



21st century science

The President of the Academy, Professor Brian Anderson, outlined his vision for science in the 21st Century in a speech at the UNESCO: Asia-Pacific Science Conference on 2 December 1998.

He concentrated on two main issues: the information revolution and the biological revolution.

He said the information revolution is challenging society even more rapidly than either the agricultural revolution or the industrial revolution. It relies on three enabling technologies: electronics, communications and computing.

In electronics, we have seen and will see ever greater packing densities on integrated circuit chips. Professor Anderson expects a need for advances in circuits with self-testing and limited repair capability, and circuits with decreasing power consumption. He predicted that we will see operation at higher and higher speeds and frequencies.

Communications has similarly seen many changes, moving from Morse code, to telephones and optical fibres. One-way radio has become television, colour television, satellite television, and soon, Professor Anderson imagines, two-way video capabilities in our homes.

There has been an explosion of wireless and mobile telecommunications and what Anderson termed 'the almost-miracle of Iridium' which allows you to make a telephone call from anywhere on the planet.

In the computing area Professor Anderson noted that 'the storage and the speed of personal computers has changed by a factor of a thousand' over the past decade and a half. Computers have gone from manipulating purely numeric data to alphabetic and numeric data; they are able to produce information from that data to offer computer games, spreadsheets and word processing. However, Professor Anderson finds a lack of human-friendly interfaces. He said 'there is a long way to go' before computers are able to translate languages, to respond to spoken commands, and to accurately take dictation.

Professor Anderson commented on

the social repercussions of the information revolution. Jobs are inevitably lost in some areas and gained in others, leaving society with the task of easing the transition for those who become displaced. There is also the threat of dominant companies such as Microsoft, and concerns about privacy

spoke of the possible advantages of human genetic engineering, such as the possibility of paraplegics walking, and sense-deficient people recovering their missing sense.

The final topic he covered in relation to the biological revolution was the public worry of a killer disease outbreak



Professor Brian Anderson

and the big brother state. Professor Anderson said, 'But by the same token, a big brother state, particularly a totalitarian regime, ought to feel very threatened by the universality of the fax, and email, which allow the challenging of propaganda, and the free expression of those news items and ideas that the regime might wish to repress.'

Professor Anderson discussed the second great revolution, the biological revolution, more briefly, as it does not belong to his particular field of study. He observed that genetic engineering has been around for at least 20 years, and has mostly been used in agriculture. He

or public health accidents such as mad cow disease.

'The information revolution and the biological revolution are two representatives, albeit very large ones, of the way science impacts and challenges peoples lives,' he said. 'An imperative for all nations is to prepare the future citizens of those nations so that they can react intelligently to these challenges.' He then called for our schools to produce citizens who are scientifically literate.

The full transcript of this speech is available at www.science.org.au/policy/statemen/unesco.htm.

Office-bearers of the Academy

President

Professor Brian Anderson

Secretary (Physical Sciences)

Professor Kurt Lambeck

Secretary (Biological Sciences)

Professor John Young

Secretary (Science Policy)

Professor John White

Foreign Secretary

Professor Michael Pitman

Treasurer

Professor Athel Beckwith

Telephone numbers

Executive Secretary (02) 6247 5777

Publications (02) 6247 5385

Awards (02) 6247 5777

Finance (02) 6249 1362

Fellowship administration (02) 6247 3966

National Committees (02) 6247 3966

International programs (02) 6247 3966

Library (02) 6247 3966

Australian Foundation for Science (02) 6247 5777

Facsimile (02) 6257 4620

Email aas@science.org.au

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

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

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

Printed by Inprint, Brisbane.

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

ISSN 1031-9204

Print Post Approved PP 255003/00025

Sunken treasure? Australian coasts and oceans

The 1999 Academy of Science symposium

9am, 30 April 1999

Becker House, Canberra

Open to the public, \$50 including lunch

At a time when oceans policy is high on the Federal Government's agenda, the Academy of Science is holding a symposium on the marine science that is essential to the implementation of that policy.

Over the last two years the government has been formulating policy to guide the responsible and sustainable use and protection of Australian marine territory. It has also been preparing a marine science and technology plan to help apply knowledge of the ocean for the national benefit.

The symposium will review the current scientific challenges and the practical needs of management, conservation and efficient use of the sea. Speakers from the CSIRO, universities, the Bureau of Meteorology, the Australian Institute of Marine Science and the Australian Geological Survey Organisation will look at how the planet is plumbed, ocean monitoring, coastal ecology and human impact, the Great Barrier Reef, fisheries, minerals and biologically active compounds in the sea.

The convenor of the symposium is the Senior Science Adviser to the Bureau of Meteorology, Dr Angus McEwan.

For more information visit the Academy's web site at www.science.org.au/academy/agm.htm.

Forthcoming events

- *Gene technology and food*, National Science and Industry Forum, 31 March 1999, see page 7.
- *Sunken treasure? Australian coasts and oceans*, Academy of Science symposium, 30 April 1999, see this page.
- *Visions of Future Landscapes*, Fenner Conference on the Environment, 2 to 5 May 1999, see page 5.

Conferences

The Academy's web site has a conference and events database that lists events occurring in Australia and New Zealand between now and 2001. Events include seminars, exhibitions, science fairs, summer schools, workshops and lectures on the subjects of science, health, information technology, engineering, mathematics and the environment. The database, prepared by the Royal Society of New Zealand, is at www.science.org.au/conf.htm.

New topics on Nova

- Monitoring the white death – soil salinity
- Cleaner production – a solution to pollution
- Measurement in sport – the long and the short of it
- The ups and downs of Australian air traffic control

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

The Basser Library

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

Gifts to the Academy

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

Meeting on higher education

On 19 January 1999, a meeting on higher education issues in the UK and Australia was held at the Academy.

The meeting included Professor Brian Fender, the Chief Executive of the UK Higher Education Funding Council, representatives from the learned academies, the Australian Research Council, the Australian Vice-Chancellors' Committee, the Department of Industry, Science and Resources, the Department of Education, Training and Youth Affairs, and the office of the Minister for Industry, Science and Resources.

Professor Fender commented on the science budget in the UK, which has increased from £1338 million in 1998–99 to £1657.6 million in 2001–02. This reflects the recognition by the government of the need to increase funds for basic research, particularly in the life sciences.

In the broader area of higher education he outlined the current system in the UK, particularly the challenges faced by both the UK and Australia in the allocation of funding between research and teaching in an expanded tertiary sector. In the UK the numbers of students studying has increased dramatically to the current level of 1.76 million.

Professor John White, Secretary

(Science Policy) of the Academy, asked Professor Fender to comment on the dual system for higher education funding in the UK and the merits of the Research Assessment Exercise, on ways to foster greater diversity in the research system and on how to encourage collaboration with industry.

There has been considerable interest in Australia in the Research Assessment Exercise, which provides a formula for research funding according to five grades based on a system of peer review. Professor Fender thought that overall the system worked well

and encouraged diversity within the system. He added that if there was going to be a fundamental change in the way research is funded, the research community would need a long time to accommodate it.

He commented that the cost of administration was very low (0.3 per cent) and this included the travel costs of expert committees. However, the percentage cost would most likely be higher in Australia, because the total funds available would be less but the cost of administering the scheme would be similar.



Participants in the Academy meeting with the Chief Executive of the UK Higher Education Funding Council, Professor Brian Fender, centre.

Australia Day Honours

Three Fellows received Australia Day Honours in January 1999.

Professor Suzanne Cory, Director of the Walter and Eliza Hall Institute of Medical Research in Melbourne, was awarded a Companion in the General Division (AC), for her services to science and the community. Professor Cory is a leader in the field of biomedical research, committed to advancement in the understanding of the molecular basis of cancer. She is also an advocate of improved science education in schools and universities.

Professor David Burke, Professor of Neurology at the University of New South Wales, was awarded an Officer in the General Division (AO), for his services to science, medicine and the

community. His field of study is neurophysiology, with a particular focus on research and education. His contributions to the community have come through medical charities and other lay organisations.

Emeritus Professor Bob Crompton, from the Research School of Physical Sciences and Engineering at the Australian National University, was awarded a Member in the General Division (AM), for his services to science and the community. He was recognised for his efforts in the field of physics education and research, particularly in his work for the Australian Science Olympiads. His contributions to the community have been mostly associated with the National Brain Injury Foundation.



Professor Suzanne Cory

International networks need support

An Academy report on international scientific networks has found that there are many obstacles for young Australian researchers seeking overseas experience. This contrasts with the substantial investment made by the European Union in the mobility of young scientists.

Since its formation in 1954, the Academy of Science has had a strong commitment to international activities. These include its exchange programs which enable Australian scientists to undertake collaborative research in overseas laboratories, links with other science academies and participation in the many bodies of the International Council for Science.

In 1997 the Academy of Science and the Academy of Technological Sciences and Engineering prepared a paper, *International science and technology: its value to Australia and the role of the Academies*. This paper explored views about international cooperation and pointed out that Australian scientists have always been outward looking.

In 1998 the Academy commissioned

a study of the opportunities available for early career researchers to obtain overseas training and career development. This study, initiated by Dr Keith Boardman and carried out by Dr Fiona Wood from the University of New England, will be released in March.

Information was sought on the support provided for established researchers to maintain overseas networks. The study investigated the type and level of support provided by Australian universities for visits by overseas scientists wanting to collaborate on research. A further area of inquiry concerned the numbers of overseas postgraduate students undertaking training in Australia.

The report addressed the topic of international networks and Australia's competitiveness in science and technology, mapping out the complexities entailed in the issue of scientific links.

The study recommended that policies intended to make Australian science more international be

benchmarked against other countries' policies, that a national strategy be adopted for securing electronic versions of major scientific journals and databases, that an overseas postdoctoral fellowship scheme be established, that overseas research funding opportunities be listed in a central database, that more information be gathered on PhD graduate employment, and that postgraduate students be funded to attend at least one international conference during their training.

The recent Health and Medical Strategic Review also stressed the benefits of overseas study for postdoctoral researchers. These benefits include the development of ideas, networks and collaborations, and exposure to other systems. This view is strongly supported by the Academy.

The Academy welcomes comments and additional information on the issue. A copy of the report will be posted on the Academy's web site in March.

Kanagawa Awards

The Kanagawa Museum of Natural History Awards fund research on the Precambrian history of life in Western Australia or the modern microbial ecosystem in Hamelin Pool, Shark Bay. Five Kanagawa Museum awards were made in 1998.

Dr Brenton Knott, from the Department of Zoology at the University of Western Australia, has been funded for research into metazoan-microbialite interactions at five sites in Western Australia.

Professor David Patterson, from the School of Biological Sciences at the University of Sydney, will be undertaking research into extremophilic micro-organisms for Shark Bay and their contribution to early cell evolution.

Dr Murray Batchelor, from the Department of Mathematics at the

Australian National University, will begin researching a mathematical approach to stromatolite morphogenesis and its significance for understanding the evolution of proterozoic environments.

Dr Brett Neilan, from the School of Microbiology and Immunology at the University of New South Wales, will study stromatolite morphogenesis as a function of microbial diversity and ecology at Hamelin Pool.

Professor Heinrich Zankl, from the University of Marburg in Germany, has been funded to study the importance of in situ precipitation and carbonate accumulation in the stromatolites at Hamelin Pool.

Supported by the Australian Foundation for Science

Frew Fellow visits

The 1998 Frew Fellowship was awarded to Professor Carl Wieman, Professor of Physics at the University of Colorado. The Fellowship was established by the Academy to enable distinguished overseas scientists to participate in the Australian Spectroscopy Conferences and to visit science centres around Australia.

Professor Wieman, with Eric Cornell, was the first to achieve Bose-Einstein condensation in a dilute gas. His general area of study is laser spectroscopy and he is a Fellow of the US National Academy of Sciences. Professor Wieman visited Brisbane, Canberra, Melbourne and New Zealand on his lecture tour.

Ralph launches library projects

On 24 November 1998, the Australian Foundation for Science held its annual general meeting. The Chairman of the Foundation, Mr John Ralph, launched two projects which will make the resources of the Academy's Adolph Basser Library more accessible to the community.

The first project relates to the cataloguing of the library's collection of books. The result of this project is that much more efficient browsing and retrieval of information is possible. Academy staff can now search the collection using the computers on their desks, and they are able to answer public enquiries about items in the collection. The support of Professor Frank Fenner in this project has been invaluable and the Academy and the Foundation thank him for his help.

The second project is funded by the ACT Heritage Grants Program which has given the Academy \$7000 to preserve the architectural drawings, sketches, blueprints and photographs related to the design and construction of Becker House (the Dome), and to undertake the necessary research to nominate the Dome for the ACT Heritage Places Register.

The ACT Heritage Grants Program supplied the Academy with a further \$2500 to nominate the architectural documents to the Heritage Objects

Register. The Academy has also nominated the flag, raised over the South Magnetic Pole on the 1908–09 Shackleton Antarctic expedition, as a heritage object.

The Academy has been fortunate to receive an ACT Heritage Grant of \$5000 to record video interviews with people involved with the construction of the Dome. The National Library of Australia, through a Community Heritage Grant, is providing \$3000 to preserve additional architectural documents and the Australian Heritage Commission is providing \$24 000 to develop a cultural management plan for the Dome. As mentioned in the last newsletter, the Centenary of Federation

Cultural and Heritage Projects has agreed to contribute \$525 000 to renovate and refurbish the Dome. The Academy will be seeking corporate funding for events in 2001.

Mr Ralph said, 'These grants have enabled many valuable projects to be undertaken.' The Academy and the Foundation are very pleased that the Dome and its history are to be preserved in this way. More information about the Dome and its construction is on the Academy's web site at www.science.org.au/construc.htm.

Supported by the Australian Foundation for Science



Mr John Ralph addressing the annual general meeting of the Australian Foundation for Science.

Fund for research into population and the environment launched

The Population and Environment Research Fund was launched by the former Chief Scientist of Australia, Professor Ralph Slatyer, in November 1998.

The fund will support research into how the size, lifestyle and other characteristics of Australia's population are likely to affect the environment, not only the land and landscape but other aspects such as health. An interdisciplinary committee will be established to decide on priorities for the fund, and the Academy will ensure that there is objectivity, rigour and balance in any research that is supported.

More than \$12 000 has been donated to the fund to date, a total which is expected to rise to \$150 000 after a combined donation and bequest have been made. The target for the fund is \$1 000 000.

'The Academy's environmental activities started a few years after the Academy was founded in 1954, and have continued ever since,' Professor Slatyer said. 'The research fund represents a departure from the normal range of Academy activities but a very welcome one.' He looked forward to the advances that will result from the research supported by the fund.

Supported by the Australian Foundation for Science

Future landscapes

The Academy's next Fenner Conference on the Environment will be called *Visions of Future Landscapes* and will be held at the National Convention Centre in Canberra from 2 to 5 May 1999. The conference is being organised by the Commonwealth Bureau of Rural Sciences and aims to stimulate new ways of looking at land use in Australia.

The program will encourage dialogue between the scientific, artistic, commercial and government sectors. Participants will consider whether current policies are likely to produce economically and environmentally sustainable landscapes that are culturally desired. The results will be delivered to relevant government and industry bodies.

Wark Medal and Lecture

The Academy's Ian William Wark medal and lecture are awarded biennially to a scientist eminent for their contribution to the prosperity of Australia where such prosperity is attained through the advance of scientific knowledge or its application. The purpose is to focus attention on applications of scientific discoveries that have benefited the community.

The 1998 medallist is Professor Thomas Healy, Professor of Physical Chemistry and Director of the Advanced Mineral Products Special Research Centre at the University of Melbourne.

Professor Healy, 61, has made extensive contributions to the science and technology of mineral processing. He has been responsible for managing a major research group in colloid and interface science and technology that has built up a position of international standing. His fundamental work in polymer and surfactant adsorption and on the stability of colloidal dispersions is applied daily in the control of flotation and flocculation of mineral pulps and in the successful management of tailings and waste materials.

During two years at the University of California at Berkeley, he published, with Hogg and Fuerstenau, the now famous HHF theory of the mutual coagulation of colloidal dispersions. In 1972 he published a classic paper on the James-Healy model of hydrolysable metal ion adsorption. He has published approximately 200 papers in major journals, co-founding the journal *Colloids and Surfaces* and serving on the editorial boards of all major colloid and interface science journals. He has advised major resource and chemical companies around the world. He was elected a Fellow of the Academy in 1983.

The lecture will be delivered and the medal presented at a dinner later in the year.

Maxwell Jacobs grants

Ms Jane Medhurst, from the Cooperative Research Centre for Sustainable Production Forestry in Hobart, and Terry Walsh, from the School of Botany at the University of Melbourne, both won grants from the Maxwell Ralph Jacobs fund in 1999.

One grant will allow Ms Medhurst to travel to a conference on canopy dynamics and forest management which is to be held in Estonia, Finland and Sweden in August.

Ms Medhurst will present a paper at the conference on the thinning response in *Eucalyptus nitens*. In this paper she aims to establish patterns of height and diameter growth of *Eucalyptus nitens*, following thinning at different plantation ages. She will provide a detailed description of the

impact of thinning on canopy development and will measure the duration of the thinning response in terms of changes in crown size and activity. Her goal is to develop appropriate thinning regimes which maximise growth and commercial returns.

Mr Walsh seeks to establish the effectiveness of using growth stage mapping as a surrogate for age. To do this he will establish the range of ages which can be associated with particular growth stages of stems and stands in the mountain ash forests of Victoria's Central Highlands. He aims to define the extent to which the growth stage of the overstorey can be used to predict understorey floristic composition and other ecological attributes.

Le Fèvre Prize

The RJW Le Fèvre Memorial Prize was inaugurated in 1989 by the Academy to recognise the achievements of young researchers in chemistry.

This year the prize was awarded to Dr Sean Smith, Senior Lecturer in the Department of Chemistry at the University of Queensland. Dr Smith has gained an excellent international reputation for his work in the field of theoretical chemical kinetics and reaction dynamics.

He has made leading contributions to both applied statistical theories and fundamental quantum dynamical methods for simulating chemical reactions in great detail. His ideas led to a breakthrough in the implementation of accurate statistical theories for the calculation of rate coefficients of barrierless association reactions. He has also developed the first and only rigorous quantum dynamical algorithm for treating these reactions. This led to the resolution of differences over the chemical kinetics of a process for removing nitrogen oxides from combustion emissions.

He has published 31 articles in leading international journals, including six solo papers, a highly regarded textbook (*Theory of Unimolecular and Recombination Reactions*, with RG Gilbert) and a review chapter in the definitive *Encyclopedia of Computational Chemistry*.

King Medal

Professor Richard Stanton is the Haddon Forrester King medallist for 1998. The biennial award recognises the scientific contributions of Haddon Forrester King. The award is made for original and sustained contributions to the earth sciences of particular relevance to the discovery and exploitation of minerals and hydrocarbons.

Professor Stanton, from the University of New England, is distinguished for his pioneering work on ore deposits of volcanic affiliation. His early and abiding interest has been the origin of volcanic massive sulphide deposits and their relationship to the evolution of island arc volcanic rocks.

He studied at the University of Sydney and worked for a time as an exploration geologist with Broken Hill South Ltd. He has worked in ore provinces in many parts of the world, most notably Canada and the south-west Pacific.

Professor Stanton wrote the widely used textbook, *Ore Petrology*, and *Ore elements in arc lavas*. Through his texts, publications and teaching, he has contributed to the education and training of a generation of geologists.

The Haddon Forrester King medal was presented at a dinner at the Academy in Canberra on 26 February 1999.

Marine science workshops

An Australia–Japan workshop on marine science was held in Hobart, Townsville and Canberra in November 1998. The workshop was organised by the Academy and the Japan Society for the Promotion of Science.

In Hobart the group looked at Southern Ocean ecosystems. They toured the CSIRO Marine Laboratories and had a meeting with the Chief of the laboratories, Dr Nan Bray. Then the Australian scientists made a number of presentations: on the remote sensing of ocean colour and sea ice, on chemistry using the mass spectrometer, on ships, moorings and electronics, and on Australian programs in physical oceanography, glaciology and biogeochemistry. There was discussion of collaboration with Japanese scientists in the Indian Ocean. Then Japanese oceanographers gave presentations on physical and chemical oceanography.

In North Queensland the Australian and Japanese scientists looked at coastal oceanography, coral reef ecosystems and palaeoclimatic change. They visited coral reefs near Cairns before going to the Australian Institute of Marine Science in Townsville. There the scientists made presentations on research projects of mutual interest to both sides. The next day the Japanese scientists visited James Cook University, the Cooperative Research Centre for the Great Barrier Reef and the Great Barrier Reef Aquarium.

Both groups met in Canberra at the end of the workshop to discuss future collaboration and report writing. Participants felt the workshop helped build links between the scientists from both countries, as well as allowing time to enjoy the ocean environments.



Japanese and Australian participants in the marine science workshop in Townsville, above, and Canberra, below.



National Science and Industry Forum

Gene technology and food

31 March 1999

Maritime Museum
Sydney

For further information email Faye Nicholas at ac@science.org.au.

Chemistry Chair

The Academy's National Committee for Chemistry has a new Chair, Professor David Black, the past President of the Royal Australian Chemical Institute. The committee has been examining ways to encourage greater participation in the International Union of Pure and Applied Chemistry by younger Australian scientists.

The union is changing its way of operating and will concentrate on funding special projects rather than directing its funding towards a large number of commissions. The National Committee supports this change. Details are available at www.iupac.org.

Primary Investigations

The Academy's science, technology and environment program for primary schools, *Primary Investigations*, continues its advance into schools around the country. Over one-third of schools have purchased the program. The highest take-up rate is in Western Australia, where 87 per cent of schools use the program. Two-thirds of ACT schools and half of Queensland schools have *Primary Investigations*.

The *Primary Investigations* home page is at www.science.org.au/pi.

Supported by the Australian Foundation for Science

Conferences

Microbiology in August

The Australian Society for Microbiology and the Australian Academy of Science are hosts of a series of major conferences to be held in Sydney in August 1999 under the auspices of the International Union of Microbiological Societies. The conferences are the 11th International Congress of Virology (9 to 13 August), the 9th International Congress of Mycology and the 9th International Congress of Bacteriology and Applied Microbiology (both 16 to 20 August). Scientists from around the world will gather at Darling Harbour to reflect on the achievements in microbiology this century and to look forward to the great scientific challenges, especially emerging diseases, of the next century.

For more information visit the congress web site at www.tourhosts.com.au/iums or telephone (02) 9262 2277.

Chemistry in 2001

The International Union of Pure and Applied Chemistry will hold its general assembly and congress in Brisbane in July 2001. Themes for the congress include materials chemistry for the future, chemistry by computer, chemistry in medicine and biology, environmental chemistry and the greening of industry, and modern synthetic chemistry. Nobel laureates will make presentations at the congress and in other capitals. There will be special activities to appeal to younger scientists and students.

For more information contact the President of the Royal Australian Chemical Institute, Professor Graeme George, email g.george@qut.edu.au.

Maths in 2003

Australian and New Zealand Industrial and Applied Mathematics has been appointed to host the 5th International Congress on Industrial and Applied Mathematics. The congress, which is held every four years, will be in Sydney from 7 to 11 July 2003. The 1999 congress in Edinburgh is expected to attract 2500 participants.

For more information visit the congress web site at www.austms.org.au/iciam2003 or telephone (02) 9241 1478.

Nova wins global recognition

The Academy's informative web site, *Nova: Science in the news*, has been recognised as one of the world's best science sites. The most used search operation on the World Wide Web, Yahoo!, has recommended *Nova* as one of 24 sites in its category Science – News and Media.

A survey of users has shown that about half are teachers, 16 per cent universities and other education, 7 per cent students and 5 per cent from the news media. About 21 per cent are from countries other than Australia.

There are 36 topics available on *Nova* (www.science.org.au/nova). New topics are:

Monitoring the white death – soil salinity

Scientists at CSIRO Mathematical and Information Sciences recently tested a new remote sensing technique to monitor the extent of dryland salinity. The results were very encouraging, with one salt-affected site being mapped remotely at an accuracy of almost 100 per cent. This topic discusses which regions are most affected by dryland salinity, the causes and prevention of salinisation, and mapping and predicting where salinisation will next occur. Topic sponsored by the Land Monitor Project.

Cleaner production – a solution to pollution

Cleaner production has been defined by the United Nations Environment Programme as 'the continuous application of an integrated environmental strategy to processes, products and services to increase

efficiency and reduce risks to humans and the environment'. In the past, companies have focused on treating waste, rather than reducing it.

The concept of cleaner production places emphasis on waste minimisation and offers both increased profits and an enhanced environmental image. Topic sponsored by the Environment Protection Authority, Victoria.

Measurement in sport – the long and the short of it

When the Olympic Games kick off in Sydney in September 2000, there will be many measures of success. Behind the scenes, a wide range of scientific and technological wizardry will be employed to ensure that those measures are as accurate as possible. Topic sponsored by the National Standards Commission.

The ups and downs of Australian air traffic control

For the last 50 years, the movement of an aircraft has been tracked largely by air traffic controllers using little more than pencil, paper and, in a few small areas of the continent, radar. The introduction of the Australian Advanced Air Traffic System brings the management of Australian skies into the computer age. Topic sponsored by Airservices Australia.

All the new topics are also sponsored by the Commonwealth Department of Industry, Science and Resources.

Supported by the Australian Foundation for Science

No proof against chemicals

On 10 December 1998, the Academy of Science, the National Environmental Health Forum and the Australian Foundation for Science presented a public lecture by Professor Iain Purchase entitled *Do environmental chemicals disrupt sex hormones? Separating fact from fiction*.

Professor Purchase, an internationally renowned British toxicologist, addressed claims that certain chemicals, to which we are exposed on a daily basis, may be disrupting our hormonal systems. Among these claims are that some synthetic chemicals are causing

decreased sperm counts and testicular abnormalities in males, and increased risks of breast and testicular cancer.

Professor Purchase said that there is no conclusive proof for a connection between environmental exposure to oestrogen-like chemicals and human health effects. He stressed the need to be objective about the effects of these suspect chemicals if a balanced view is to be reached on the available evidence.

Supported by the Australian Foundation for Science

Exchanges with Japan

Ten Australian scientists will travel to Japan in 1999 and 2000 under the exchange program between the Academy and the Japan Society for the Promotion of Science.

Professor Graeme Dandy, of the University of Adelaide, will travel to the Water Resources Research Centre at Kyoto University to study the development of comprehensive decision support systems for the operation and planning of water supply systems.

Dr Ling Guan, from the University of Sydney, will visit the Department of Computational Intelligence and Systems Science at the Tokyo Institute of Technology to study computational intelligence and applications in multimedia processing.

Dr Andreas Houben, of the University of Adelaide, will travel to the Joetsu Educational University to research the isolation of chromosome-specific DNA.

Associate Professor Jerzy Kulski, from the University of Western Australia, will be hosted by the School of Medicine at Tokai University, where

he will study evolution and genomic organisation of the MHC.

Dr Serdar Kuyucak, from the Department of Theoretical Physics at the Australian National University, will travel to the Department of Physics at Tohoku University to research octupole excitations in nuclear structure and reactions.

Dr Victor Streltsov, from the University of Western Australia, will visit the Materials and Structures Laboratory at the Tokyo Institute of Technology to use x-ray diffraction techniques to study structure and electron density in ferroelectric materials.

Dr Serguei Vladimirov, of the University of Sydney, will visit the Department of Energy, Engineering and Science at Nagoya University to study collective interactions of particles and waves in plasmas containing highly charged impurities.

Associate Professor Colin Woodroffe, from the University of Wollongong, will be hosted by the Department of Geography at Nagoya University where he will undertake

research into the geomorphology of delta and reef coasts in the western Pacific.

Dr Dimitri Ionov, from the School of Earth Sciences at Macquarie University, will visit the Department of Earth and Planetary Material Sciences at Hokkaido University to study the evolution of the mantle at active continental margins.

Dr Andrew Moorhouse, from the University of New South Wales, will travel to Kyushu University where he will work in the Department of Physiology to study the effects of pain neuropeptides on inhibitory synaptic transmission in rat spinal cord.

There is also one recipient of a Japanese Government Research Award for Foreign Specialists. **Dr Graeme Allinson**, from the School of Ecology and Environment at Deakin University, will be hosted by the Regional Environment Division at the National Institute of Environmental Studies in Ibaraki. During his three-month visit, Dr Allinson will monitor heavy metal transport in soil.

Chance to collaborate with European scientists

Following the recent conclusion of negotiations between Australia and the European Commission on broadening the scope of the Australia-European Union Agreement on Scientific and Technical Cooperation, Australian researchers and industry consortium have an opportunity to participate in the European Union's Fifth Framework Program.

The program will focus on quality of life and management of living resources, user-friendly information society, competitive and sustainable growth, and preserving the ecosystem.

For further information on this program please contact Mr Peter de Souza, Department of Industry, Science and Resources, telephone (02) 6213 6381, email Peter.deSouza@isr.gov.au.



New link with Malaysian science

The President of the Academy of Sciences, Malaysia, Professor Omar, centre, with the President of the Australian Academy of Technological Sciences and Engineering, Mr Tim Besley, left, and the President of the Australian Academy of Science, Professor Brian Anderson, at the signing of a memorandum of understanding between the three Academies in Perth on 23 November 1998.

Following the signing of the memorandum, arrangements were made for a joint Australian-Malaysian workshop on science and technology policy. The workshop, to be held in Canberra on 22 and 23 March, is being organised by the two Australian Academies.

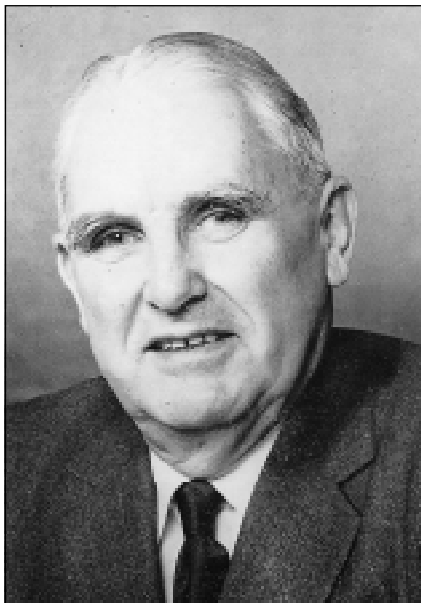
Sir Ian McLennan

The former Chairman of BHP, Sir Ian McLennan, died on 27 October 1998.

Ian McLennan was born in 1909 in Stawell, Victoria, from where he moved with his family to Foster and then to Shepparton. He attended Shepparton High School and then went to Scotch College in Melbourne in 1925. He studied mathematics and physics as his honours subjects at Scotch College and was equal dux in 1927. He was awarded a Senior Government Scholarship to attend Melbourne University and to reside at Ormond College. He completed his degree of Bachelor of Electrical Engineering in 1931.

As he could not find satisfactory work immediately, he remained at Melbourne University doing further study until 1933 when he joined the Broken Hill Proprietary Company Limited at Whyalla. This marked the beginning of over 45 years service with the company during which he was promoted many times until finally retiring as the Chairman of the Board in 1977.

His influence and accomplishments while he was with BHP have been described as astounding. Sir Ian promoted the exploration program that led to BHP discovering petroleum in Bass Strait, a resource which once yielded more profits than steel. He also



Sir Ian McLennan

led the company's diversification of products, away from steel.

Sir Ian noticed that BHP was seriously lacking the scientific and technological support necessary for success on the global market. He was substantially responsible for the development of an independent research division within BHP; this exercised a major role in the development of ferrous metallurgy in Australia. The research groups have

greatly improved efficiency and productivity in all facets of coke making, iron making and steel production.

In 1977 he became the Chairman of the ANZ Bank and then, in 1980, the Chairman of Elders, where he helped assemble a corporate giant. Due to Sir Ian's excellent management skills he joined many company boards.

Sir Ian received three honorary degrees from Australian universities and was invested as a Knight Commander of the British Empire 'for services to industry', and a Knight Commander of the Order of St Michael and St George 'for services to youth, community and industry'.

He was elected as a Fellow of the Academy by special election in 1980 and supported the Academy for many years, chairing the symposium which founded the National Science and Industry Forum in 1964. He was the Foundation President of the Australian Academy of Technological Sciences and Engineering. He maintained great interest in the CSIRO and served as a member of the CSIRO Advisory Council for several years. He helped develop the Ian Clunies Ross Memorial Foundation which provides office space at low rental facilities for the meetings and activities of scientific societies.

New Centenary of Federation Science Project

The Academy has received a grant of \$50 000 from the National Council for the Centenary of Federation's History and Education Program to fund a project called *100 Years of Australian Science*. This project will extend the Academy's *Video Histories of Australian Scientists* program, which was initiated in conjunction with Dr Max Blythe of the Royal College of Physicians and Oxford Brookes University VTR Archive in Great Britain.

The *Video Histories* program was established in 1993 to record interviews with outstanding Australian scientists for this and future generations. These personal stories provide an informal counterbalance to their formal scientific publications.

For the *100 Years of Australian Science* project, additional interviews will be conducted, then transcribed, edited and made available on the Internet. The interviews will be shown during the Australian Science Festival in May 2001. They will also be available for purchase from the Academy or for loan from Cinemedia. The list of scientists interviewed is on the Academy's web site at www.science.org.au/education/vhas.htm.

Supported by the Australian Foundation for Science

Honours to Fellows

Professor Graeme Clark, from the University of Melbourne, and **Dr Douglas Waterhouse**, formerly of the CSIRO Division of Entomology, have been elected to the Australian Academy of Technological Sciences and Engineering.

Professor Peter Doherty, of St Jude's Children's Research Hospital, Memphis, has been elected to the US National Academy of Sciences.

He will deliver the Royal Society of London's Leeuwenhoek Lecture, on the subject of killer T cells and virus infections, on 17 March 1999.

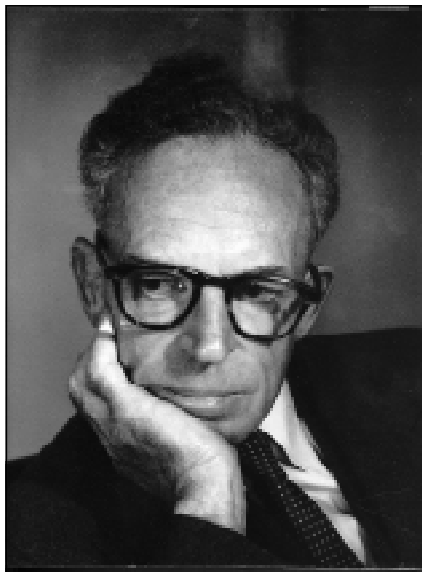
Sir Otto Frankel

Sir Otto Frankel, former Chief of the CSIRO Division of Plant Industry, died on 21 November 1998. He was 98.

The son of a Jewish barrister, Otto Frankel was born on 4 November 1900 in Vienna. He had a classical education, learning more Greek and Latin than science. Having not fought in the war, he was refused entry to university, so he studied the curriculum from outside the system and eventually gained formal credit for his study. He subsequently studied at universities in Munich, Vienna and Giessen and in Berlin gained his doctorate for a study of genetic linkage.

He initially worked as a plant breeder for a private estate near Vienna, then travelled briefly to Palestine with a team to set up a plant and animal breeding operation. He then spent a short time breeding plants at Cambridge before going to New Zealand's Department of Scientific and Industrial Research, in 1928, as a plant breeder at its new Wheat Research Institute near Christchurch.

He bred a number of highly successful wheat varieties and performed research in cytogenetics which led to his election to Fellowship of the Royal Society of London in 1953. His contributions to cytogenetics included studies of New Zealand plants, especially Hebe, and on the



Sir Otto Frankel in 1956

mechanics and physiological behaviour of the chromosomes of plants.

However, in 1951, just after being promoted to Director of the DSIR Crop Research Division, Frankel left New Zealand to work in Canberra. Ian Clunies Ross, then Chairman of CSIRO, had chosen him to become the new Chief for the run-down Division of Plant Industry. Frankel was appointed to revitalise the division and, soon after, it became Australia's leading plant biology research institution. In an

obituary in *The Australian*, two CSIRO colleagues of Sir Otto, Dr Lloyd Evans and Dr John Philip, wrote 'Frankel was a convinced exponent of Rivett's principle of research management: find the best person to head up the task then give him the maximum freedom and help to get on with it'. He was elected a Fellow of the Academy of Science in 1954.

Frankel became a member of the CSIRO executive in 1962. He retired in 1966 and was knighted in that year. He returned to Plant Industry as an honorary research fellow. He continued his research well after his official retirement and began to take a serious interest in the conservation of the botanical gene pool. He was a campaigner for biodiversity and wrote and edited a number of books on the subject. He sought to convince people of the necessity of conserving the entire gene pool, not only selected species.

Sir Otto enjoyed many non-scientific pursuits: trout fishing, skiing, gardening and architecture. He and his second wife, Margaret Anderson, built a house in Christchurch which appeared in two architectural books. Sir Roy Grounds, the architect of the Academy's Dome, designed the Frankels' third house in Campbell, ACT. Its garden is a manifestation of Sir Otto's botanic skills and love of gardening.

Japan reception *continued from page 12*

where island arc structures have been welded onto the ancient core of the continent. Professor Kennett said these similarities have generated strong links between Australia and Japan in the earth sciences and he detailed diverse Australia–Japan collaborations.

Dr Osamu Takikawa, a visiting fellow at the University of Wollongong, told the audience how Australia and Japan have combined forces to combat cataract, the main cause of blindness in the world. Scientists at the University of Wollongong have recently discovered that an unstable metabolite of tryptophan could be implicated in lens coloration, the predominant feature of the disease. The key enzyme used to produce the metabolite, IDO, was discovered in Japan and has been studied extensively by Japanese scientists, including Dr Takikawa. Japan and Australia are now working

together to develop an inhibitor specific for IDO to help delay, or even prevent, the onset of this disabling disease.

The final speaker, Dr Alexander Zelinsky, from the Australian National University, discussed human-friendly robots. He defined a 'robot' as an independent, self-sustaining mechanism equipped with autonomy and its own energy sources. Dr Zelinsky believes human-friendly robots will be the next frontier in science and technology and he presented recent results in this area.

A closing speech was given by the Vice-President of the Academy of Technological Sciences and Engineering, Mr Martin Thomas.

Earlier in the day, seven former fellows of the Science and Technology Agency postdoctoral fellowship and short-term program discussed the

program with staff of the agency and of the Japan International Science and Technology Exchange Centre. The former fellows gave presentations on their experiences in Japan, what they liked about the program and what could be improved.

Biographical memoirs

A number of biographers have been appointed to write memoirs of former Fellows for publication in *Historical Records of Australian Science*. Dr RI Sommerville and Professor Chris Bryant will write about Professor WP (Buddy) Rogers, Dr Peter Hannaford will write about Sir Alan Walsh, Professor Frank Fenner and Professor Stuart Harris will write about Dr HC (Nugget) Coombs, and Dr Lloyd Evans will write about Sir Otto Frankel.

Reception celebrates links with Japan

A reception was held at Becker House on Friday 13 November 1998 to recognise, strengthen and celebrate the links between Australian and Japanese scientists. It was organised by the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering, as a part of the 10th anniversary celebrations of the National Science and Technology Centre. It was supported by the Japan Science and Technology Agency.

The reception was an opportunity to advertise the important scientific exchanges between Australia and Japan. The majority of the Academy's programs with Japan are fully funded by the Japanese government. The Academy also administers an exchange program of its own which enables eight Australian scientists to visit Japan annually, and eight Japanese scientists to visit Australia each year. Six Japanese-funded programs are administered by the Academy, four with the Japan Science and Technology Agency, and two with the Japan Society for the Promotion of Science.

The audience of scientists, diplomats and others was welcomed by Professor Brian Anderson, the President of the Academy of Science. A speech by the Japanese Ambassador, Mr Takahashi, followed. Mr Takahashi highlighted the positive and rewarding relationship

between Australian and Japanese scientists and said that 'a certain significance and priority has been given to the effective networking of the two countries' scientists and engineers, through the researchers' exchange and dissemination of information'. He concluded with the hope that the reception would provide 'a key occasion for both Australian and Japanese scientists to realise the significance of bilateral collaboration and to strengthen their research links'.

A short speech by the Director of Questacon, Dr Mike Gore, preceded seven Australian and Japanese scientists who spoke on a variety of subjects, outlining the benefits of their international alliances.

Dr Keith Boardman, a former head of CSIRO, gave a speech on the plant sciences, which detailed the valuable links between Australian and Japanese scientists. This association has been particularly useful in the field of plant production, especially in reference to photosynthesis.

Professor Ikuzo Tanaka, the Chancellor of Musashi Gakuen, gave an outline of science in Japan. Professor Tanaka is a renowned chemist, a former president of the Tokyo Institute of Technology and a member of the Japanese Council for Science and Technology.

The Academy's Secretary (Science Policy), Professor John White, talked about small science at big science facilities. He noted the large numbers of scientists who use big science facilities for little science experiments and how this is more cost-effective than performing little science experiments at lower powered facilities. He addressed the need to provide cutting edge infrastructure for the broad scientific community.

Dr Kiyofumi Matsuda, a Japanese scientist currently visiting the Department of Physical Optics at the University of Sydney, described his experience of research co-operation with Australia in the field of optical measurements. Dr Matsuda has worked in Australia on two occasions and collaborated on many research projects with Australian scientists while living in Japan. Dr Matsuda recently received an award for work done in Sydney.

From the ANU, Professor Brian Kennett spoke about 'Young Islands - Old Continent: Earth science links between Japan and Australia'. The creation of the Japanese islands by the continuing subduction of the Philippine and Pacific plates provides a model for the margin of the Australian continent from 300 million years ago,

continued on page 11



Participants in the Australia-Japan science reception.