AUSTRALIAN ACADEMY OF SCIENCE

NEWSLETTER

January–March 1998 http://www.science.org.au Number 39

Innovation a key to prosperity

The Academy of Science has welcomed the overall strategy of the Federal Government's $1.26 billion *Investing for Growth* industry statement, which was launched in December. The statement includes a $1 billion commitment to increase targeted support for innovation and provision for specific incentives to attract strategic investment projects to Australia.

The President of the Academy, Sir Gustav Nossal, said, 'In a harsh competitive world, schemes to support industry R&D are one of the few World Trade Organisation-approved tools left to improve economic performance. We welcome the overall strategy. Government should have longer-term plans for developing the industries that will provide wealth and jobs for our future.'

Sir Gustav also welcomed the importance placed on international activities, saying, 'There are powerful benefits to Australia from international collaboration in science and technology due to the international nature of scientific discovery. Informal networks make a strong contribution to this and individuals are the key resource.'

He was also pleased at the introduction of 50 new Australian Postgraduate Awards (Industry) to further build industry–university links.

But it was not all good news.

The Academy is concerned that basic research could lose funding as research goals become focused on meeting industry needs. 'We are concerned that the proposed refocusing to immediate industry needs may exclude Australian researchers from a seat at the table in many small to medium-scale science and technology initiatives. There is a danger in failing to distinguish basic and strategic research from application.'

The Academy was cautious about the maintenance of the 125 per cent R&D tax concession, preferring a return to the 150 per cent concession, which 'had the benefit of simplicity and avoided the higher costs associated with discretionary grants schemes.'

Sir Gustav urged the government to maintain a commitment to the continuation of the Cooperative Research Centre program, a successful means of building the international links that help Australian companies validate their high-tech products in overseas markets.

Science Now! a new forum

Science Now!, a new national science forum, will be held at the Melbourne Exhibition Centre, from 7 to 10 May 1998, collocated with the Great Australian Science Show.

The most important element of *Science Now!* will be fresh science: scientists starting to make their mark in the world of science will be encouraged to present their work to the media and the public. A scientific committee will select the topics. Key criteria include that the work has not received significant media attention and that the scientist can present the work in a way that makes it interesting and relevant to the media. Nomination criteria will be circulated in mid-February.

Other streams will include public debates and forums on cloning and other topical issues, professional development workshops and a youth program.

For more information, contact Niall Byrne by phone on (03) 5253 1391, mobile 0417 131 977 or by email on **niall@aahl.dah.csiro.au**.

French and Belgian visitors

The Academy's President, Sir Gustav Nossal, right, and Foreign Secretary, Professor Michael Pitman, left, met the Vice-President of the French Academy of Sciences, Professor Guy Ourisson, second from right, and Professor Jacques Reisse of the Belgian Academy of Science, third from left, in January. Joining the discussions were the French Ambassador, His Excellency Mr Dominique Girard, middle, the Embassy's Scientific Counsellor, Professor Gerard Siclet, second from left, the Academy's Secretary for Science Policy, Professor John White, third from right, and Professor Ron Johnstone of the Academy of Technological Sciences and Engineering.

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Environmental protection through taxonomy – the case for ABRS

The President of the Academy of Science, Sir Gustav Nossal, argued strongly in a submission to the program evaluation of the Australian Biological Resources Study (ABRS) that funding for the study be increased. (See *AAS Newsletter* number 38 for an earlier report on the Academy's support for the ABRS.)

Sir Gustav argued that the ABRS makes an invaluable contribution to the general scientific community through its three major subprograms of research, training and provision of biodiversity data. 'The roles of the modern taxonomist are not only to identify museum specimens, a seemingly simple task which belies the years of experience needed to provide accurate identifications. They also encompass accurate and reliable species identifications for a variety of purposes including screening of quarantine pests, ecological indicators, pathogens, vectors of diseases and parasites, and identifications used in detailed biogeographical studies. Without such accurate identifications provided by taxonomists, the validity and usefulness of the subsequent analyses are rendered virtually meaningless.'

The submission pointed out that some estimates suggest that Australia is home to more than 600 000 species but during the past decade the workforce required to describe and classify this biota has been seriously eroded through funding cuts. The Academy estimates that the annual funding level required to support ABRS research and publishing is about $5 million.

The Minister for the Environment, Senator Robert Hill, indicated in December that funding for the ABRS would be increased in 1997–98 to $1.2 million.

Forthcoming events

The next National Science and Industry Forum will be held on Tuesday 7 April 1998 at the Australian Academy of Science (the Dome). The topic is *Endocrine disruption: Australia's role in an international issue*. For information, contact Faye Nicholas, phone (02) 6247 5777, fax (02) 6257 4620, or email **faye.nicholas@science.org.au**

A new national science forum, *Science Now!*, will be held in Melbourne from 7 to 10 May 1998. See page 1.

Publications available

Historical records of Australian science, volume 11, number 4.

For more information on publications email **aas@science.org.au**

The Basser Library

Anyone wishing to use the Basser Library should contact the librarian, Rosanne Walker, telephone (02) 6247 3966 or email **Rosanne.Walker@asap.unimelb.edu.au**

New topic on *Nova*

- El Niño – riding the climate roller-coaster

The address of the *Nova* science web site is **http://www.science.org.au/nova/**

Scientists reflect: new television series

Four interviews from the *Video Histories of Australian Scientists* project will be shown on Optus Vision cable television channel 55 in Melbourne and Sydney. The series will feature Professor Frank Fenner, Sir Rutherford Robertson, Dr Douglas Waterhouse and Professor Chris Christiansen. Screening times are Fridays at 7.30pm, starting 20 February and continuing fortnightly, with repeats on Sundays at 5.00pm, starting 22 February.

Conferences

The Academy's web site has a list of forthcoming conferences in Australia and New Zealand. Press the button on the Academy's home page.

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.

Managing diversity in higher education

Both the Council of the Academy of Science and the Academy's National Committee for Chemistry have made further submissions to the Review of Higher Education Financing and Policy, chaired by Mr Roderick West. The Academy made a submission in April last year (see *AAS Newsletter* number 36) and the President of the Academy, Sir Gustav Nossal, and the Secretary for Science Policy, Professor John White, made oral submissions in September.

The review was set up early last year by the then Minister for Employment, Education, Training and Youth Affairs, Senator Amanda Vanstone, and has released a policy discussion paper entitled *Learning for Life*.

The Council's submission welcomes the West Committee's vision of wide access to post-secondary education. However, the discussion paper fails to point out the current high quality of the Australian higher education system and to link this with the need for a greater variety of offerings to undergraduate and graduate students. The submission states, 'The major challenge is to produce diversity, maintaining equity, opportunity and excellence at all levels and from a geographical point of view.' In recent times, diversity has suffered as the national higher education system has unified and new universities have set themselves up according to traditional models. This has led to a proliferation of academically oriented teaching and structures.

The submission also welcomes the Committee's emphasis on teaching quality but criticises the 'efficiency gains' of recent years that have jeopardised the social dimension of education, 'a costly but irreplaceable aspect of the highest quality education at all levels'. Students with the talent and ability should be able to move into scholarship and research. The high cost of their postgraduate courses should be met, at least partially, by redistribution of the current higher education budget to meet the equity criterion. This could be partially offset by fuller use of concentrated infrastructure such as libraries and costly equipment.

Smaller tertiary institutions need to have the resources to encourage research for academic staff. This could be achieved through internal competition for the home institution's funds and through access to unique facilities at bigger universities and at major national and international facilities, as occurs with many smaller colleges in the United States.

The Academy is concerned about the training of science teachers. 'In science, some 70 per cent of teachers have not been trained in subjects like mathematics, physics and chemistry which they are obliged to teach. This trend of non-expert teachers having to teach well beyond the limits of their training must be reversed.' This could be achieved by introducing 'HECS fee waiver scholarships' for those students willing to make a commitment to up to five years' teaching in schools.

Although the quality of the higher education research system cannot be doubted, in terms of basic research Australia is probably neither distributing resources as well as it could nor maintaining international collaborations as in the past. As well, science itself has become less attractive to students as an academic career as public appreciation of the discipline, security of tenure and remuneration have all decreased. The future differentiation of the higher education system must recognise this, regardless of the funding for basic research.

The submission strongly criticises the discussion paper's national priority settings and foresighting, describing them as 'misguided and reminiscent of failed eastern European dirigisme'.

'For applied research and engineering the opportunities for collaborative work with industry need encouragement. Individuals in the universities and industry have a prime responsibility for this and schemes such as the Cooperative Research Centre program, the SPIRT scheme of the Australian Research Council and the START scheme of the Department of Industry, Science and Tourism should be strengthened. Present indications are that despite major research student participation and onflow to industry, the Cooperative Research Centre scheme is likely to be attenuated.'

Chemists define research

The National Committee for Chemistry's second submission argued that the discussion paper's proposed 10 to 20 year perspective should involve progressive changes over time rather than sharp step changes. This would minimise the effect of errors and allow an opportunity for changes of policy direction if required.

The proposed fully deregulated post-secondary education system should be differentiated but integrated. The submission argues that 'universities should still be the prime focus for pure basic research and that CSIRO and other government agencies should have as their fundamental focus strategic basic and applied research, while the TAFE sector could be involved more with applied research.'

The chemists support the broadening of research training for higher degree students to include more explicit emphasis on generic skills, while maintaining the study of open-ended research problems as the primary focus.

Australian to head nutrition agency

At the August 1997 General Assembly of the International Union of Nutrition Sciences (IUNS), Professor Mark Walqvist was elected President-Elect. His four-year term as President begins at the next General Assembly in Vienna in 2001. He is a member of the Academy's National Committee for Nutrition.

Professor Wahlqvist is head of Medicine at the Monash Medical Centre, a member of the Board of the Australian and New Zealand Food Authority, Chair of the Food Safety Council of Victoria, Chair of the Australasian Nutrition Foundation, and Chair of the recently formed Federation of Australian Nutrition Organisations

The IUNS has responsibility for food security, food safety, sustainability of food supply, environmental degradation, the production and processing of food and the use of genetically modified organisms.

Rapid change needed in land management

The Academy's National Committee for the Environment responded in November to the draft report of the Industry Commission's Inquiry into Sustainable Land Management. The draft report, entitled *A Full Repairing Lease*, was released in September.

Many of the commission's basic conclusions were supported: the need for change in the development of markets for key natural resources, the inadequacy of regulation for sustainable land management, the need for education at all levels about ecologically sustainable land management, and the case for removal of subsidies.

However, the Committee emphasised the need for whole-of-government measures to ensure rapid change in land management. In the Committee's opinion, the commission's proposed measures will operate too slowly to ensure that all sectors of society adopt the 'duty of care' approach. The Committee stated, 'The most important principle that should be adopted is that any activity that involves destruction of the environment is eventually life-threatening and socially unacceptable. This places the need for duty of care as a higher requirement than the need for financial success.'

The commission's report fails to address the fact that, historically, the pre-eminent users of resources have the strongest advocacy in maintaining the status quo and in requiring all alternative users to prove their case. 'The law in most cases supports the current (that is, within the past 200 years) users. Thus, pastoral leases, soldier settlement schemes, irrigation and hydro-electric authorities and similar government-backed schemes are endorsed through established legislation and usage, and are often inflexible in their operation.'

A 'no regrets' policy is endorsed by the report but the National Committee feels that, as the principal reasons for massive natural resource degradation in Australia are a combination of historical and current inappropriate government policies, all tiers of government should review all laws, policies and programs to achieve consistently sustainable resource use.

Science built on international networks

'Building international networks is something Australian scientists have had to be good at to overcome the "tyranny of distance". As a result, Australia has a valuable resource of a high-quality base of science, engineering and technology with extremely strong links to the rest of the world,' said Professor Michael Pitman and Professor Greg Tegart in the introduction of a report launched at the annual general meeting of the Academy of Technological Sciences and Engineering in November.

The report, entitled *International science and technology: its value to Australia and the role of the Academies*, looks at international cooperation in science, technology and engineering involving public and private sector research and suggests expanded international roles for the Academies of Science and Technological Sciences and Engineering.

'While Australia is a modest player in international science and technology as measured by its output (2 per cent of total publications),' the report says, 'the quality of its science, engineering and technology capability and the strength and richness of its international recognition and alliances, formed out of the necessity of Australians to travel to be part of the international scene, have served to build a strong position at a time when international networks have become so important.'

The report points out the importance of personal contacts in establishing trust and building long-term relationships with overseas universities and organisations: 'Experience as postdoctoral fellows, on study leave or at conferences is a well-established catalyst for the relations.'

Industry links help companies apply science and technology both locally and overseas. Australia is seen by countries in the region as an inventive nation with very able scientists and technologists. Not only must this perception be maintained but Australians must also recognise the technological capabilities of companies from countries such as Korea and Taiwan.

While the government has a substantial responsibility for international cooperation, the report argues that the academies, with their experience in international science and technology programs, can help to bring individual scientists together. As non-government organisations, the academies can, through their contacts, promote Australia's interests in countries where there is no formal link between governments. The report states, 'They can provide the bottom-up support to the top-down policy development by government departments.'

Copies of the report are available from Rachel Douglas at the Academy, email **ns@science.org.au**.

Research grants harder to get

The Academy has criticised the limited amount of funds available to the Australian Research Council (ARC) for the support of high quality research and researchers. The criticism came as the 1998 ARC large grants were announced. The grants support high quality research by individuals or research teams, mostly in universities. They are allocated for specific research projects on a competitive basis.

The President of the Academy, Sir Gustav Nossal, said that over the last two years the success rate of ARC grant applications had declined from 23 per cent to 20 per cent, putting enormous pressure on the selection process and denying opportunities for many talented researchers. The Academy argued that funding should be increased so that at least 33 per cent of qualified proposals received funding.

'We are very worried about the effect that funding cuts and shortfalls are having on morale in universities, especially on younger scientists,' Sir Gustav said. 'At this stage of Australia's history, we should be nurturing and cherishing our young talent. The Academy has recommended to the government that high priority be given to new funding to be reserved for younger researchers.'

Primary Investigations on the Web

The Chairman of the Australian Foundation for Science, Mr John Ralph, launched the *Primary Investigations* World Wide Web site at the Foundation's annual general meeting on 25 November 1997.

Primary Investigations is a science, technology and environment program for primary schools. It consists of seven teacher resource books and five student books that allow students to work in teams to carry out activities using simple equipment. There is also an inservice workshop program providing training for teachers. *Primary Investigations* has received wide acclaim.

The web site will extend the information available to primary school teachers about the program. Users can find the latest media releases about the program, background information about its development, tips for teachers, lists of trainers, sponsorship for schools, and an electronic form for ordering the *Primary Investigations* package.

The address of the *Primary Investigations* web site is **http://www.science.org.au/pi**

…and on Optus Vision

During the last school term, Optus Vision in Sydney and Melbourne screened a three-part introductory series about *Primary Investigations* on their educational channel 55. The series was produced by Optus Vision in Melbourne.

The series covers teaching strategies, cooperative learning, classroom organisation, equipment and assessment. It features the *Primary Investigations* project director, Dr Denis Goodrum, and the Academy's development officer, Dr Nancy Lane, along with footage from the 'Do-it-yourself' inservice video package. St Bernadette's Primary School in West Ivanhoe, Victoria, helped to trial the series.

The series can be used by schools to decide whether to purchase *Primary Investigations*, to inform parents about the program, or to train new teachers in schools where the program is already running. It can also be supplemented with hands-on activities for use as a professional development workshop for school staff. A facilitator's manual is available free of charge from the Academy for this purpose. Contact Nancy Pritchard toll-free on 1800 673 383.

The *Primary Investigations* series will be screened again on Optus Vision channel 55 as follows:
Wednesday 4, 11 and 18 March at 3.30pm (Melbourne, Sydney, Brisbane)
Thursday 5, 12 and 19 March at 6.30pm (Melbourne and Sydney).

Supported by the Australian Foundation for Science

Students from St Vincent de Paul Primary School, Canberra, test their wind indicators from a Primary Investigations *lesson on the weather. Juanita Rilometo from the Marshall Islands, a science educator sponsored by UNESCO, observes the class.*

Pioneer award for teachers

Pioneer International Ltd, one of the world's largest building materials companies, has announced sponsorship of the Pioneer Award for Science Teachers. The award will enable three science teachers to attend the Academy's Annual General Meeting symposium and education workshop in Canberra on 30 April and 1 May 1998. The topic is *Pests and People: Prospects for 2020.* Speakers will discuss the latest research into biological control of pest species.

The award includes free registration for the symposium, workshop and talks by Academy medal winners; return airfares to Canberra; accommodation; and a formal dinner with Fellows of the Academy.

Selection for the award will be based on merit. Selection criteria include the applicant's involvement in classroom teaching related to the symposium topic, contributions made to science teaching generally and plans to disseminate the information gained at the symposium to colleagues.

Application forms are available on the Australian Science Teachers Association home page at **http://sunsite.anu.edu.au/asta/** or phone the Association secretariat on (02) 6282 9377 or fax (02) 6282 9477. Closing date for applications is Friday 20 March 1998.

Supported by the Australian Foundation for Science

Nova award

The Academy's *Nova* web site was judged the best science site at the recent Australian Internet Awards. Pictured with the award are the Chairman of the Australian Foundation for Science, Mr John Ralph, and the Academy's Managing Editor, Ms Maureen Swanage. The *Nova* site was created with funding from the Australian Foundation for Science, BHP and the Science and Technology Awareness Program of the Department of Industry, Science and Tourism. The site's address is **http://www.science.org.au/nova**

The effects of public policy reform on research and development

The President of the Academy of Science, Sir Gustav Nossal, outlined the Academy's views on public policy reform in a submission last December to the Inquiry into the Effects on Research and Development of Public Policy Reform in the Past Decade. The Inquiry is being conducted by the House of Representatives Standing Committee on Industry, Science and Technology.

In its submission, the Academy pointed out that the introduction of the 150 per cent tax rebate in 1985 allowed business expenditure on R&D to more than double from about $1.5 billion per annum to $4.2 billion per annum in 1995–96. This figure is still less than the OECD average. Current suggestions are that the reduction to a 125 per cent rebate in the 1997–98 budget has resulted in a drop in the level of R&D activity.

Sir Gustav said that the syndicated R&D arrangements introduced in 1987 to encourage institutional investors to invest in R&D projects had produced economic benefits for Australia in excess of its costs. The scheme was replaced in 1996 by the START program because of concern about increased costs to revenue. However, the Academy would have preferred a return to the 150 per cent tax concession, as the tax had the benefit of simplicity and avoided the higher costs of discretionary grants schemes.

The Academy was critical of the proposal in the government's December Industry Statement *Investing for Growth* that policy and program delivery be separated. 'We believe in many cases this will reduce essential feedback from the customer base. Business needs consistency of delivery and interpretation of the rules. Corporate knowledge, expertise and professionalism within research funding and performing organisations should not be scarified in bids to encourage outsourcing.'

Planning lower secondary science

Researchers from the University of Western Sydney, the Queensland University of Technology and Edith Cowan University met with Professor Neville Fletcher, Academy staff and senior education officials on 8 December 1997 to discuss the results of their studies to improve science education at the lower secondary level.

Gentle scholar looks at fertilisers

A forestry graduate from New South Wales, Neil Cowley, has recently returned from two years at the University of Washington, where he conducted research and masters course work in the use of organic residuals in forestry. Neil was the inaugural recipient of a postgraduate scholarship in forestry science funded by the Stanley Wallace Gentle Fund. This fund was established in 1990 to commemorate the life and work of Dr Wal Gentle, an outstanding forest scientist and administrator.

Neil's research and course work focused on gaining an increased understanding of soil science, the relationships between soils and forest productivity and an appreciation of the current use of organic residuals (composts and fertilisers) in forestry. The scholarship also enabled Neil to experience forest management practices in the Pacific Northwest and to understand the social, cultural and economic differences between forest management in North America and Australia.

In his report to the Wal Gentle Scholarship Committee, Neil said, 'Washington has 25 years of experience of use of biosolids [fertilisers] in forest management and is a world leader in organic residuals management. I had ample opportunity to view current state of the art practices and review past mistakes.'

During his scholarship, Neil completed the course work requirement for a Master of Science (Ecosystems Analysis). The thesis, entitled 'Relationships between biosolids application and understorey in Douglas fir stands in western Washington', examined the understorey compositional change in older Douglas fir stands treated with heavy rates of fertilisers in the early 1980s, measured the herbaceous understorey growth after fertiliser application to two-year-old stands, and determined the nitrogen accumulation rates for the understorey in stands of different ages.

'Although these three projects are site-specific to Douglas fir,' Neil said, 'the general concepts on biosolids applications are transferable to Australian ecosystems. If biosolids are used in native systems, the threshold level of fertilisation on species change would need to be considered, as well as the relationship between the successional type of understorey and the understorey's role in nitrogen accumulation and cycling.'

The next Wal Gentle Scholarship will be taken up at the University of Melbourne and discussions are in progress for a second scholarship at the University of Washington.

Academy's visit to Korea

The Academy of Science, the Academy of Technological Sciences and Engineering and the Australian Research Council have a memorandum of understanding with the Korea Science and Engineering Foundation (KOSEF) to promote cooperation in science and technology. To discuss the operation of this program, the Academy's Foreign Secretary, Professor Michael Pitman, and the International Programs Officer, Ms Thérèse Lewis, visited Korea and Taiwan during October 1997.

The visit coincided with the Academy's President, Sir Gustav Nossal, attending the opening of the International Vaccine Institute in Seoul, which led to preparation of a draft memorandum of understanding between the Australian Academy and the Korean Academy of Science and Technology.

The meeting with KOSEF agreed that the priority areas under the joint academies' agreement will be the environment, light alloys, pharmaceuticals, aquaculture, and biotechnology. It also identified other areas of mutual interest between Australia and Korea, such as the eradication of disease, the human genome program, communications and technology.

It was agreed that in future the exchange program should build on exchanges already initiated in selected areas to develop the long-term interactions that make effective cooperation possible. Mr Andrew McCredie, Counsellor, Industry, Science and Tourism at the Australian Embassy in Seoul, reported that, as Korea is a resource-intense economy, Australian scientists perhaps gain greater benefit by preparing focused research projects that have clear objectives and offer up-to-date technology. An example of this is a biotechnology joint venture between Seoul National University and the University of New South Wales. He said that networking between Australia and Korea is improving and Korea is expected to pursue commercial links in Australia.

Other visits were made to the Korea Advanced Institute of Science and Technology; the Korea Research Institute of Bioscience and Biotechnology; the Department of Microbiology at Seoul National University; the Science and Technology Policy Institute; and the Pohang University of Science and Technology. In a number of these places, Korean scientists commented on their knowledge of science and technology in the USA and their need to be better informed about Australia. Australian understanding of Korean capability is equally important.

Mr Byung-Ock Chung, Director-General of the Division of International Cooperation at the Korea Science and Engineering Foundation, with Professor Michael Pitman in Seoul in October.

It was evident that there has been a worthwhile growth of collaboration between Korea and Australia including student exchanges and that the Academies' exchange program has made a useful contribution to this growth.

The commitment to science in Korea has been impressive, and indications are that despite the current economic problems the need to continue support for research is recognised.

Cooperative Research Centres deserve support

In a submission to the Review of Approaches to Greater Commercialisation and Self Funding in the Cooperative Research Centre (CRC) program, the Academy recommended that a prime policy goal for Australia in the next century should be the production of a greatly enlarged knowledge-based industry. The review is being conducted by the Departments of Finance and of Industry, Science and Tourism and will make recommendations about ways in which greater commercialisation, stronger private sector financing and reduced public funding could be introduced to the CRC program. It is due to report in April 1998.

The Academy's submission proposed that a joint development program be established to complement the CRC's ability to link the science base of national, tertiary education and science agency research sectors. The program would help products at the prototype phase be carried through the development phase and from there to manufacture.

The program should provide funding, on a competitive basis, for CRCs, research agencies and universities that have a marketable product. Public funding need not be large as the major part of the funding should come from the industrial partner and from venture capital.

The Academy strongly supported the current CRC program. In the last few years, the program has involved major industrial firms, has led to new products for development, has enabled 50 per cent of students graduating through the CRC link programs to find employment in industry and has helped to change the culture within the tertiary education sector, government agencies and industry. The submission stated, 'In the most general sense, the CRC program can be seen as a true industry support program by providing tangible inputs for commercialisation, contributing to a major culture change in favour of greater entrepreneurial activity and sensitivity to opportunities for commercial exploitation of scientific discoveries.'

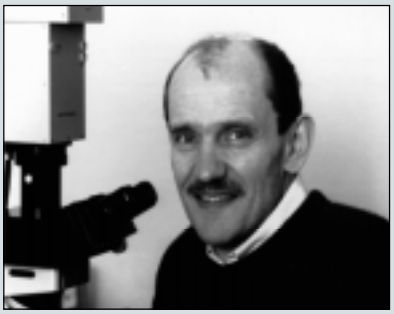
National Science and Industry Forum

Tuesday 7 April 1998
Australian Academy of Science (the Dome), Canberra

Endocrine disruption: Australia's role in an international issue

Please contact Faye Nicholas for information: phone (02) 6247 5777, fax (02) 6257 4620, email **faye.nicholas@science.org.au**

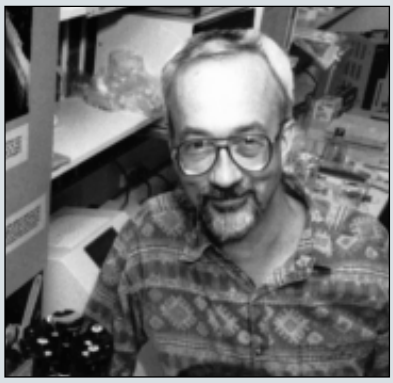
Bede Morris Fellows



Dr David Hampson
Rhône-Poulenc Fellow

Dr Robert Mensah
Rhône-Poulenc Awardee

Dr Edith Sevick
French Embassy Fellow



Dr James Pickles
Australia–France Foundation Fellow

Seven Australian scientists will visit institutions in France in 1998 under the Bede Morris Fellowship Scheme. The scheme, set up in 1989, honours the achievements of the late Professor Bede Morris, an immunologist at the Australian National University, who formed close ties with the French scientific community.

The scheme's major sponsor is Rhône-Poulenc Australia, a division of the international pharmaceutical and chemical company. The company conducts research into animal health and nutrition, genetics and vaccines as well as producing speciality chemicals, fibres and polymers, and agricultural chemicals and seeds. Other sponsors are the French Embassy, the Australia–France Foundation and the Commonwealth Government.

Dr David Hampson, of the Division of Veterinary and Biomedical Sciences at Murdoch University in Western Australia, will take up the Rhône-Poulenc Fellowship for 1998. He will visit the Unité de Bactériologie Moléculaire et Médicale at the Institut Pasteur in Paris for 17 days to optimise methods to isolate the spirochaete bacterium, *Serpulina pilosicoli*, from human and animal blood. Murdoch University is working on methods to control infections of this bacterium in pigs and poultry and, as French scientists have recently isolated it in the blood of critically ill patients, it is now imperative to find out if it is also invading the bloodstream of human patients in Australia.

Dr Hampson has had 10 years' experience working with intestinal spirochaetes and has organised and edited the first textbook written on these bacteria, published in 1997. He has collaborated with Dr Isabelle Saint Girons, of the Unité de Bactériologie Moléculaire et Médicale, who is his main host for the trip. Although Dr Hampson has had considerable success working with intestinal spirochaetes in animals, his work has been constrained by the lack of access to human patients and by the non-availability of the best techniques for isolating the bacteria from blood.

The Rhône-Poulenc Awardee is **Dr Robert Mensah**, a research entomologist at the Australian Cotton Research Institute at Narrabri in New South Wales. Dr Mensah will spend six weeks at the Institut National de la Recherche Agronomique, studying responses of the moths, *Sesamia nonagroides* and *Ostrinia nubilalis*, to a newly developed natural pest food supplement, Envirofeast. The moths are major pests of maize in France and are controlled exclusively by the use of synthetic insecticides. As the major focus of the grains industry is to reduce its dependence on synthetic insecticides, research is focused on managing these pests via alternative methods. Envirofeast, a product developed by Dr Mensah, is added to food and can deter egg-laying in *Helicoverpa* species, another cotton pest. Dr Mensah's work in France will examine how Envirofeast can stop the moths laying eggs on maize.

The French Embassy Fellow is **Dr Edith Sevick**, of the Research School of Chemistry at the Australian National University. Dr Sevick will spend five weeks at the Institut de Chemie des Surfaces et Interfaces in Mulhouse, studying the stacking of disk-like molecules and the compression of water-soluble polymers at surfaces. Disk-like molecules forming rod-like aggregates (sometimes one molecule in thickness) show behaviour similar to that of living polymers. Some of these could serve as molecular wires for charge transport, while some (with hollow cores) can form molecular channels or molecular templates. These stackings are also surface active and stabilise emulsions (for example, asphaltenes and resins play a detrimental role in oil recovery as they stabilise oil and water emulsions). Dr Sevick's collaboration with the Institut is probably one of the first joint theory and experiments to examine the stacking of disk-like molecules.

The study of water-soluble polymers that are capable of hydrogen bonding with a solvent has practical relevance to the stabilisation of colloids in water. Dr Sevick will examine the compression of such hydrosoluble

bound for France

surfaces, how compression changes the way the polymer layer dissolves and how this affects aggregation.

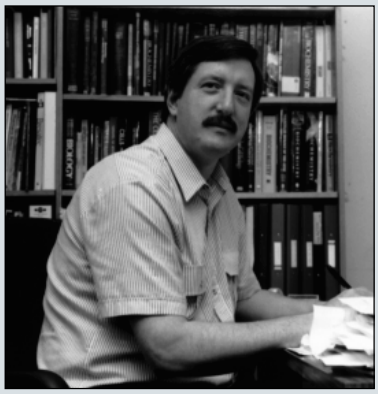
Dr James Pickles, of the Vision, Touch and Hearing Research Centre at the University of Queensland, is the 1998 Australia–France Foundation Fellow. Dr Pickles will study the mechanisms of pathology and repair in the inner ear at the CHU Hôpital St Charles at Montpellier for nine weeks. The nerve supply to the inner ear is easily damaged by loud noise and by ischaemia (a reduction in the blood supply). This can cause massive swelling and destruction of auditory nerve fibre terminals where they contact the receptor cells of the inner ear. The process of self-repair over several days of these nerve terminals in animals has been studied at the Montpellier laboratory. Dr Pickles will be looking at the signalling molecules known to be involved in the repair and growth processes. One such class of molecules is the group known as eph-class receptor tyrosine kinases. These molecules are surface receptors on cells and affect growth and repair processes. If the results of the experiments are positive, it could be possible to stimulate the signalling pathway pharmacologically to reverse this sort of deafness in humans.

Three scientists will take up Commonwealth Fellowships this year.

Associate Professor Rodney Devenish, of the Department of Biochemistry and Molecular Biology at Monash University in Melbourne, will spend three weeks at the Institut de Biochimie et Génétique Cellulaires du CNRS in Bordeaux, studying the energy production of living cells. The project will use yeast as a model system to examine the biochemical role of subunit 8, a small membrane-associated component of the ATP synthase of mitochondria. Mitochondria are the principal powerhouses of fungal and animal cells and ATP is the energy source of living cells. The results of the project will provide information about the structural and functional organisation of ATP synthases in animals and humans, especially the diseases and ageing associated with the defective energy function of cells.

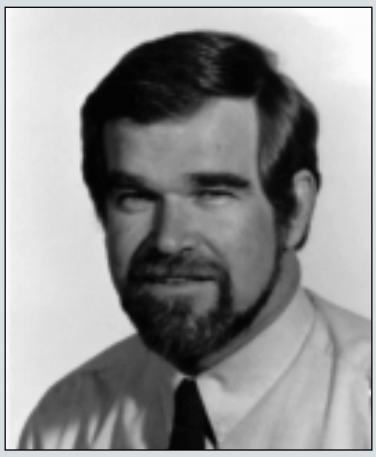
Associate Professor Bastiaan Hensen, of the Department of Applied Geology at the University of New South Wales, will spend six weeks at the Laboratoire de Pétrologie Cristalline at the Université de Rennes, studying the thermal and tectonic evolution of the deep continental crust. The project will investigate the geological processes in the earth's deep crust during the Proterozoic era, about 1500 to 1800 million years ago. The results, to be published in internationally refereed science journals, will contribute to the understanding of the formation and evolution of the continental crust over time and the genesis of the economically important ore deposits found in deep crustal rocks worldwide. Professor Hensen will be able to use the unique Laser-Raman spectrometry facility in Rennes to study minute mineral grains in high temperature pseudotachylites, collected during the 1996 field season by the University of New South Wales.

Associate Professor Richard Keene, of the School of Biomedical and Molecular Sciences at James Cook University in Townsville, will study electron and energy transfer in metal assemblies at the Laboratoire de Chimie Organo-Minérale at the Université Louis Pasteur in Strasbourg over six weeks. In photosynthesis, light energy is absorbed and is used to promote chemical reactions that produce foods, such as carbohydrates. The flow of energy through the organism is controlled by the arrangement of components in an enzyme matrix. The same principles apply in artificial materials designed for light harvesting. The project could help the development of new materials for solar cells. Professor Keene will be able to combine expertise from his laboratory in the isolation of stereoisomers of metal complexes with the French expertise in energy transfer within molecules in transition metal complexes.



Associate Professor Rodney Devenish Commonwealth Fellow

Associate Professor Bastiaan Hensen (right), Commonwealth Fellow



Associate Professor Richard Keene Commonwealth Fellow

Scientific exchanges with China and Japan

China

Six Australian scientists will visit China in 1998 and 1999 under the exchange program between the Australian Academy of Science and the Chinese Academy of Sciences.

Professor Patricia Vickers-Rich and **Dr Thomas Rich**, of the Earth Sciences Department at Monash University in Victoria, will visit the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing in July 1998 to study the relationship between dinosaurs with V-shaped or U-shaped teeth in China and Australia.

Dr Zheng Li, of the School of Electrical, Computer and Telecommunication Engineering at the University of Wollongong in New South Wales, will go to the Institute of Systems Science at the Chinese Academy of Sciences in Beijing in February 1999 to develop an adaptive control method for the control of unknown time-varying random systems.

Dr Tianshun Liu, of the Materials Division of the Australian Nuclear Science and Technology Organisation, will visit the National Engineering Research Centre for High Performance Homogenised Alloys in Shenyang in October 1998 to develop an advanced calcium oxide-based refractory for use in crucibles or as a lining for melting high grade alloys.

Dr Shishan Bao, of the Department of Veterinary Pathology at the University of Sydney, will travel to the Shanghai Institute of Cell Biology at the Chinese Academy of Sciences in August 1998 to study the role of the soluble factor TGF-ß in transgenic mice in the regulation of immunoglobulin-A, which provides defence against pathogens in mucous membranes.

Dr Stuart Hudson, of the Fusion Plasma Research Laboratory at the Japan Atomic Energy Research Institute in Ibaraki, Japan, will go to the Institute of Plasma Physics at the Academia Sinica in Anhui in February 1999 to analyse the magnetic field structure and the magneto-hydro-dynamic equilibrium of the Chinese tokamak, HT6M, and to help the Chinese nuclear fusion research project.

Japan

Five Australian scientists will travel to Japan in 1998 and 1999 under the exchange program between the Australian Academy of Science and the Japan Society for the Promotion of Science.

Dr Tim Baker, of the Department of Mathematics and Statistics at the University of Melbourne, will go to the Research Institute of Mathematical Sciences at Kyoto University from July 1998 to July 1999 to investigate algebraic aspects of quantum many-body systems.

Dr Craig Hayward, of the School of Biological Sciences at the University of New England, will visit the Graduate School of Agricultural and Life Sciences at the University of Tokyo from April 1998 to April 2000 to study whether freshwater eels and the harmful gillworms they harbour coevolved throughout the world.

Dr Du Q Huynh, of the Department of Computer Science at the University of Western Australia, will visit the Department of Computer Science at Gumma University in Kiryu from April 1998 to March 2000 to investigate a scheme to remove the statistical bias that noise produces in the image data used in stereo vision systems.

Mr Andrew Kricker, of the Department of Mathematics and Statistics at the University of Melbourne, will go to the Department of Mathematical and Computing Sciences at the Tokyo Institute of Technology from June 1998 to May 1999 to study topological quantum field theories to aid the understanding of the different ways surfaces can glue to one another.

Miss Mei Wei, of the School of Materials Science and Engineering at the University of New South Wales, will visit the Division of Materials Chemistry at Kyoto University from April 1998 to March 2000 to investigate the development of a bioactive composite that will mimic the structure and mechanical properties of natural bone, and which could be used for repairing bones or for implants requiring high loads.

Australia Day honours

Three Fellows of the Academy and one Corresponding Member received honours on Australia Day.

Professor Grant Sutherland, Director of the Department of Cytogenetics and Molecular Genetics at the Women's and Children's Hospital, Adelaide, has been made a Companion in the General Division of the Order of Australia (AC). He received the honour for his research into human genetics and the human genome project and for his contribution to the discovery of the importance of fragile chromosomes in inherited diseases.

Sir Robert May, a Corresponding Member of the Academy, Chief Scientific Adviser to the United Kingdom Government and Head of the Office of Science and Technology, has been made a Companion in the General Division of the Order of Australia (AC) for his research in biological conservation involving the interaction between population, resources and the environment, for his scholarship and for the formulation of science policy.

Dr John Phillip, Fellow Emeritus at the Laboratory for Environmental Mechanics at the CSIRO in Canberra, has been made an Officer in the General Division of the Order of Australia (AO) for his work in hydrology and in promoting the interests of science for the community, and for promoting Australian culture, particularly architecture and literature.

Dr Stephen Boyden has been made a Member in the General Division of the Order of Australia (AM) for developing scientific ideas and for his scholarship in human ecology.

Biographers

Professor Pauline Ladiges, of the University of Melbourne, and Dr Donald Gaff, of Monash University, will write a biographical memoir on the late **Professor Bruce Knox** for publication in *Historical records of Australian science*.

Dr Barbara Briggs, of the Royal Botanic Gardens in Sydney, will write a biographical memoir on the late **Professor Lawrie Johnson**.

Deaths

John Booker

The Professor of Engineering Mechanics and Head of the School of Civil and Mining Engineering at the University of Sydney, Professor John Booker AO, died on 13 January 1998.

John Robert Booker was born in Sydney on 24 July 1942. He gained an honours degree in applied mathematics at the University of Sydney in 1965 and gained his PhD in engineering there in 1970, researching applications of theories of plasticity for soils. In 1983, he was awarded the degree of Doctor of Engineering by the University of Sydney – a very rare honour, which has only been bestowed on three civil engineers in the history of the university.

Dr Booker's early work involved the application of the mathematical theory of plasticity to the theory of soil stability. This included the study of a perfectly plastic anisotropic solid, a basic reference in this area. This highly theoretical work later found a practical application in the study of the bearing capacity of fissured clay and rocks.

During the 1970s, two fundamental papers co-authored by Dr Booker helped to determine the behaviour of offshore structures founded on soils whose strength increased with depth from the mud-line. There had been some previous investigations of such materials using approximate engineering (slip circle) methods but these methods had been shown to be inadequate for the size and type of the structures. Dr Booker's papers proved that the failure pressure that can be applied at the mud-line increases from a value of zero at the edge at precisely the same rate as the soil strength increases and provided results to estimate the safety factor of gravity platforms.

After this time, the emphasis of Dr Booker's work changed to the study of the time-dependent and inelastic behaviour of soil and rocks.

The 1970s saw Dr Booker's career take him to the University of California, Berkeley, in 1976 as the Senior Fulbright Scholar Research Engineer. Later that year, he spent four months at Kings College, University of London. In 1979, he was a research fellow at Cambridge.

Dr Booker is credited with the solution to a number of the problems of the consolidation of saturated soils. He evaluated the solution for the time settlement behaviour of a surface footing resting on a layer of finite depth which overlaid rigid bedrock. He also found analytical solutions that took into account the anisotropic behaviour of both the deformation and flow properties.

An investigation of storm loading on offshore structures established that the design practice used at the time was unduly conservative. The computer program, GADFLEA, developed during the investigation, is still used for the analysis of offshore gravity structures.

Dr Booker played an important role in the development of finite layer methods, which are used to analyse a horizontally layered deposit made up of a number of soils that have linear (but possibly time-dependent) behaviour.

In the 1980s, Dr Booker turned his attention to developing a simple theory to explain whether burying radioactive waste in remote parts of the sea floor would result in contamination as water saturating the marine sediments was heated by the radioactive waste, fracturing the soil and allowing waste to escape. Dr Booker found a simple analytic solution which showed that, although the increase in temperature around the soil caused the pore pressure to rise, there was an accompanying flow of water from regions of high water pressure to regions of low water pressure. This flow caused the thermally generated pore pressures to dissipate and mitigated the danger of soil fracture.

Dr Booker was appointed to the Chair of Engineering Mechanics in the School of Civil and Mining Engineering at the University of Sydney in 1985. He became Head of the School in 1989 and Pro Dean of the Faculty of Engineering in 1990.

He was elected to the Fellowship of the Academy in 1995 and was a member of the Academy's National Committee for Theoretical and Applied Mechanics.

In 1997, he received the award of Officer in the General Division of the Order of Australia (AO) for his scientific achievements.

Honours to Fellows

Dr Liz Dennis, Chief Research Scientist of the CSIRO Division of Plant Industry in Canberra, won the 1997 Avon Spirit of Achievement Award in November 1997. Dr Dennis is studying the role of genes in how plants know when to flower and how they react to stress. She will use the $15 000 grant in a project called The Discovery Centre, an interactive program funded by the ACT Government and Optus aimed at enhancing the public's understanding of and interest in science.

Professor John Pate, of the Department of Botany at the University of Western Australia, was awarded a 1997 Australian Minerals and Energy Environment Foundation Environmental Excellence Award in October. He received the award for his extensive contribution to our understanding of the plant ecological processes of Western Australia, his commitment to cooperation between botanical ecologists and the mineral industry, and for his teaching and inspiration of a generation of mineral industry ecologists.

Fenner conference on research ethics

The ethics of research and management practices in World Heritage areas was the topic of the Fenner Conference on the Environment, held in Canberra in November 1997. The Fenner conferences are supported by Professor Frank Fenner and the late Mrs Fenner and aim to bring together scientific, administrative and policy experience to consider environmental problems in Australia and to help form policies to alleviate the problems.

Despite sweltering in the heatwave that hit Canberra at the time of the conference, the more than 100 participants overcame the difficult conditions to tackle enthusiastically this difficult topic.

There has been a great deal of controversy in recent times over a number of research programs in the Great Barrier Reef World Heritage Area and other world heritage areas. Conservation groups, the scientific community and the public have called for national ethical guidelines for World Heritage and environmentally sensitive areas. The conference used two half-day workshops, involving case studies covering a range of research and management issues, to develop recommendations and draft ethical guidelines. These will be submitted to Commonwealth and state governments for their consideration.

The outcomes of a study by the Australian Science, Technology and Engineering Council, which reviewed procedures for assessing the appropriateness of research, ethical issues associated with the conduct of research and the development of draft ethical guidelines, were made available to participants as background material.

Conference themes included:

- How do we value and manage World Heritage and environmentally sensitive areas?
- What are the social and ethical issues arising from the conduct of manipulative research and management practices in World Heritage and protected areas?
- What are the principles and procedures for determining ethical practices?

The Fenner conference was sponsored by the Australian Institute of Marine Science, the Australian Science, Technology and Engineering Council, the Bureau of Resource Sciences, the CRC Reef Research Centre, Environment Australia and the Great Barrier Reef Marine Park Authority.

Reviewing the review: Academies Forum

A National Academies Forum, entitled *Reviewing the Review*, was held in Canberra on 8 December 1997. The forum looked at the Review of Higher Education Financing and Policy's discussion paper, *Learning for Life* (see the report 'Managing diversity in higher education' on page 3).

Topics included 'Does *Learning for Life* prepare us for the future?', 'The global context' and 'What's missing in *Learning for Life*?', funding and research issues, and technology. Mr West, Chair of the Committee, made a response at the end of the forum.

The President of the Academy of Science, Sir Gustav Nossal, said in his summing up, 'The Australian Academy of Science found much to like in *Learning for Life*. It applauds the strong defence of the role of universities in the first chapter. It finds the concept that every Australian should have access to five years of some kind of post-secondary school educational experience at some time of life novel, ambitious and appealing. It strongly supports the courageous statement that the commitment of government funding to higher education should increase or at least stay the same.'

However, Sir Gustav said that the Academy would have liked to see more emphasis placed on the public good aspect of universities, rather than on the private good gained by individual students. 'I venture to suggest that 40 per cent of university funding should be primarily related to scholarship and research and should be more sharply differentiated from the cost-per-student style of arguments.'

The Academy believes that the discussion paper's approach to research is 'seriously under-cooked'. A greater proportion of the total university cake should go to the Australian Research Council and research, while the National Health and Medical Research Council should be funded out of a different pot but should keep pace. The Academy is especially concerned about younger academics because if Australian Research Council large grants only go to 20 per cent of applicants, the chances of younger academics competing on an equal footing are slight. More attention should be paid to the morale problems and career worries of younger academics as losing many overseas would be a national tragedy.

Finns keen to collaborate

The Foreign Secretary, Professor Michael Pitman, left, welcomed a delegation from the Academy of Finland to the Academy in January. They discussed the further development of scientific cooperation between Australia and Finland, particularly possible collaborations in the fields of the environment, forestry, paper production, machinery, telecommunications and electronics.