for scientific research and academic enquiry, scientists will be forced to play by the majority rules.

Ironically, as science enters an era of unprecedented usefulness, it is threatened with being manacled by commerce. The loser is the world at large.

There always has been an element of commercialism in even basic science, and that commercialism finds one of its fulcrums in information flow. Publishing has costs, both in page charges and subscriptions. There are subscriptions payable to expensive cooperative research programs and for membership in data networks.

There are profits to be made from being able to recognise importance or value in the data itself, and to withhold or distribute the data accordingly. Satellite data and genomic data are examples of this and without the databases the work could not be done.

In the case of oceanography, the biggest ever international experiment is just concluding its observational phase this year. It is called the World Ocean Circulation Experiment. Its purpose is to improve the numerical calculation of global climate. To do this it is necessary to understand how the ocean behaves, since it has a long thermal memory and it moves about as much heat between the equator and the poles as does the atmosphere.

The World Ocean Circulation Experiment has encouraged nations of the world to participate in a highly coordinated set of ocean observations using ships, automated instruments and satellites. One of the spin-offs has been to demonstrate how powerful are the altimeters on radar satellites in mapping in near real-time the topography of the ocean surface. This makes it possible to estimate surface currents, which in turn improves the calculation of current through the whole water column. To manage the data a number of world data centres were established and the archive is distributed across them.

The cornerstone policy with the data is free access. Originators of the data may withhold it for personal use for two years after which peer pressure is applied for release. In this way, personal scientific aspiration is balanced with public good.

Another example is genomic sequence data, which has enormous application and benefit in drugs, medical diagnosis, plant breeding, food, biological control and environmental remediation. Australia is both a significant user and provider.

Large databases exist in areas such as: nuclear structure; high energy physics; materials science; chemistry, including patent, toxic substances and crystal structure; seismology; astronomy; geophysics; and satellite remote sensing.

What is the reaction of the scientific community to the proposed treaty?

The reaction seems to be widespread but ill-defined abhorrence. When

pressed in terms of the possible impact on their own disciplines, scientists are well able to anticipate the effect of deprivation of data and the impossibility of continuing many lines of enquiry if the costs were more than minimal.

Price-setting for data discriminates against the small, powerless or impoverished operator (or country).

This outcome could be self-correcting. It may not make good commercial sense to price certain forms of data out of the market. Yet there is an example of Landsat data where, although the price of scenes was reduced ten-fold to accommodate complaints within US federal agencies, the remainder of the community remained unable to afford the images while other satellite operators complained of price-cutting.

The general message of this example is that price-setting for data discriminates against the small, powerless or impoverished operator (or country). Australia is a small country; we are net data importers.

It is difficult to determine the cost of not doing or using something (the opportunity cost) and, especially in esoteric enterprises (like research), the cost is not visible to the bean-counters.

Oceanography and many other branches of environmental science require large datasets and the biggest downside of the treaty is to discourage contribution at the start, rather than what we might be asked to pay for subsequent access to the dataset. This is because the treaty breaks the reciprocal relationship between the data provider and the database owner: give freely and get back freely. The creator of the data will need to protect his or her own interest, as will any intermediate compiler of the data. Indeed intermediate datasets could become fair game rather than fair use.

A feature of many of the largest database networks is that they have been set up cooperatively by scientists or organisations in the field, and they are unlikely to impose provisions under a ownership regime that are tough enough to discourage use. Those most at risk are smaller datasets or fields where cooperative arrangements have not motivated database creation. This makes data arrangements between countries, especially if the data resides in centres that are under pressure to get users to pay, very vulnerable.

So what effect has the European equivalent of the treaty, the directive on the legal protection of databases, had on European scientists? Well, it's early days but the silence has been deafening. It must be said that the scientific community would not normally pay much heed to the topic.

So, given that there are sound reasons for a database treaty to be created, how would scientists prevent it from doing harm to the free and ever improving access to database information.

Some critical elements seem to be:

1. fair use provisions, appropriately defined
2. concessions for public good applications, that is, non-depletability (the data cannot be degraded by use) and non-discriminatory (access should not deny benefits to some users)
3. access to public domain information (that generated on terms that include requirements or assumptions that it be publicly available) should not be impaired by inclusion in a database
4. default conditions (for example, free unless otherwise specified) determining the rights of generators or authors of original or raw data to impose conditions of free use upon the maker of a database.

International cooperation in meteorology

Dr John Zillman is Director of the Bureau of Meteorology and Vice-President of the Australian Academy of Technological Sciences and Engineering

For more than a century the provision of essential meteorological services has been based on the free and unrestricted exchange of basic meteorological data between countries and between the operational and research communities.

This tradition of international cooperation is built into the convention and practices of the World Meteorological Organization (WMO) which, like WIPO, is a specialised agency of the United Nations. It is based on the concept of meteorological data as international public property and the understanding that every country will contribute what it can to the total global pool of data in exchange for the right to draw freely from that pool to fulfil its public interest responsibilities to its national community.

Within this international framework, National Meteorological Services:

- operate extensive national data collection networks
- provide and exchange large volumes of raw and processed meteorological data
- maintain comprehensive national climate databases
- provide a wide range of public interest services to the community at large
- support national and international research programs.

Virtually all data exchange between National Meteorological Services takes place on a dedicated global telecommunications system which is jointly and cooperatively operated with no payment one way or the other between services. All the data is regarded as public property and, subject only to certain understandings on proper use and courtesy acknowledgment, is provided free (that is, at no more than the cost of copying or otherwise making available) to anyone in the public or private sector who seeks it. In many countries even the costs of providing access are waived when there is a significant public interest element in the use of the data by the research and education communities.

In Australia the national meteorological databases include:

- daily rainfall totals for more than 6000 locations for more than a century
- six-hourly observations of a wide number of meteorological variables (temperature, pressure, windspeed, cloud cover and so on) at more than 500 locations over the continent and offshore islands
- large volumes of remotely sensed data from weather radar and meteorological satellites.

For the globe, there are some hundreds of thousands of rainfall stations and more than 10 000 surface observing stations. Most of the data is held in world data centres operated under the auspices of WMO or the International Council of Scientific Unions. This data is available to anyone who needs it.

WMO Resolution 40

This cooperative approach remained stable until about a decade ago when several National Meteorological Services were put under pressure to commercialise by their governments and found themselves having to restrict the free flow of their data so that they could either sell it directly or develop commercial services based on the data. After several years of complex and difficult negotiation under the auspices of the WMO, the 1995 World Meteorological Congress achieved *unanimous* adoption of its Resolution 40 which sets out the basic principles of data exchange in the following terms:

> As a fundamental principle of the WMO, and in consonance with the expanding requirements for its scientific and technical expertise, WMO commits itself to broadening and enhancing the free and unrestricted international exchange of meteorological and related data and products.

Notwithstanding the unanimous adoption of Resolution 40, which temporarily headed off a threatened international meteorological data war and reaffirmed the fundamentally cooperative nature of international operational meteorology, the WMO data exchange system remains fragile and under great stress. Virtually all National Meteorological Services are doing their best to live within the letter and the spirit of Resolution 40 but commercialisation and government ideological pressures in many countries are intense.

The US operational meteorological and scientific communities are strongly united against any restriction on data flow and the position has been widely supported within the US administration. The official US position in WMO is one of vigorous opposition to any restriction albeit the US is attempting to honour the limited restriction built into Resolution 40. The internal tensions have been substantially greater in Europe but a range of mechanisms has been invoked to attempt to hold the intent of Resolution 40 together. Some tensions exist between some national services and their private sectors.

WMO and the database treaty

The WMO did not become fully aware of the proposed database treaty until mid-1996.

The WMO community see the draft treaty as an extremely severe threat to the future of international cooperation in meteorology. The stated primary objective of contracting parties to the proposed treaty – 'to *enhance* and *stimulate* the production, distribution and *international trade* in databases' – is the antithesis of the primary objective of the meteorological community which is to *avert* the development of an *international trade* in meteorological databases.

All countries, even those whose National Meteorological Services have been partially commercialised, are convinced that the breakdown of international free exchange of meteorological and related environmental data and its replacement by a commodity market in data would adversely affect their national interest. It would certainly affect Australia extremely severely. The meteorological community, through the WMO, is thus strongly opposed to any development, such as the proposed treaty, which would be likely to be used by ideologues within governments to increase pressure (already intense) on National Meteorological Services to restrict their data flow.

It is not a solution to implement the treaty and then leave it to National Meteorological Services to make their own cases to their governments for exception or dispensation at the national level. There is ample evidence that, once such instruments are in place internationally, the national counterpart agencies will push forcefully for across-the-board domestic application. It would be unlikely that many National Meteorological Services would have sufficient influence to successfully swim against the tide. And, once a few get caught up, this will affect the stability of the remainder.

The only satisfactory solution from the perspective of the WMO, short of abandonment of the proposed treaty which remains the preferred option, would be the incorporation of an explicit exclusion in the treaty relating to meteorological and related environmental databases exchanged internationally in accordance with the provisions of the convention and general regulations of the WMO. Whether this should be built into Article 5 or whether there should be a separate exclusions article (which might also include exclusion clauses for other international conventions based on the WMO data exchange model as well as for general scientific research and teaching) is a drafting matter. However, from the WMO perspective, it is considered essential that, if the treaty goes ahead, nothing less than a specific exclusion would be sufficient to head off the threat which the proposed treaty holds for international cooperation in meteorology.

Super for visiting academics

The Academy has expressed its concern to the Federal Government over changes to rules for superannuation payments. From 1 July 1997 superannuation contributions must be preserved until retirement age.

The Secretary, Science Policy, Professor John White, has written to the Assistant Treasurer, Senator Rod Kemp, pointing out that this will adversely affect academic staff visiting Australia for short periods. He wrote, 'The principle of mobility of academic staff is of particular importance to the effective operation of universities and the new preservation rules will injure that substantially.'

Professor White suggested an exemption from the Superannuation Guarantee Charge for temporary-visa academics. He also supported the making of reciprocal pension arrangements.

Honours to Fellows

A computer scientist from the Australian National University, **Professor Richard Brent**, has been appointed to the chair of computing science at Oxford University. He will take up the appointment in March 1998.

The International Society for Optical Engineering has presented its 1997 AE Conrady Award to a physicist from the Australian National University, **Emeritus Professor Hans Buchdahl**, for exceptional contributions in design, construction and testing of optical systems and instrumentation.

The Director of the Plant Cell Biology Research Centre at the University of Melbourne and former Chair of CSIRO, **Professor Adrienne Clarke**, has been appointed Lieutenant Governor of Victoria. She is the first scientist to be appointed to the post.

The Chairman of the Centre for Water Research at the University of Western Australia, **Professor Jörg Imberger**, has received one of five Clunies Ross national science and technology medals for his environmental engineering work aimed at improving water quality.

The President of the Academy, **Sir Gustav Nossal**, has been elected an Honorary Member of the Mathematics-Natural Science Class of the Austrian Academy of Sciences, has received an honorary doctorate of science from McMaster University in Canada, and delivered, on 1 July 1997, the Stanhope Oration of the Australian Science Teachers Association.

The Institute of Physics in London has awarded the 1997 Harrie Massey Silver Medal and Prize to the Professor of Physics at Griffith University, **Professor David Pegg**. The award is for his 1988 discovery, with Professor Stephen Barnett of the University of Strathclyde in Glasgow, of a quantum mechanical operator which represents the phase of light. The operator makes it possible to understand the dual nature of light (particle and wave) within one mathematical expression.

Emeritus Professor Alan Sargeson, of the Australian National University, is the 1997 winner of the Izatt-Christensen Award in Macrocyclic Chemistry. Professor Sargeson will receive his award and present a lecture at the XXII International Symposium on Macrocyclic Chemistry to be held in Seoul in August 1997.

A mathematician the University of New South Wales, **Professor Ian Sloan**, has been awarded the 1997 Australian and New Zealand Industrial and Applied Mathamatics Medal for his contribution to the development of applied mathematics in Australia. He is Chair of the Academy's National Committee for Mathematics.

The Dean of the School of Mathematical Sciences at the Australian National University, **Professor Neil Trudinger**, has been elected a Fellow of the Royal Society of London.

Planet Rosstaylor

A planet has been named after the geochemist and planetologist from the Australian National University, Dr Ross Taylor. Minor Planet (5670) Rosstaylor, in the outer part of the main asteroid belt, has a diameter of about 32 kilometres. The planet was discovered and named by Eugene and Carolyn Shoemaker (see page 15).

Japanese increase funding for public awareness of science

The Japanese Government has increased activities to promote the public awareness of science, setting up a science television channel and expanding science museums. They have also increased the budget for overseas fellowships which will allow more Australian postdoctoral fellows to work in Japanese institutes.

On 11 April 1997 the former First Secretary of the Embassy of Japan, Mr Masato Nakamura, and the man who has succeeded him in the position, Mr Naoki Saito, met Academy staff, Ms Thérèse Lewis and Mr Peter Vallee, to discuss exchange programs between Australia and Japan.

Chinese study Australian museums

A delegation from the China Association for Science and Technology, pictured above, visited the Academy on 13 June 1997. The association aims to popularise science, organise academic exchanges and act as a bridge between scientists and the government. It operates the China Science and Technology Museum which, after 10 years, needs expanding and renovating. The delegation visited Australian science museums to discuss construction, design and operation. At the Academy they discussed, with Thérèse Lewis and Bonnie Bauld, the functions of the Academy in relation to other scientific organisations within Australia and internationally.

Deaths

John Eccles in 1951

John Eccles

The Nobel Laureate and second President of the Academy, Sir John Eccles, died in Switzerland on 2 May 1997. His health had been poor for some years.

John Carew Eccles was born in Melbourne on 27 January 1903. He was educated at Warrnambool and Melbourne High Schools and gained a medical degree from the University of Melbourne in 1925 and, with the help of Rhodes Scholarship, a DPhil in natural sciences from Oxford in 1929. Studying under the physiologist, Sir Charles Sherrington, he explored the neuromuscular transmission of spinal reflexes. He became a research fellow at Exeter College, Oxford, moving to Magdalen College in 1934.

In 1937 he decided to return to what seemed the security of Australia, becaming Director of the Kanematsu Memorial Institute of Pathology at Sydney Hospital. In 1977 he wrote, 'In retrospect I feel I should have stayed in England and weathered the storm, but instead I embarked on my Odyssean journeyings, never to return to my beloved England.'

He stayed in Sydney until 1943, then he moved to the University of Otago in Dunedin, where he was appointed professor of physiology. In spite of a heavy teaching load he developed new techniques for recording electrical signals from single nerve cells in the spinal cords of experimental animals. The story of Sir John's research is also the story of advancing physiological methods: from antique pendulums and string galvanometers, through cathode-ray oscilloscopes and valve amplifiers to electron microscopes, digitimers and intracellular recording.

In 1951 he was tempted back to the new Australian National University in Canberra to be foundation professor of physiology in the John Curtin School of Medical Research. He wrote, 'Without doubt it was the high point of my research career.' His electrical stimulating and recording units were used to discover the electrical and chemical mechanisms of synaptic transmission in cats. He built a strong team of scientists and students who for many years influenced the directions of neurophysiology and neuropharmacology in Australia and overseas. Following an argument over the retiring age, he left the university in 1966.

He spent two unhappy years at the Institute for Biomedical Research in Chicago, and then went to the State University of New York in Buffalo. He finally retired with his books and journals to Contra in Switzerland in 1975.

In 1941 he was elected a Fellow of the Royal Society in London. He was a Foundation Fellow of the Academy of Science in 1954. He was President of the Academy from 1957 to 1961, succeeding Sir Mark Oliphant. He was knighted in 1958.

He shared the 1963 Nobel Prize for physiology or medicine with AL Hodgkin and AF Huxley 'for their discoveries concerning the ionic mechanisms involved in excitation and inhibition in the peripheral and central portions' of the nervous system. Sir John's research had been done at the John Curtin School.

He won many medals, received honorary degrees and academy memberships, and delivered invited lectures in Australia, North America, Asia and Europe. He became a Companion of the Order of Australia in 1990.

He published 420 articles in learned journals and a number of important books, including *The Neurophysiological Basis of Mind* (1953), *The Physiology of Nerve Cells* (1957), *The Physiology of Synapses* (1964) and *The Self and its Brain* (1976) with Sir Karl Popper, whom he met in New Zealand in 1944. His philosophical publications on the mind-brain problem generated widespread interest.

He is survived by his first wife, Irene, and their nine children, and his second wife, Helena.

Jack Piddington in 1963

Jack Piddington

Dr Jack Piddington died on 16 July 1997. He was a radioastronomer who spent most of his working life at CSIRO in Sydney.

John Hobart Piddington was born in Wagga Wagga on 6 November 1910, the son of a wool classer. He was educated at Wagga and Sydney High Schools and the Universities of Sydney and Cambridge, studying mathematics, engineering and radio. He was Walter and Eliza Hall Engineering Fellow from 1936 to 1938 and joined the CSIR Radio Physics Laboratory in 1939.

During the second world war he did radar research for the British Army, working in Malaya, Hong Kong, Burma and the British Air Ministry. The CSIR team built radar units for Sydney and Darwin.

Dr Piddington's research moved from the radiophysics relevant to military radar, such as studies of the ionosphere and radio propagation in the troposphere, to the radioastronomy of the sun, moon and galaxy, and theories about the phenomena occurring in plasmas. From his measurements of the radio emissions of the moon, he deduced its temperature and surface structure.

He joined the CSIRO Division of Radiophysics in Sydney in 1955, later working in the Division of Physics and the National Measurement Laboratory.

His later work was on hydromagnetics and the mechanism of heating in plasmas containing neutral atoms. He applied this research to a wide variety of solar and cosmic problems such as the heating of the sun's corona, the generation of solar flares, the emission of cosmic rays and the generation of cosmic magnetic fields.

He represented Australia at the International Geophysical Year conference in Spain in 1956, and the international Committee on Space Research (COSPAR) conference in Italy in 1964. He worked as a consultant on the solar programs of Kitt Peak National Observatory in the USA in 1974, and was a visiting professor at other US universities.

He won the Syme Medal of the University of Melbourne in 1958 and the Sidey Medal of the Royal Society of New Zealand in 1959. He was elected to the Academy Fellowship in 1963.

Dr Piddington published hundreds of scientific papers and a number of books, including *Radio Astronomy* (1961) and *Cosmic Electrodynamics* (1969). He is survived by his wife, Patricia, and three children.

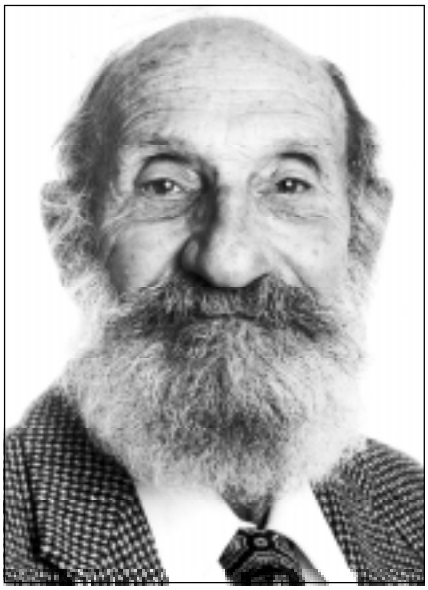
William Rogers

The parasitologist, Emeritus Professor William Rogers, died on 28 April 1997.

William Percy Rogers was born at Katanning, Western Australia, on 23 November 1914. He matriculated from Perth Modern School in 1933, having already developed an interest in field biology and radio. With the aid of a bursary he gained a science degree from the University of Western Australia in 1936 and, with another scholarship, a master of science in parasitology two years later.

He then went to the London School of Hygiene and Tropical Medicine, gaining a PhD in 1940. His early publications were on parasites of cats, sheep and other grazing animals. He looked at nematode parasites (round, unsegmented worms), particularly their digestive systems.

He worked at Cambridge from 1940, taking part in wartime work on



William Rogers

malaria, trichinosis and other parasitic diseases of humans, and testing the effect of possible drugs. He took up the study of biochemistry, one of four students with 20 distinguished lecturers. He wrote later, 'This gave me a basis on which I was able to build much of the knowledge and biological understanding I use in research and teaching.'

In 1946 he joined the research staff of CSIRO, where he used radioactive markers to examine the respiratory metabolism of nematodes. In 1952 he became professor of zoology at the University of Adelaide, then professor of parasitology from 1962.

'The central argument of my major research interest was proposed in 1957 and confirmed in 1958,' he wrote. 'It postulated that the infective stage of parasites required a stimulus or signal from the host which induced development of the parasitic stage.' The juvenile or egg is dormant until signals from the host switch on the parasite's endocrine system, its anaerobic system of energy production and the transcription of DNA. Within minutes development of the next, parasitic stage begins.

Professor Rogers moved to the Waite Agricultural Research Institute in 1966, retiring from there in 1979, but continuing his research at the university while living on his farm.

He was one of the first group elected to Fellowship of the Academy of Science, in 1954. He was a member of the Council from 1958 to 1960 and Vice-President from 1971 to 1973.

As well as his many scientific publications, he wrote a number of articles on science education in Australian universities.

In 1956 he organised demonstrations and public lectures against the Maralinga atomic bomb tests. He lamented that these raised little interest. During the 1960s and early 1970s he lectured on nuclear warfare, conservation and the need to curb the growth of the human population.

Gene Shoemaker

The US astrogeologist, Dr Eugene Shoemaker, 69, died in a car accident in the Northern Territory on 19 July 1997. His wife, Dr Carolyn Shoemaker, an astronomer, was injured in the collision. They were in Australia looking for meteor craters.

Gene Shoemaker trained as a geologist and became an expert on interplanetary collisions. He advised US space missions and jointly discovered the comet Shoemaker-Levy 9, which crashed into Jupiter in 1994. He initiated surveys to detect asteroids likely to cross the earth's orbit and has discovered more than 800 asteroids, one of which he recently named after the Australian scientist, Dr Ross Taylor.

A colleague called him 'one of the great founders of planetary science'.

Dr Shoemaker has made a significant contribution to Australian earth science, having conducted 12 field expeditions which showed that the ancient shield areas possess a fine record of meteorite and comet impacts.

Biographers appointed

Emeritus Professor David Curtis, from the Australian National University, and Professor Per Andersen, from the University of Oslo, will write a biographical memoir of **Sir John Eccles** for publication in *Historical records of Australian science* and *Biographical memoirs of Fellows of the Royal Society*.

Professor Alexander Mathieson, from La Trobe University, and Professor SR Hall, from the University of Western Australia, will prepare a biographical memoir of **Dr Ted Maslen** for publication in *Historical records of Australian science*.

Becker House documents preserved

The Academy's Becker House, commonly known as the Dome, is a Canberra landmark. In 1956 the Academy commissioned six designs and chose the one by Sir Roy Grounds. The building, with its copper dome, was completed in 1959. It is considered a prime example of geometric structuralism and has won a number of architectural awards.

The ACT Heritage Grants Program gave the Academy $7000 to undertake research and preserve documents related to Becker House. As a result Becker House has been nominated for the ACT Heritage Register. A contractor, Stuart Ramshaw, prepared the nomination.

The documentation comprises sketches, architectural drawings of the successful and unsuccessful designs, blueprints, drawings of furnishings and fittings, photographs and landscape drawings. Susan MacDougall has sorted the 350 items and compiled a preliminary list organised by topic and firm. The list has been added to the Academy's World Wide Web site (**http://www.science.org.au/history.htm**), together with an account of the building's construction (**http://www.science.org.au/construc.htm**).

The documents have been assigned to one of six categories, reflecting their historical value, condition and preservation needs. The Director of Art and Archival, Kerry McInnis, has assessed the condition and tested the pH of samples from documents, and has provided a schedule of recommended treatments with associated costs to serve as the basis for a preservation plan. Twenty-five items of high historical value and deteriorating condition have been given preservation treatment and individually encapsulated.

There is still much more to do, including preserving and encapsulating documents in the categories of high historical value, storing other documents in mylar pockets and nominating the most important documents for the Heritage Objects Register.

Kerry McInnis, above, treating a floor plan of the dome.
Susan MacDougall, below, sorting documents relating to the design and construction of the dome.

The Italian connection

The Scientific Attaché at the Embassy of Italy, Professor Silvio Dottorini, right, delivers to Mr Peter Vallee, of the Academy of Science, a copy of a scientific cooperation agreement between the Australian Academy and the Italian National Academy of the Lincei on 6 May 1997.

Indonesian visitors

A group of scientists from the Indonesian National Research Council had dinner at the Academy on 7 May 1997. The group was in Australia to strengthen links between Indonesian and Australian research management bodies and to discuss the role of the Academy. A number of Australian government officials also attended the dinner.

Closing dates 1997

Gottschalk Medal	30 September
Pawsey Medal	30 September
Frederick White Prize	30 September
Jaeger Medal	30 September

For further information, email Faye Nicholas at the Academy on **ac@science.org.au**.

Japan postdoctoral and short-term fellowships	1 September
China exchange	1 October
Germany program	1 October
Japan exchange	1 November
Japan awards for foreign specialists	1 November

For further information, email Thérèse Lewis on **io@science.org.au** or consult **http://www.science.org.au/internat/**.