

AUSTRALIAN ACADEMY OF SCIENCE

Submission to the Committee of
Review of the Learned Academies

August 2005



Australian Academy of Science

Terms of Reference for the 2005 Review of the Learned Academies

The Review of the four Learned Academies, and of their joint consultation and coordination mechanism, the National Academies Forum (NAF), will assess the performance of the Academies in promoting and advancing their respective fields of endeavour, supporting their international affiliations and providing independent expert advice to Government, and consider how they can most effectively discharge these roles in the future.

In particular, the Review will:

- (a) Evaluate the efficiency and effectiveness of the Academies in carrying out their distinctive mandates in the natural and social sciences, the humanities, and the technological sciences and engineering;
- (b) Examine the value and performance of the Academies, and of the National Academies Forum, as sources of independent expert advice to Government on matters related to their respective fields of expertise;
- (c) Consider and advise on the scope for new or expanded roles for the individual Academies, and for the National Academies Forum, in meeting the needs of Government in line with the objectives of the Learned Academies Grant Program; and
- (d) Assess and recommend on the level of funds needed to meet Government and community expectations of the Academies under the Learned Academies Grant Program.

Objectives of the Department of Education, Science and Training's Learned Academies Grant Program

- To assist the Academy in maintaining itself as an independent organisation that promotes research and scholarship in the natural and applied sciences;
- To assist the Academy in maintaining itself as an independent source of advice to the Government;
- To assist the Academy of Science in providing support for affiliations with appropriate international organisations;
- To maintain the Academy of Science as a focal point for contact between the Government and the communities represented by the Academy;
- To assist the Academy in supporting those of its activities which are considered to be of value to Government and which the Government might otherwise have had to undertake;
- To assist the Academy of Science to undertake activities that are in the national interest and to contribute to broad Government and Departmental objectives.

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Executive summary

This submission to the 2005 Committee of Review of the Learned Academies addresses each of the four terms of reference of the review and takes into account the six objectives for the Department of Education, Science and Training (DEST) in providing a grant-in-aid.

For more than fifty years the Australian Academy of Science has provided independent scientific advice to the nation and promoted a scientific culture and a long-term scientific vision within Australian society. Some 380 Australian scientists are Fellows of the Academy of Science and their honorary contributions to science policy, science education, public awareness of science and international science relations are underpinned by a secretariat of twenty people.

The activities of the Academy of Science are supported by administration of some government programs, investment income, annual Fellowship subscriptions, donations, competitive research grants, tenders, sponsorships, income from publications and the grant-in-aid.

This submission describes some of the activities of the Academy of Science in the past five years (terms of reference (a) and (b)), including a new emphasis on fostering the recognition and professional development of early-career researchers.

Under term of reference (c), the Academy of Science identifies three areas where it could expand its activities:

- an expanded level of science policy studies;
- a higher level of activity in international science-industry partnerships;
- a higher level of leadership in science capacity building in the Asia-Pacific region.

Under term of reference (d) we present our financial report for the year ended 30 June 2005 and identify a number of areas where we have an excellent track record and a proven product, but where funding is short-term or precarious. The Academy of Science suggests that the grant-in-aid be effectively doubled to support the strong expectations in the science community that these highly successful initiatives be allowed to flourish.

The Australian government recognises the Academy as a resource of high-level expertise on scientific matters, as an authoritative source of advice on national issues involving science and its applications, and as a body that provides evidence-based leadership in protection and management of the national estate.

In seeking a doubling of government grant-in-aid, we seek to nurture future generations of scientists by exposing them to scientific issues of national and international importance, to ensure a long-term scientific vision for Australian society.

Jim Peacock

AC PresAA FRS FTSE

August 2005

Introduction

For more than fifty years the Australian Academy of Science has provided independent scientific advice to the nation. Some 380 Australian scientists, selected by their peers on the basis of their scientific attainments, make up the Fellowship of the Academy of Science. The Academy of Science was founded in 1954 by Australian Fellows of the Royal Society of London, with the distinguished physicist Sir Mark Oliphant as Founding President. Her Majesty Queen Elizabeth II granted a Royal Charter establishing the Academy as an independent body, but with government endorsement. The Academy's constitution follows that of the Royal Society of London¹. It receives a modest grant-in-aid from the Australian government for support of its activities, but has no statutory obligation to government.

As stated in the Strategic Plan (**Appendix 1**), it is our vision that the Academy of Science be the prime representative of Australian natural and applied sciences, a champion for scientific excellence in Australia and an independent adviser on Australian scientific research, teaching and technological innovation. Our mission is:

- to advance the development of a scientific culture and a long-term scientific vision within Australian society;
- to sustain a national learned academy for the recognition of excellence in scientific research and achievement;
- by advising government and other bodies, to promote the understanding that high-quality science teaching, research and innovation are essential elements for the advancement of Australian society.

The activities of the Academy of Science are supported by investment income from bequests, annual subscriptions, donations, competitive research grants, contract work, tenders, sponsorships, income from publications and a grant-in-aid from the Australian government through the Department of Education, Science and Training (DEST). This grant is the subject of the five-yearly review in 2005. It is intended that the grant-in-aid to the Academy of Science will assist it in attaining the Australian government's objectives. In 2004-2005 the grant-in-aid was \$304,000 for general activities and \$517,000 for international scientific activities, including subscriptions to international Scientific Unions. Each year, the Academy of Science submits a report to DEST. The *Australian Academy of Science Annual Report 2004-2005* is given as **Attachment 1. Annual Reports** for the past five years are available on the Academy's website².

¹ *The Australian Academy of Science: The First Fifty Years*. Ed. F. Fenner, Australian Academy of Science, Canberra, 2005.

² www.science.org.au/reports/anrep.htm

Term of
reference (a)

Evaluate the efficiency and effectiveness of the Academy of Science in carrying out its distinctive mandate in the natural and applied sciences

In providing funding to the Academy of Science, the Australian government, through DEST, has six objectives that are outlined in the grant-in-aid contract. These objectives are key to evaluating the efficiency and effectiveness of the Academy of Science. The following section addresses those six objectives, under the headings 1 to 6.

1. To assist the Academy of Science in maintaining itself as an independent organisation that promotes research and scholarship in the natural and applied sciences

The Academy of Science maintains itself as an independent organisation that promotes excellence in scientific research through elections to Fellowship of the Academy, through presentations of awards to young and senior researchers for scientific achievements and through an annual celebration of scientific attainments by young Australians in the Frontiers of Science program.

The Academy's Fellows

The Fellowship of the Academy of Science is made up of about 380 of Australia's top scientists, distinguished in the physical and biological sciences and their applications. Each year up to sixteen scientists, judged by their peers to have made an exceptional contribution to knowledge in their field, are elected to Fellowship of the Academy. Election is subject to a searching appraisal of the candidate's published works, including reference to leading scientific researchers around the world. Fellows contribute to the Academy of Science in an honorary capacity by serving on Council, committees and as advisers.

Fellows may be elected on the basis of distinguished contributions to science by means other than personal research, but no more than two Fellows may be elected in this fashion every three years. A small number of distinguished foreign scientists with substantial connections to Australian science are elected as Corresponding Members. In turn, many Fellows of the Academy of Science receive honours from distinguished overseas academies: for example, sixty-three Academy Fellows are also Fellows of the Royal Society of London and fifteen are Foreign Associates of the US National Academy of Sciences.

The Fellows of the Academy elect the Council of seventeen which manages the business of the Academy. The decisions of the Council are carried out by the secretariat of about twenty people in Canberra, supervised by the Executive Committee. The Executive Committee comprises the seven officers of the Academy: the President, Secretary (Physical Sciences), Secretary (Biological Sciences), Foreign Secretary, Secretary (Science Policy), Secretary (Education and Public Awareness) and the Treasurer. Officers serve for a term of four years and ordinary members of Council for three years.

The Academy's awards

The encouragement and reward of excellence in science is at the heart of the ethos of the Academy of Science. The Academy awards several medals each year. The Pawsey Medal is awarded to a young physicist, the Gottschalk Medal to a young medical researcher, the Fenner Medal to a young biologist and the Dorothy Hill award to a young woman geoscientist. Among other awards are the Ian William Wark Medal and Lecture, and the Rees Lecture, both established to encourage those whose research bridges science and industry, and the Thomas Ranken Lyle Medal, for research workers in mathematics and physics.

In alternate years the Academy of Science holds the Matthew Flinders and Macfarlane Burnet lectures, given by senior physical and biological scientists. There are also medals or lectures in chemistry (the David Craig Medal), Earth sciences (the Mawson Lecture, the Jaeger Medal, the Haddon King Medal) and in mathematics (the Moran Medal, the Hannan Medal).

Support for scholarship is provided on a competitive basis for research conferences (the Boden, Fenner and White Research Conferences), for travel to conferences in the earth and plant sciences and in physiology, for visiting lecturers to Australia (the Lemberg and Selby Travelling Fellowships) and to support forestry research and study (the Jacobs and Gentle Funds).

The Academy of Science, in conjunction with the Academy of Technological Sciences and Engineering, organises the Sir Mark Oliphant International Frontiers of Science and Technology Conferences with the support of the Australian government.

Information about the Academy's awards, travelling fellowships and national conference support is given on the Academy's website³.

Frontiers of Science Program

The Academy of Science has initiated an innovative event to showcase Australia's rising research science talent, Frontiers of Science. This series copies unashamedly the successful program initiated by the US National Academy of Sciences. The second event in the Frontiers of Science program was held at the Walter and Eliza Hall Institute of Medical Research in Melbourne on 12-13 April 2005. The symposium series represents an exciting initiative designed to bring together some of Australia's best young scientists to present and discuss emerging science and technology, highlight and discover new opportunities, and share cutting-edge advances in their fields. It involves participants from universities, government and industry, and the topics cover a diverse range of biological and physical sciences. Over the course of the event some sixteen young scientists present their latest research, explaining what they

³ www.science.org.au/awards

do and why, in an interactive format. The process has enabled much cross-disciplinary bridging and forged new associations. Proceedings of the 2005 event are available on the Academy's website⁴.

2. To assist the Academy of Science in maintaining itself as an independent source of advice to the government

The Academy of Science has a wealth of expertise that enables it to be an independent source of advice to government, and from its foundation has broadened the base of its expertise through the appointment of National Committees, bringing together Fellows and non-Fellows. The National Committees have extensive networks and affiliations with national professional scientific societies and international Scientific Unions. The Academy of Science also engages with industry, teacher organisations and, particularly, with early-career researchers in a regular forum known as the High Flyers Think Tanks. As issues become increasingly complex, the Academy of Science works closely with the other learned academies. Evidence for the performance of the Academy of Science in providing independent expert advice to government is given later in this document under term of reference (b); here we discuss the structures put in place to ensure access to a range of perspectives and to a broad base of expertise.

National Committees

The role of the twenty National Committees of the Academy of Science is to foster a designated branch of natural or applied science in Australia, to serve as an effective link between Australian scientists and overseas scientists in the same field, and to advise Council on relevant matters. The National Committees, their memberships in 2004-2005 and their affiliations with other national organisations are given in **Appendix 2**. The activities of the individual National Committees are outlined in the Academy's *Annual Reports*. National Committees are frequently called on for advice on science policy matters, as described under term of reference (b), on proposals for Academy sponsorship of scientific conferences and on proposals for grants from special purpose funds.

National Committees prepare documents on the state and outlook of their respective disciplines. For instance, the National Committee for Astronomy is currently undertaking a decadal review of Australian astronomy and astrophysics, while the National Committee for Mathematical Sciences is undertaking a national strategic review of mathematical sciences. These reviews follow a *National strategic plan for the geosciences*, October 2003⁵, prepared by the National Committee for Earth Sciences.

⁴ www.science.org.au/events/frontiers2005

⁵ www.science.org.au/natcoms/earth-strategic.pdf

National Committees maintain active links with relevant scientific societies and international organisations, the latter of critical import for a small and isolated nation that produces between 2-3 per cent of the world's scientific papers. The National Committees are assisted in their meetings and other activities by the Academy of Science's secretariat, and the Secretaries host a biennial meeting of Chairs of National Committees in Canberra to encourage best practise by sharing ideas for the efficient and effective operation of the Committees.

High Flyers Think Tanks

Underpinning all of the Academy's activities is the awareness that we need to engage and encourage Australia's early- to mid-career researchers, not only for their own career development, but also because they have so much to offer! In each of the past four years the Academy has hosted a High Flyers Think Tank for fifty to seventy young researchers, on topics of national importance. Each Think Tank has generated a publicly available report that has also been presented to government. These reports have been highly regarded and are a credit to the participants of the Think Tanks. In a very short time the Academy's Think Tanks have become prestigious events and an invitation to attend is recorded proudly on the participant's curriculum vitae.

The first Think Tank (2002) addressed *National Research Priorities*, inviting leading younger scientists to come up with some research priorities for Australia. Their submissions⁶ on Healthy, Wealthy and Wise, and a tool-kit for science, were widely commended – and indeed did not look very different from the final set of priorities that emerged from Cabinet. Subsequent topics have been *Safeguarding Australia* (2003), *Emerging Diseases* (2004) and *Biotechnology and the Future of Australian Agriculture* (2005). The reports^{7, 8} from these Think Tanks are available on the Academy's website and the 2005 event is described in a recent Academy Newsletter (**Attachment 5**). The Think Tanks will continue to be held in different Australian capital cities.

National Academies Forum

As issues become increasingly complex, the Academy of Science engages increasingly with the other learned academies, either in partnership with the Academy of Technological Sciences and Engineering or with the National Academies Forum (NAF). The Academy of Science provided the secretariat for NAF for four years (2001–2004) and the Presidency for two years (2003–2004), and has strongly supported and indeed subsidised this organisation

⁶ www.science.org.au/events/priorities/highfly.htm

⁷ www.science.org.au/events/safeguarding_australia

⁸ www.science.org.au/events/emergingdiseases

in past years, directly and in-kind. A separate submission to the Review Committee from the National Academies Forum has been provided.

3. To assist the Academy of Science in providing support for affiliations with appropriate international organisations

International Council for Science

The Academy of Science is Australia's representative on the International Council for Science (ICSU) and many of its constituent organisations. The Academy has taken a leading role in Australia in some other international programs, for example the International Geosphere Biosphere Program (IGBP) that is funded outside the grant-in-aid.

The Academy of Science administers funds on behalf of the Australian government to engage with international scientific organisations with a minimum of bureaucracy and administrative cost for maximum effect. About two-thirds of the DEST grant-in-aid (\$517,000 in 2004-2005) is expended in subscriptions to ICSU and more than thirty international Scientific Unions and programs. The grant-in-aid also supports Australian voting delegates to attend business meetings of the international Unions and meetings of the National Committees within Australia. At any time about 300 Australians hold honorary offices in ICSU organisations.

Recently, the Academy of Science undertook an ARC-funded study on *Maximising the benefits of Australia's formal linkages to global scientific activities*⁹ to examine mechanisms to enhance Australian scientific involvement in global scientific programs, including the mechanism of subscriptions to international Unions. A copy of the report is given as **Attachment 2**. An analysis of the subscription levels to the major global Scientific Unions suggested that Australia is paying at appropriate levels to most of these organisations. However, the Academy has been under increasing pressure to maintain its international obligations, especially in the environment of widely fluctuating currency exchange rates. With the help of advice from the National Committees, the Academy has reduced or cut some membership subscriptions to international Unions in recent years. It has proved increasingly difficult to provide adequate support for the National Committees; following a meeting of the Chairs of National Committees in April 2002, these have been streamlined by mergers and reduced in number from twenty-nine to twenty.

An important responsibility of National Committees is to bid for, and host, international congresses of ICSU Unions in Australia. To date, fifteen international congresses associated with ICSU Unions have been held in

⁹ www.science.org.au/reports/linkages.htm

Australia¹⁰. Recent congresses held in Australia include the 41st General Assembly of the International Union of Pure and Applied Chemistry in Brisbane in 2001, the 25th General Assembly of the International Astronomical Union in Sydney in 2003, and the Joint International Association of Geodesy (IAG)/ the International Association for the Physical Sciences of the Ocean (IAPSO)/ the International Association for Biological Oceanography (IABO) in Cairns in 2005.

Plans are in place to host a number of international congresses in future years:

- XXIX meeting of the Scientific Committee on Antarctic Research (SCAR), July 2006, Hobart, Tasmania;
- IGU (International Geographical Union) Regional Conference, July 2006 Brisbane;
- XVII INQUA (International Union for Quaternary Research) Congress, July, 2007, Cairns;
- 18th International Botanical Congress, July 2011, Melbourne;
- 34th International Geological Congress, August 2012, Brisbane.

The Academy of Science encourages National Committees to organise international congresses in Australia, not only for national economic benefit, but to showcase Australian science and to provide opportunities for younger Australian scientists to be exposed to cutting-edge science and scientists.

Inter-Academy Panel on International Issues (IAP)

The primary goal of IAP is to help member academies work together to provide advice on scientific aspects of critical global issues. It is particularly interested in helping younger and smaller academies to achieve these goals. The Academy of Science has been a member of IAP since its inception in 1993 and was a member of the IAP Executive from 2001 to 2003. IAP has released statements on scientific capacity building, science education, science and the media, access to scientific information and mother and child health. The Academy of Science has provided input to IAP on Australian science education for the IAP portal, and into a statement calling on the United Nations to ban human reproductive cloning, but not the use of cloning techniques for approved research in cell biology.

Federation of Asian Scientific Academies and Societies (FASAS)

FASAS was established in 1984 to promote greater awareness of the roles of science and technology in nation building and regional development. The Academy of Science is one of sixteen member academies and has been a member since 1995. The FASAS secretariat is based in Kuala Lumpur. The

¹⁰ Appendix 16: *The Australian Academy of Science: The First Fifty Years*. Ed. F. Fenner, Australian Academy of Science, Canberra, 2005.

Academy of Science will host the 2005 meeting of the FASAS executive in Canberra on 7-9 September. This network of academies can be mobilised quickly to share information, in the case of extreme events, such as SARS and the Indian Ocean tsunami, and in the case of future threats such as pandemic influenza.

4. To maintain the Academy of Science as a focal point for contact between the government and the communities represented by the academies

The Academy of Science is a focal point for contact between government and scientific communities in a number of ways. The President of the Academy of Science is, by virtue of that position, a member of a number of government-appointed committees, including the Prime Minister's Science, Engineering and Innovation Committee (PMSEIC), where he is expected to chair agenda working groups from time to time. The President also serves on the Prime Minister's Science Prize Committee and on high-level science policy committees.

The Academy of Science often partners with government agencies to bring together experts and policy makers to engage in think tanks, round tables, workshops and symposia. A recent initiative is the President's *soirée*, an evening meeting that brings together experts, policy makers and representatives from foreign missions in round-table discussion of issues of national and international significance, such as global dimming (June 2005) and recent advances in nuclear energy research (August 2005).

Appendix 3 lists some recent examples where the Academy of Science has been supported by government agencies to progress matters of science policy with the help of the scientific community. This work may be initiated by the Academy of Science or by government. The partnerships may be underpinned by contract work, as was the case for *A review of salinity mapping in the Australian context* for the Land and Water Resources R&D Corporation and for *A review of international climate change research* for the Australian Greenhouse Office. Other work is funded by competitive research grants from the Australian Research Council (ARC); examples of ARC-funded work include *Benchmarking Australian research in emergent areas of science and technology* and *A strategic framework for the population and environment nexus in Australia*. In some cases the partnership with government arises from competitive tender, as was the case when the Academy of Science was asked by the New South Wales Environmental Trust to evaluate its research grant program. More often, partnerships are sponsorships, underpinned by contractual arrangements, as typified by the recent sponsorship by Biotechnology Australia of the Academy's High Flyers Think Tank on *Biotechnology and the future of Australian agriculture* in August 2005.

The Academy of Science acts as a focal point for contact between government, scientific experts, community leaders, educators and industry, by hosting conferences and lectures on contemporary issues. As the owner and operator of an iconic building for science that includes a lecture theatre, this remains a privilege and an obligation. A list of the Academy's recent conferences and lectures is given in **Appendix 4**. Conference proceedings are made available on the Academy's website and published as hard-copy when in demand; this was the case with the symposium on *Measuring excellence in research and research training*, a symposium organised by the National Academies Forum and published by the Academy of Science at DEST's request.

The Academy of Science acts as a focal point for the science community when making submissions to government or parliamentary inquiries, or when developing position statements. This important function is expanded upon under term of reference (b). In one example of the coordination role of the Academy of Science, the National Committees have recently proved an exceptionally valuable resource in advising the government-appointed committee on national major research infrastructure, known as NCRIS (National Collaborative Research Infrastructure Strategy Advisory Committee). The National Committees undertook audits of skills and infrastructure needs in their disciplinary areas. The scoping studies were collated by the Academy's secretariat for submission to the Committee¹¹.

5. To assist the Academy of Science in supporting those of its activities which are considered to be of value to government and which the government might otherwise have had to undertake

The Academy of Science maintains international and national scientific relations on behalf of the Australian government as described elsewhere in this submission. In addition, the Academy of Science operates an international scientific collaborations program to improve Australian access to global science and technology in North America, Europe and North East Asia (**Appendix 5**). The program gives Australian researchers the opportunity to collaborate with foreign colleagues, to widen research perspectives and experience, to exchange ideas, to be recognised in the international arena, to gain information and knowledge of techniques that will stimulate and advance Australian research, and to be involved in large international projects. This scheme is funded by DEST's International Science Linkages Programme announced in the government's Innovation Statement, *Backing Australia's Ability*. It is funded outside the grant-in-aid, and will continue to be funded until at least 2010-2011.

¹¹ www.science.org.au/reports/25february05.pdf

6. To assist the Academy of Science to undertake activities that are in the national interest and to contribute to broad government and departmental objectives

The Academy of Science undertakes many activities that are in the national interest and contribute to the broad objectives of DEST. The Academy is particularly proud of its contributions to primary and secondary school science, commencing with the publication of school textbooks in 1965, initially for students in the last two years of secondary education and, more recently, for primary school science teaching with the launch in 1995 of *Primary Investigations*. *Primary Investigations* recently received a favourable independent review that led to DEST funding the early stages of a revitalised primary science project called *Primary Connections*, a program to inject scientific concepts and knowledge into the literacy program of primary schools.

Primary Connections

*Primary Connections*¹² is an innovative and exciting new initiative linking the teaching of science with the teaching of literacy in Australian primary schools. It is a partnership between the Academy of Science and DEST. *Primary Connections* provides a comprehensive approach to the development of scientific literacy and consists of a rich curriculum resource integrated with a professional learning program.

Eight units from the curriculum resource are being trialled in 2005 and refined for a rollout in 2006. The units have a ‘working scientifically’ focus, span all years of primary school, and map to the four strands of the National Statement and Profile for Science — Life and Living, Earth and Beyond, Energy and Change, and Natural and Processed Materials. An example of a trial unit for Stage 3 (the final two years of primary school) is given as **Attachment 3**.

Primary Connections aims to improve students’ learning outcomes in science and literacy. This will be achieved through innovative curriculum and professional learning resources that enhance teachers’ confidence and competence for science teaching. Linking science to literacy will enable teachers to use their time and resources more efficiently and allow students to demonstrate outcomes in science and literacy simultaneously.

Primary Connections is being developed in collaboration with key groups involved in the teaching of science and literacy. These include state and territory education departments, Catholic education, independent schools professional associations and the Academy of Technological Sciences and Engineering.

The first stage of the *Primary Connections* project was funded by the Academy of Science through its Australian Foundation for Science. Stage 2 is funded by the DEST as a quality teacher initiative under the Australian Government Quality Teacher Programme.

¹² www.science.org.au/primaryconnections

Nova: Science in the news

In 1997 the Academy of Science launched its educational website, *Nova: Science in the news*¹³. The Academy developed *Nova* to help overcome the curriculum gap between textbook theory and real-life applications of science and technology, and to assist Australian scientists to communicate their achievements more readily. The site now displays more than 80 topics, a number that is growing steadily, and the Academy ensures that the topics are constantly revised and brought up-to-date in terms of content and electronic links (**Appendix 6**).

Interviews with Australian scientists program

The Academy of Science established the *Interviews with Australian scientists* program in 1993 to record interviews with outstanding Australian scientists. The scientists talk about their early life, the development of their interest in science, their mentors, research work, and other aspects of their careers. The program includes videos, transcripts and teachers notes and is well-regarded by teachers and students and is becoming increasingly popular. More than 90 interviews¹⁴ have been recorded, including interviews with thirty-four women and twenty young scientists. The current focus is on interviewing Fellows of the Academy of Science.

Historical Records of Australian Science

The Academy's *Historical Records of Australian Science* is the journal of record for the history of science, pure and applied, in Australia and the southwest Pacific. It is published twice per annum; there is a strong community expectation, both within and outside the Fellowship, that the Academy of Science continues to produce this journal because it is a key resource for anyone studying the history of science. The journal publishes high-quality articles and reviews, biographical memoirs of deceased Fellows of the Academy of Science commissioned by the Council of the Academy, and an annual bibliography of the history of Australian science. The journal has a broad international readership and provides definitive and comprehensive biographical memoirs, historical perspectives from all fields of scientific endeavour, an annual bibliography on natural, applied and human sciences and reviews of books. The Academy of Science contributes about \$35,000 per annum to publication of this journal, plus pro bono writing and editing.

Public events

It is a community expectation that the Academy of Science will, from time to time, host free public lectures and provide community education in science

¹³ www.science.org.au/nova

¹⁴ www.science.org.au/scientists

more generally. The Academy has participated in the Australian Science Festival since its beginning in 1993. In 2004, the Academy developed a travelling exhibition in collaboration with the National Museum of Australia in recognition of the Academy's 50th anniversary¹⁵. The exhibition celebrates Australian science and acknowledges the role that Australian scientists have played. It has been displayed in museums in six states and territories in the past eighteen months and in September 2005 will move from Brisbane to Gin Gin in Queensland.

Science at the Shine Dome

Each year, the Academy of Science arranges three days of events known as *Science at the Shine Dome*, held in conjunction with the Annual General Meeting. The events feature presentations by the newly elected Fellows, talks by those winners of the Academy's awards and a major symposium. The programs are aimed at the educated layperson, and the public and media are encouraged to attend.

Research institutions are invited to sponsor early-career researchers to attend *Science at the Shine Dome* and this program is always oversubscribed. In addition, each year the Academy of Science supports an outstanding science teacher from each state and territory to attend the AGM symposium and education workshop. The symposium enables science teachers to meet and talk with Academy Fellows and other renowned scientists, as well as the best and brightest of their peers. They also have a unique opportunity to be brought up-to-date on the latest research developments and to consider future directions for Australian science and science education. The teachers are selected in consultation with the Australian Science Teachers Association.

Adolph Basser Library

The Adolph Basser Library was established in 1962 by a gift from Sir Adolph Basser. Its aim is to document the history of science in Australia and support related research. The collection, housed in the Shine Dome, contains printed and manuscript material, the latter providing a unique source for historical research. The library is an important resource for the community of scholars, as testified by the website hits.

The manuscript collection contains 208 sets of papers, ranging in quantity from a few sheets of correspondence to many hundreds of items. Individual scientists represented in the collection include significant figures in CSIRO such as Sir David Rivett, Sir Ian Wark and Dr Lloyd Rees, academics such as Professor Frank Fenner and Sir Ernest Titterton and more than sixty other

¹⁵ www.science.org.au/eureka

Fellows of the Academy of Science. The collection is not limited to Fellows; the papers of Sir Neil Hamilton Fairley, for example, are heavily used by people interested in malarial research. A number of scientific societies have also chosen the Basser Library as the repository for their archives with the Australian Institute of Physics and the Geological Society of Australia providing the largest collections.

The Library's manuscript collections are publicised throughout the archival community. In addition to being listed on the Academy's website, they are accessible through the National Library's Register of Australian Archives and Manuscripts (RAAM).

It is the expectation of the community of scholars that the Academy of Science provides public access to its collections and maintains the integrity of them. To this end, the Academy employs a qualified librarian with training in archival work.

Term of
reference (b)

Examine the value and performance of the Academy of Science as a source of independent expert advice to government on matters related to its field of expertise

The Academy of Science has published many reports on public issues such as national research priority setting, human cloning, stem cell research, genetic engineering, climate change, measuring dryland salinity, alpine grazing and space science. The Academy also makes submissions to government ministers and parliamentary inquiries. A list of recent reports and submissions is given in **Appendix 7**.

As mentioned earlier the President of the Academy is, *ex officio*, a member of the Prime Minister's Science, Engineering and Innovation Council, and Fellows of the Academy and members of the Academy's secretariat contribute to the working groups of the Council. The Council advises the Prime Minister on important scientific issues.

Every two years the Academy develops and publishes a policy statement¹⁶ on research and innovation (see **Attachment 4**, *Policy Statement on Research and Innovation in Australia, September 2003*) that provides an agreed policy base from which to respond quickly to requests from government. In addition, longer term, underpinning science policy studies are undertaken, funded by competitive research grants awarded under the Australian Research Council's Learned Academy Special Projects scheme.

Appendix 8 outlines the leadership of the Academy of Science in just one of its ongoing policy-related activities: setting the national priorities for research.

¹⁶ www.science.org.au/reports/10september03.pdf

The Academy of Science frequently calls on its National Committees for assistance with science policy matters. One recent submission in July 2005 includes a proposal¹⁷ from the National Committee for Medicine to the Legislation Review of Australia's Prohibition of Human Cloning Act 2002 and Research Involving Human Embryos Act 2002. This submission was based on many years of policy work undertaken by the Academy of Science in this area, commencing with the publication of a position statement, *On Human Cloning*¹⁸, in February 1999.

Other important recent submissions have been made to the Victorian government's Review of Alpine Grazing¹⁹ (Geography Committee), to the Victorian government's Review of Education in Mathematics and the Sciences²⁰ (Mathematical Sciences Committee) and to the Senate inquiry into the adequacy of Australia's funding of Antarctic research (Antarctic Research Committee)²¹.

National Committees are also encouraged to prepare occasional reports, as recently undertaken by the Earth System Science Committee on pan evaporation²².

Term of reference (c) **Consider and advise on the scope for new or expanded roles for the Academy of Science in meeting the needs of government in line with the objectives of the Learned Academies Grant Program**

An expanded role in science policy studies

The Academy of Science considers it could provide an expanded arrangement for offering advice, particularly science-for-policy advice, possibly based on the model of the National Research Council of the United States. The essence of that structure is a group of broad subject area Commissions which are supported by staff at arms length from government, and with sufficient funding to generate a steady output of reports. The working parties preparing those reports consist of unpaid experts nominated by the Commissions, subject to the policy guidance of a council constituted by the relevant academies.

The Academy of Science is well-placed to generate an expanded level of activity in science policy studies. A higher and consistent flow of fully-costed work is particularly important to develop competence in science-for-policy studies which require thorough processes of consultation and communication. These studies are needed to support informed public debate of the growing number of issues generated by the advance of knowledge.

¹⁷ www.science.org.au/reports/25july05.pdf

¹⁸ www.science.org.au/reports/clone.pdf

¹⁹ www.science.org.au/natcoms/geography-submission-june04.rtf

²⁰ www.science.org.au/natcoms/16december04.rtf

²¹ www.science.org.au/natcoms/antarctic-letter.rtf

²² www.science.org.au/natcoms/pan-evap.pdf

It should be recognised that the size of Australia's scholarly communities is modest and that those most qualified to contribute expertise have the least time. The Academy of Science considers that good support from competent salaried staff is essential to make the best use of the valuable honorary time of Australia's scientists.

A higher level of activity in international science–industry partnerships

The Academy of Science, in part because it is based in Canberra, has excellent relations with many of the foreign missions and a particular involvement with scientific attachées of those missions.

In addition, Academy Fellows and staff regularly host visitors and officials from foreign academies, science institutions and government departments to promote and encourage cooperation and to discuss international relations matters. The Academy's officers and staff have represented the Academy at various international meetings and visited foreign academies, and similar institutions. Reports about visiting international delegations are a standing item in the Academy's Newsletters²³ (**Attachment 5**).

Increasingly, the Academy of Science has been using these international contacts to foster international science–industry partnerships with Australian businesses. For instance, our close relationship with the Chinese Academy of Sciences enabled the Academy to introduce Academy Fellow Dr Bob Watts to appropriate contacts that enabled him to broker a formal agreement between BHP Billiton and the Chinese Academy of Sciences (**Appendix 9**).

From time to time, the Academy organises bilateral workshops at the request of DEST. For example, in October 2004 the Academy of Science and the Australian Academy of Technological Sciences and Engineering organised a workshop with the Chinese Academy of Sciences on the topic of sustainability. The Academy of Science received DEST funding for this meeting, which promoted science and technology between Australia and China and identified mutually agreeable priorities for long-term cooperation.

On behalf of DEST, the two Academies are organising a second workshop with the Chinese Academy in Beijing in October 2005, on the topic of biotechnology and nanotechnology. The Academy of Science, in leading the Australian delegation to China, has given particular attention to inviting representation from small and medium enterprises and will include representatives from Castella Research, Australian Surgical Design and Manufacturing, Heartware, Cochlear, ResMed and the Australian Stem Cell Centre.

²³ www.science.org.au/newsletters

The Academy of Science intends to continue expanding its role in facilitating international science–industry partnerships and has been working with FEAST (the Forum for European Australian Science and Technology Cooperation) to this end.

A higher level of leadership in science capacity building in our region

As mentioned earlier, Australia is one of sixteen member academies of the Federation of Asian Scientific Academies and Societies (FASAS). The FASAS secretariat is based in Kuala Lumpur. The Academy has taken the decision to markedly increase its support, including financial support, for FASAS, and will host the 2005 meeting of the FASAS Executive in Canberra on 7-9 September. The Academy of Science has been sharing its experiences in primary science education with the Executive of FASAS and is exploring other opportunities for capacity building in the region. The FASAS network of academies, that includes moderate Muslim countries, can mobilise quickly to share information and expertise.

The Academy of Science was represented at the Malaysian Science and Technology Convention in August 2005, where Academy Fellow Dr Bob Watts presented a plenary address on ‘Keys for effective R&D management to encourage collaboration among researchers, industry and the government towards successful innovation and commercialisation’. It is the observation of the Academy of Science that Australia does not use science as effectively as some other countries as a foreign policy tool. This is a challenge for the Academy to consolidate its credentials in fostering international collaboration among researchers, industries and governments with a particular focus on the Asia–Pacific region.

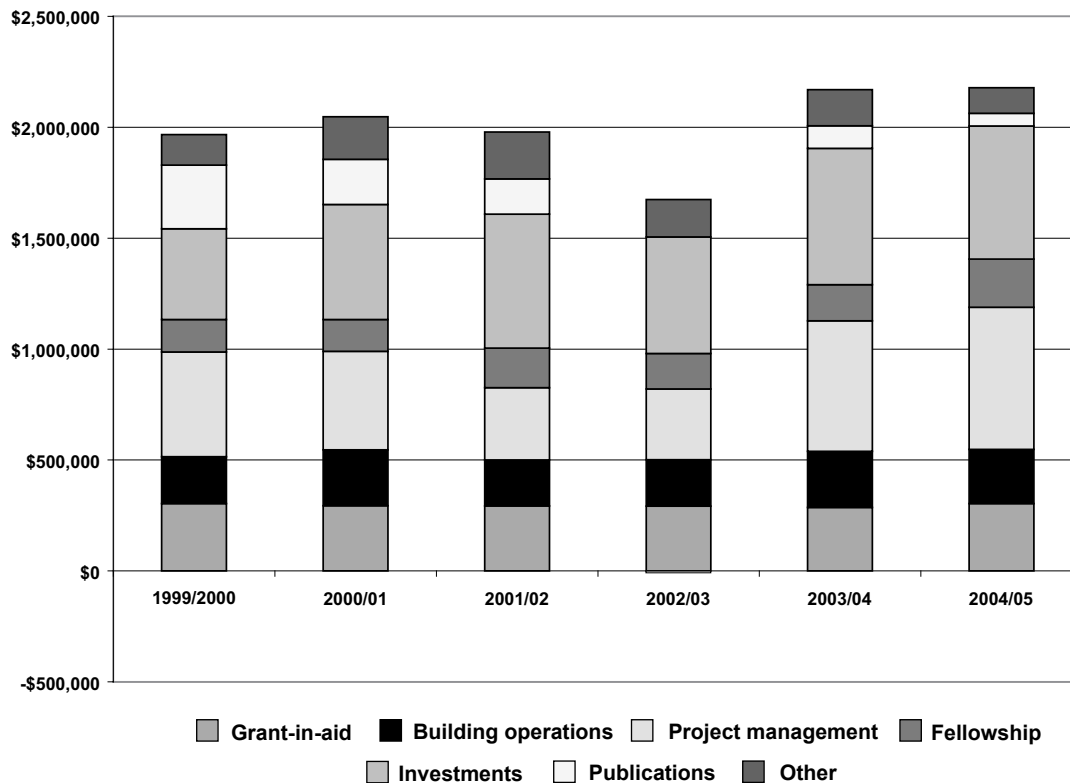
Term of
reference (d)

Assess and recommend on the level of funds needed to meet government and community expectations of the Academy of Science under the Learned Academies Grant Program

Finance and investments

The Academy of Science’s financial report for the year ended 30 June 2005 is given as **Attachment 6**. The main sources of revenue are the government grant-in-aid for secretariat support (\$303,827), project management, investment income, building operations and subscriptions from the Fellowship, as shown in Figure 1. The main categories of expenditure are secretariat support, building operations and activities associated with the Fellowship, as given in Figure 2. Fellowship activities include annual elections, symposia and the events associated with the Annual General Meeting. The second portion of the grant-in-aid, \$517,328, is dedicated to international and national activities (Figure 3).

Figure 1: Main sources of revenue 2000-2005 (indexed to 2005 dollars)
(excluding \$517,328 for international and national activities)



A breakdown of the relative expenditure (three-year average for 30 June 2002–30 June 2005) of the grant-in-aid (\$517,328 in 2004-2005) that is provided for international and national activities is given in Figure 4.

Figure 5 shows the broad range of activities undertaken by the Academy of Science and the way in which these activities are funded.

First, there are government projects that are managed by the Academy, including the DEST International Science Linkages (ISL) Programme for international research exchanges, the Department of Environment and Heritage international and national activities in climate change research, and the DEST Sir Mark Oliphant conference series. These projects are fully-funded by government.

Second, there are grant-in-aid funded activities, for subscriptions to international Scientific Unions and for some Academy of Science secretariat support.

Third, there are activities to promote early-career researcher activities that are funded from the Academy's investment income.

Figure 2: Main categories of expenditure 2000-2005 (indexed to 2005 dollars)

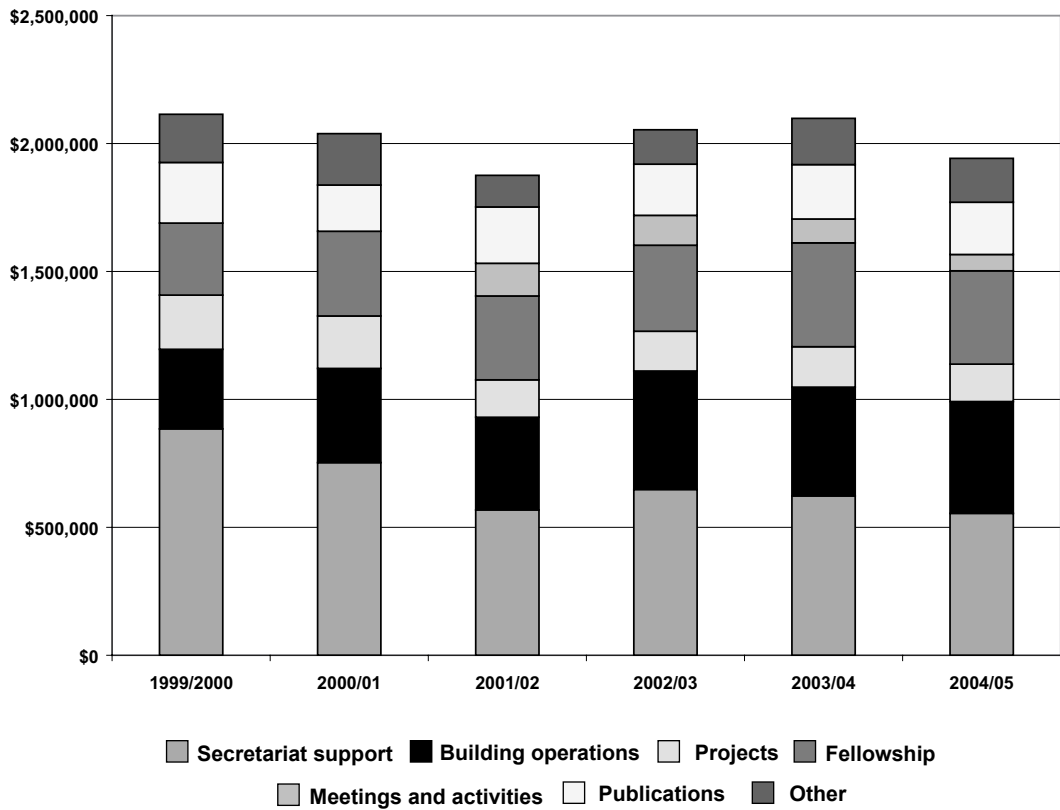


Figure 3: Government grant-in-aid 2004-2005

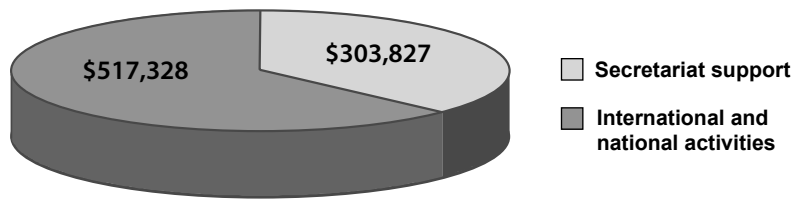


Figure 4: Breakdown of international and national activities (three-year average June 2002-June 2005)

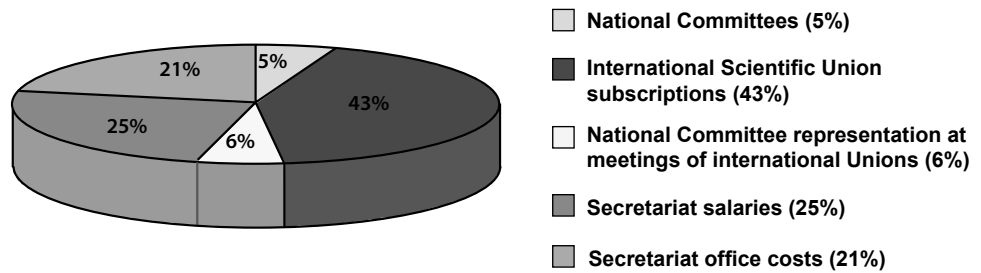
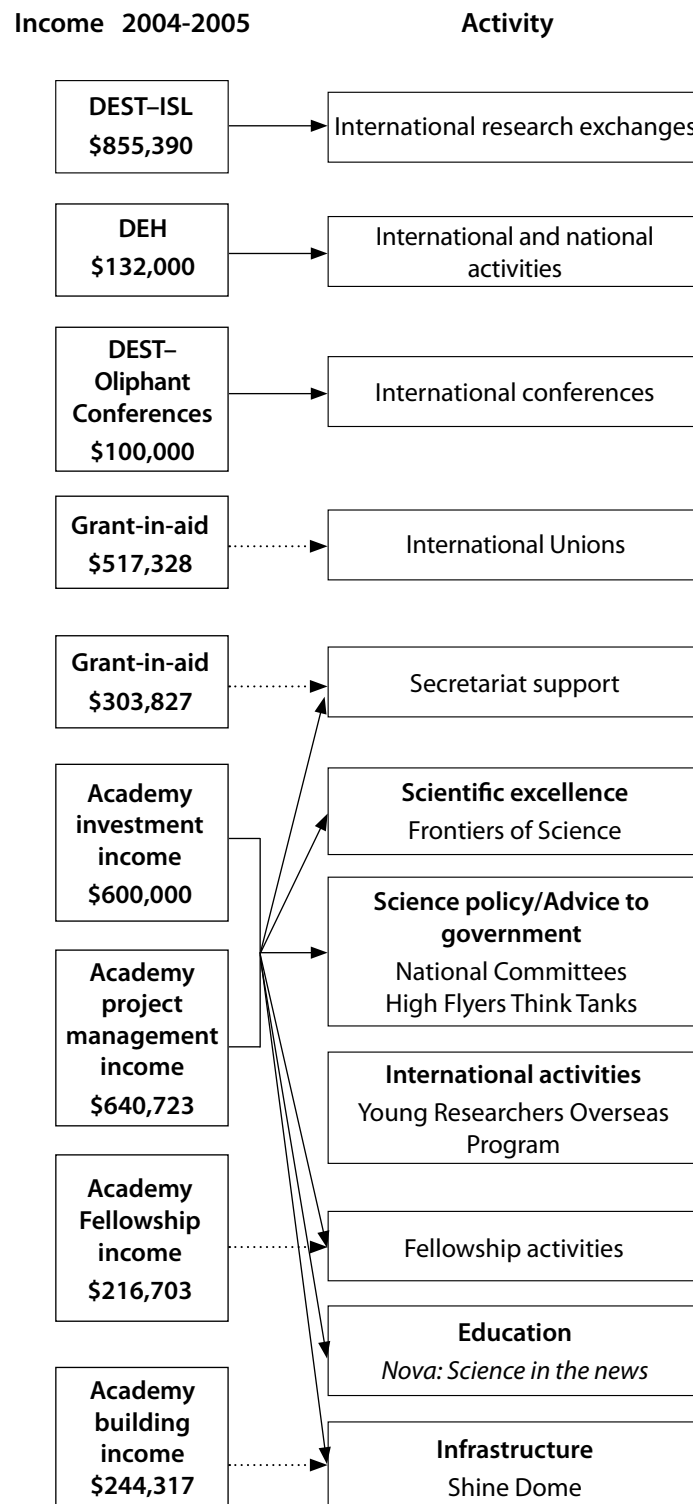


Figure 5: The scope of activities undertaken by the Academy of Science



Fourth, there are Fellowship activities that are funded in part by subscriptions from the Fellowship, but are subsidised from the Academy's investment income.

Fifth, there is income from rental and room-hire of the Academy's buildings, but building operations are heavily subsidised by the Academy's investment income.

Government expectations of the Academy of Science

Government could reasonably expect that the Academy of Science puts its science policy work on a sounder footing. The Academy's National Committees have the potential to make a much greater contribution to science policy if properly resourced. At present they are basically supported by whatever funds are remaining after payment of international subscriptions and payment of very modest subsidies for Australian voting delegates to attend international meetings of their Unions. The twenty National Committees (reduced through mergers from twenty-nine in 2002) each receive an annual subsidy from the Academy of Science of \$2,000 per annum to support their travel to face-to-face meetings and for teleconferences. This is \$2,000 per Committee, each of which has eight members. Each National Committee may subsidise up to three international voting delegates to attend the three-yearly business meetings of their international Unions, but the subsidy for international travel for each delegate cannot exceed \$2,000. So, at present, the Academy, with the help of its grant-in-aid, pays subscriptions to international Unions and provides (on average) \$4,000 per year to each of its twenty National Committees, for a total of (in theory) \$80,000. In practice, only about \$40,000 of this amount is provided by the grant-in-aid.

Investment in the National Committee structure would be the most efficient and effective way in which government expectations of high-quality, evidence-based and objective science policy advice could be met. The Academy of Science proposes that in order to better realise the potential of the National Committees, it is necessary to provide:

- \$4,000 per annum for at least one face-to-face national meeting;
- \$4,000 for each National Committee to examine and report on one matter of substance relating to that discipline each year, and;
- \$4,000 each for up to three international voting delegates to attend the three-yearly business meetings of the relevant international Union, for a total of 20 x \$12,000 (on average) per annum, or \$240,000.

Thus an increase of \$200,000 per annum in the grant-in-aid for this activity would be required.

Community expectations of the Academy of Science

The Academy's buildings

The Academy of Science's buildings include the Shine Dome (previously known as Becker House). It was opened in 1959 and has become a Canberra landmark. Many national and international meetings have been held in the Dome's Wark lecture theatre. The Academy's secretariat is in the adjacent Ian Potter House. Both buildings are registered as part of the National Estate.

There is a strong community expectation that the Academy of Science will maintain these two iconic buildings in a manner appropriate for Australian heritage-listed estate. Conservation and refurbishment of the Dome is an ongoing challenge. The receipt in 1999 of \$525,000 as a Centenary of Federation Cultural and Heritage Projects Grant, together with \$575,000 committed by the Academy, and other donations, provided about \$1,200,000 and restricted the works to those regarded as essential to satisfy contemporary safety and building requirements. However, an additional gift of \$1,000,000 from Academy Fellow John Shine permitted additional works to be undertaken, including air-conditioning of the lecture theatre and installation of state-of-the-art audiovisual and communication technologies.

There is an expectation from the scientific, and indeed the broader academic community and the general public, that the Academy of Science will make available its lecture theatre and meetings rooms at reasonable rates. The Academy is pleased to facilitate conferences, workshops and public lectures; a list of events held in the Shine Dome in 2004-2005 is given in **Appendix 10**. However, the cost of day-to-day maintenance for the Shine Dome will always exceed receipts and the short-fall is in excess of \$200,000 per annum. For Ian Potter House, rental income subsidises routine expenses but does not cover exceptional items.

It is proposed that the grant-in-aid should take into consideration the costs of maintaining an iconic, high quality meeting venue for the scholarly community.

International scientific exchanges for young researchers

The scientific community has an expectation that the Academy of Science will support international scientific exchanges for young researchers, including the Young Australian Researchers Program that is currently unfunded.

Reciprocal visits to Australian laboratories by US graduate students, under the Summer Program with the National Science Foundation have been exceptionally valued, by students and hosts alike, but this program is also unfunded beyond 2006.

Young Australian Researchers Program

In 2000 the Academy of Science received a grant of \$100,000 from the Department of Industry, Science and Resources to undertake a pilot program for young Australian researchers to visit Europe and the United States for periods of two to six weeks to conduct research projects and establish international networks. A total of twenty researchers were funded.

Subsequently, in 2003, the Academy entered into a contract with DEST for \$244,000 to deliver the Young Australian Researchers Program, in order to facilitate an increase in strategic alliances between Australian and researchers in the United States of America and Europe. It was developed in response to reports and studies indicating that there was a need to strengthen networks between young researchers and their overseas colleagues. The program was highly competitive, with 174 applicants for thirty-three places. Participants were given grants of up to \$7,540 each.

From the individual reports of participants, it is clear that the young researchers were very enthusiastic about their experiences and felt that the visits provided excellent opportunities to network in the international arena, establish collaborations and assist in the development of their careers. The visits gave them the opportunity to work in multi-national teams and be involved in the continued development of collaborations and projects, and perhaps the short-term exchange of researchers. They considered that the program was of great value to early-career researchers. A booklet detailing the program is given as **Attachment 6**. It is proposed that the grant-in-aid be enhanced so that the Young Australian Researchers Program can become a treasured annual highlight of the Academy's work on behalf of government, for \$250,000 per annum.

Summer Program with the National Science Foundation

The Academy of Science and the United States National Science Foundation (NSF) have developed a Summer Program in Australia for US graduate students in science and engineering. The program aims to bring to Australia twenty United States graduate students on an annual basis over the period of three years, commencing in 2004. The primary objective of the program with Australia is to introduce students to Australian science and engineering in the context of a research laboratory and to initiate personal relationships that will better enable them to collaborate with their Australian counterparts in the future. The program lasts approximately eight weeks from June/July to August.

In June 2004, the Academy of Science entered into a contract with DEST for \$80,000 per annum for three years to deliver this activity. DEST provides in-country travel and living expenses, while NSF provides international travel expenses and stipends. A booklet detailing the program is given as **Attachment 7**. This program is a magnificent investment for Australia, because if only a

single US participant returns to Australia as a three-year NSF postdoctoral fellow, then the investment is more than recouped. It is proposed that the grant-in-aid be enhanced so that the Academy/NSF Summer Program can continue as an annual program, for \$80,000 per annum.

Support for early-career researchers

As described in these pages, the Academy of Science has developed two series of annual events that embrace and promote the professional development of early- to mid-career scientists. The first is the annual innovative event that showcases Australia's rising research science talent, in *Frontiers of Science*. The second series is the annual Think Tank for High Flyers, an event that brings together young researchers across the sciences, including social sciences, to focus on how their research might be adapted and applied to address an issue of national import. There are virtually no other programs in Australia that facilitate scientific meetings for interdisciplinary exchange, unlike the US with annual meetings of American Association for the Advancement of Science and unlike the UK with the annual meetings of the British Association for the Advancement of Science. Given the demise of ANZAAS (Australian New Zealand Association for the Advancement of Science), these two Academy of Science initiatives have become a much heightened national imperative. In past years the two initiatives have been funded from the Academy's investment income to the level of \$50,000 per annum for each event. (The recent Think Tank funded by Biotechnology Australia was in addition to the annual series.) The Academy of Science proposes that the success of these events warrants their being placed on a sounder footing, with support from the grant-in-aid. This could be achieved with \$50,000 per annum for the *Frontiers of Science* Program and \$50,000 per annum for the High Flyers Think Tank.

Nova: Science in the news

The Academy developed *Nova: Science in the news* to help overcome the curriculum gap between textbook theory and real-life applications of science and technology, and to assist Australian scientists to communicate their achievements more readily. The site now displays more than 80 topics, a number that is growing steadily, and the Academy ensures that the topics are constantly revised and brought up-to-date in terms of content and electronic links.

The Chairman of the Australian Foundation for Science arranged for *Nova* to receive funding of \$390,000 from two principal sponsors in the years 2000 to 2005. Telstra funded *Nova* for three years from July 2000 to June 2003 to a total of \$240,000. The Commonwealth Bank Foundation is currently the principal sponsor for *Nova*, providing \$150,000 over three years from July 2003 until June 2006. These funds are matched by topic sponsors.

A stable source of funds from principal sponsors plays a crucial role in providing the security necessary to plan topics for development and for the continual revision of existing topics. It is impossible to attract topic sponsors for revisions. Funding from a principal sponsor also allows for the independent selection of topics based on interest or appeal, rather than addressing the needs of specific topic sponsors. Support of *Nova* by the grant-in-aid would provide the Australian government with a high profile for support of secondary school science education, for an annual contribution of \$100,000.

Recommendations on the level of funds needed to meet government and community expectations of the Academy of Science

The Academy of Science provides exceptional value to government for the grant-in-aid, but considers it could make more profound contributions to government, to the community of scholars and to the general public, if properly resourced. The Academy is prepared to continue to use its investment income to seed and trial new programs in the natural and applied sciences and in science education. However, as described above, several initiatives piloted by the Academy of Science have been so well-received there is a strong expectation that they should be continued. These are the areas, where we have an excellent track-record and a proven product, where we seek an enhanced grant-in-aid. We are suggesting that the grant-in-aid be effectively doubled, from \$821,000 to \$1,750,000 per annum for the following activities.

Proposed funding purpose	Amount (\$)
Resource twenty National Committees	200,000
Maintain heritage meeting venue	200,000
Young Australian Researchers Program	250,000
Summer Program with NSF	80,000
Frontiers of Science Program	50,000
High Flyers Think Tank	50,000
<i>Nova: Science in the news</i>	100,000
Total enhancement of grant-in-aid	930,000

Conclusion

The Australian government recognises the Academy as a resource of high-level expertise on scientific matters, as an authoritative source of advice on national issues involving science and its applications, and as a body that provides evidence-based leadership in protection and management of the national estate.

In seeking a doubling of government grant-in-aid, we seek to nurture future generations of scientists by exposing them to scientific issues of national and international importance, to ensure a long-term scientific vision for Australian society.

Appendix I

Academy of Science Strategic Plan, 2005–2009

Vision

Our vision is that the Academy is the prime representative of Australia in natural and applied sciences, a champion for scientific excellence in Australia and an independent adviser on Australian scientific research, teaching and technological innovation.

Mission

Our mission is:

- a. to advance the development of a scientific culture and a long-term scientific vision within Australian society.
- b. to sustain a national learned academy for the recognition of excellence in scientific research and achievement.
- c. by advising government and other bodies, to promote the understanding that high-quality science teaching, research and innovation are essential elements for the advancement of Australian society.

Objectives

Development of a national scientific culture in Australia

1. To act on behalf of Australian science to ensure that the community recognises the importance of high-quality science and science-based innovation, as essential components of the infrastructure for Australia's national development, and to promote the development of a scientific culture in Australia.
2. To provide a forum for the debate and public exposure of issues of social, political and environmental concern that require informed insight into their scientific basis or context, and to provide formal comment on such issues when appropriate.
3. To promote the teaching of science at all levels, primary, secondary and tertiary, to assist in ensuring that science holds a high place in teaching curricula, to promote the elevation of national standards of science teaching and to encourage the best students to consider science and science-dependent vocations as careers.

Promoting excellence in scientific research in Australia

4. To raise the national profile of the Academy and ensure its recognition as the principal independent representative body for excellence in Australian science and its application.
5. To ensure that the Academy and its Fellowship are seen as fully representative of the best scientists in Australia.
6. To promote support for the best Australian scientific research and for Australian linkages to international science, including international scientific organisations and programs where nationally relevant.
7. To promote career development and opportunities for young researchers.

Providing independent advice

8. To ensure a robust and mutually beneficial relationship between the Academy and Australian governments that recognises the Academy is:
 - a resource of high-level intellectual insight and expertise on scientific matters;
 - an authoritative source of advice on national issues involving science and its application;
 - providing evidence-based leadership in protection and management of the national estate.
9. To develop strong relationships with industry and non-government organisations dependent on science and technology.
10. To strengthen cooperation and concerted action with the other Australian academies and professional bodies in order to gain synergies in the promotion of scientific and technological interests.

Appendix 2

The National Committees of the Academy of Science

National Committees foster a designated branch of natural science in Australia and serve as a link between Australian scientists and overseas scientists in the same field.

Links with scientists overseas are maintained primarily through the International Council for Science (ICSU) and its constituent bodies and committees. The principal objective of the Council is to encourage international scientific activity for the benefit of mankind by initiating, designing and coordinating international scientific research projects. It also acts as a focus for the exchange of ideas, the communication of scientific information and the development of standards in methodology, and units. The Academy adheres to 21 member unions of ICSU:

Astronomy (IAU)	Nutritional Sciences (IUNS)
Biochemistry and Molecular Biology (IUBMB)	Pharmacology (IUPHAR)
Biological Sciences (IUBS)	Physiological Sciences (IUPS)
Crystallography (IUCr)	Psychological Sciences (IUPsyS)
Geodesy and Geophysics (IUGG)	Pure and Applied Biophysics (IUPAB)
Geography (IGU)	Pure and Applied Chemistry (IUPAC)
Geological Sciences (IUGS)	Pure and Applied Physics (IUPAP)
History and Philosophy of Science (IUHPS)	Radio Science (URSI)
Immunological Sciences (IUIS)	Theoretical and Applied Mechanics (IUTAM)
Mathematics (IMU)	Toxicology (IUTOX)
Microbiological Societies (IUMS)	

Committees or commissions of ICSU are created to organise programs in multi- or trans-disciplinary fields which are not completely under the aegis of any one of the scientific unions. Australia currently adheres to the committees concerned with:

Antarctic Research (SCAR)	Solar-Terrestrial Physics (SCOSTEP)
Global Change (IGBP)	Space Research (COSPAR)
Oceanic Research (SCOR)	World Climate Research (WCRP)

The Academy of Science, through the relevant National Committees, also adheres to one Scientific Associate of ICSU, concerned with Quaternary Research (INQUA); and to the International Federation for the Theory of Machines and Mechanisms (IFTToMM).

The Academy's activities in Sustainability are carried out by the Joint Academies Committee on Sustainability (JACS), with membership from the four Australian learned academies. JACS is chaired by Professor K Lambeck, FAA.

Membership of National Committees

Antarctic Research

Dr I Allison (Chair)
Associate Professor M Ashley
Professor K Lambeck, FAA
Associate Professor A McMinn
Professor K O’Dea
Professor I Simmonds
Professor R Vincent, FAA
Professor C Wilson

Corresponding Scientific Organisations:
Australian Antarctic Division
Australian Marine Sciences Association
Scientific Committee on Antarctic Research (SCAR)

Astronomy

Dr B Boyle (Chair)
Professor M Bailes
Dr M Colless, FAA
Professor W Couch
Professor M Dopita, FAA
Dr A Green
Dr A Melatos
Professor P Sackett

Corresponding Scientific Organisations:
Astronomical Society of Australia

Biomedical Sciences

Professor P Kuchel, FAA (Chair)
Professor D Adams
Professor J Angus, FAA
Professor P Barry
Associate Professor D Ellis
Professor R Sutherland, FAA
Professor J Wallace

Corresponding Scientific Organisations:
Anatomical Society of Australia and New Zealand
Australasian Society of Clinical and Experimental Pharmacologists
Australian Association of Clinical Biochemists
Australian Micrological Society

Australian Neuroscience Society
Australian Physiological and Pharmacological Society
Australian Society for Biochemistry and Molecular Biology
Australian Society for Biophysics
Australian Society for Medical Research
Australian Society for Microbiology
Australian Society for Parasitology
Australian Society of Reproductive Biology
Endocrinology Society of Australia

Chemistry

Professor A Canty, FAA (Chair)
Professor D Black
Ms D Crossing
Dr A Duncan
Professor R Lamb
Professor J Ralston
Mr R Rose
Professor T Spurling

Corresponding Scientific Organisations:
Australian Science Teachers Association (ASTA)
Royal Australian Chemical Institute

Crystallography

Professor P Colman, FAA (Chair)
Professor S Hall
Dr B Kennedy
Associate Professor J Martin
Professor R Robinson
Professor J W White, FAA
Dr S Wilkins
Dr R Withers

Corresponding Scientific Organisations:
Society of Crystallographers in Australia and New Zealand (SCANZ)

Taskforce: Replacement Research Reactor Project

Professor J White, FAA (Chair)
Professor G Dracoulis, FAA
Associate Professor R Hunter, FAA
Professor A Klein, FAA
Professor I McDougall, FAA
Professor J Newton, FAA
Professor E Weigold, FAA

Earth Sciences

Dr P L McFadden, FAA (Chair)

Dr C Barton

Professor R Cas

Professor J Chappell, FAA

Professor A Gleadow, FAA

Dr I Lambert

Associate Professor D Muller

Corresponding Scientific Organisations:

Australian Association of Palaeontologists

Australian Institute of Energy

Australian Institute of Mining and Metallurgy

Australian Society of Exploration Geophysicists

Australian Society of Soil Science

Geological Society of Australia

Institute of Australian Geographers

The Institution of Surveyors, Australia

Earth System Science

Dr M Manton (Chair)

Dr I Allison

Dr R Gifford

Dr T McDougall, FAA

Professor A Pitman

Dr W Steffen

Professor R Wasson

Corresponding Scientific Organisations:

Academy of Technological Sciences and Engineering (ATSE)

Geography

Professor D S Gillieson (Chair)

Dr R Baker

Dr S Cranby

Professor D Fagan

Professor K Gibson

Professor I Hay

Professor L Head

Professor J Kirkpatrick

Corresponding Scientific Organisations:

Australian Geography Teachers' Association

Australian Mapping Sciences Institute

Geographical Society of New South Wales

Institute of Australian Geographers

Royal Geographical Society of Australasia (SA Branch)

Royal Geographical Society of Queensland

History and Philosophy of Science

Professor R Home (Chair)

Dr R Ankeny

Dr H Chan

Professor D R Curtis, FAA

Professor S Encel

Dr L Robin

Associate Professor H Sankey

Associate Professor J Schuster

Corresponding Scientific Organisations:

Australasian Association for the History, Philosophy and Social Studies of Science

Sino-Australian Symposium on History and Philosophy of Science

Mathematical Sciences

Professor H Rubinstein, FAA (Chair)

Dr N Bartlett

Professor R Bartnik, FAA

Professor M Bulmer

Professor N de Mestre

Associate Professor P Galbraith

Professor A Guttmann, FAA

Professor C Praeger, FAA

Corresponding Scientific Organisations:

Australian Mathematical Society

Australian Society for Operations Research

Computer Science Association

Statistical Society of Australia

Mechanical Sciences

Dr F Rose (Chair)

Dr J Denier

Dr R McAree

Professor J Middleton

Professor H Muhlhaus

Dr I Parkin

Dr A Tordesillas

Associate Professor J Trevelyan

Medicine

Professor R Williamson, FAA (Chair)

Professor H G Burger, FAA

Professor D Cameron

Associate Professor M Gillespie

Professor E Lumbers, FAA

Professor J Stone, FAA

Dr D Vaux, FAA

Professor J Whitworth

Corresponding Scientific Organisations:

Anatomical Society of Australia and New Zealand

Audiological Society of Australia

Australian Physiological and Pharmacological Society

Australian Society for Biochemistry and Molecular Biology

Australian Society for Microbiology

Australian Society of Clinical and Experimental Pharmacologists

Australian Society of Neurologists

Australian Society of Reproductive Biology

Endocrine Society of Australia

Haematology Society of Australia

Nutrition

Professor M Wahlqvist (Chair)

Professor J Brand-Miller

Ms N Caffin

Associate Professor D Colquhoun

Professor M Gidley

Dr G Jones

Dr G McIntosh

Professor T Worsley

Corresponding Scientific Organisations:

Australian Institute of Agricultural Science

Australian Institute of Food Science and Technology

Australian Society for Biochemistry and Molecular Biology

Australian Society for Medical Research

Australian Society of Animal Production

Nutrition Society of Australia

Physics

Professor G J Milburn, FAA (Chair)

Professor M Bilek

Professor A Byrne

Professor R Elliman

Professor V Flambaum, FAA

Professor K Nugent, FAA

Professor H Rubinsztein-Dunlop

Associate Professor M Simmons

Corresponding Scientific Organisations:

Australasian College of Physical Scientists in Melbourne

Australian Acoustical Society

Australian Institute of Energy

Australian Institute of Physics

Australian Optical Society

Australian Scientific Industry Association

Plant and Animal Sciences

Dr T J Higgins, FAA (Chair)

Dr T Entwisle

Professor H Lambers

Mr B Lepschi

Dr J Ridsdill-Smith

Professor R Saint

Professor S Tyerman, FAA

Professor M Westoby

Corresponding Scientific Organisations:

Australian Entomological Society

Australian Genetics Society

Australian Society for Comparative Physiology and Biochemistry

Australian Society of Plant Scientists

Australian Systematic Biology Society

Ecological Society of Australia

Psychology

Professor M Coltheart, FAA (Chair)

Professor S Andrews

Dr A Barnier

Dr A Castles

Professor H Jackson

Professor P Martin

Dr J Mattingley

Professor T Thomas

Corresponding Scientific Organisations:

Australian Psychological Society

Quaternary Research

Professor J Chappell, FAA (Chair)

Dr T Barrows

Professor A Chivas

Dr S Haberle

Dr P Hesse

Dr J Nott

Dr A Ross

Professor I Simmonds

Corresponding Scientific Organisations:

Australasian Quaternary Association

Australian Society of Soil Science

Geological Society of Australia

Institute of Australian Geographers

Radio Science

Dr P Wilkinson (Chair)
Professor B Fraser
Dr G James
Dr K Joyner
Dr Le Nguyen Binh
Dr D Noon
Dr R Norris

Corresponding Scientific Organisations:
Institution of Radio and Electronic Engineers,
Australia
IPS Radio and Space Services
National Committee for Space Science

Space Science

Professor P Dyson (Chair)
Dr C Barton
Dr T Bedding
Dr I Cairns
Dr D Cole
Dr D Jupp
Professor R Vincent, FAA

Corresponding Scientific Organisations:

Australian Institute of Physics
CRC for Space Satellite Systems
IPS Radio and Space Services

Taskforce: MUSES-C

Professor S R Taylor, FAA (Chair)
Dr A Bevan
Dr T Esat
Dr T Ireland
Dr M Norman
Professor M Walter, FAA

Spectroscopy

Professor G J Milburn, FAA (Chair)
Professor P Hannaford, FAA
Associate Professor S Kable
Professor E Krausz
Professor W MacGillivray
Dr P Meredith
Professor H Rubinsztein-Dunlop

Appendix 3

Partnerships with government in progressing matters of science policy

Start date	Title	Awarded by	Amount (\$)
May 2002	Assistance with developing the national research priorities	National Research Priorities Taskforce, Department of Education, Science and Training	80,850
May 2002	Assistance with conference on 'Living with climate change.'	Australian Greenhouse Office	80,000
Dec 2002	Benchmarking Australian research in emergent areas of science and technology – A pilot study of nanotechnology	Australian Research Council, Linkage–Learned Academies Special Projects	95,000
Dec 2002	Development of a strategic plan for Australian Earth sciences	Australian Research Council, Linkage–Learned Academies Special Projects	45,000
Dec 2003	International climate change research: A review	Australian Greenhouse Office	50,000
Dec 2003	Review of salinity mapping in the Australian context	Land and Water Resources R&D Corporation	30,000
Dec 2003	Maximising the benefits from Australia's formal linkages to global scientific activities	Australian Research Council, Linkage–Learned Academies Special Projects	100,000
March 2004	High Flyers Think Tank	Queensland government, Department of Primary Industries and Fisheries	5,000
June 2004	Academy of Science's Speakers Program	Department of Education, Science and Training	12,000
Feb 2005	Publication costs: Measuring excellence in research and research training	Department of Education, Science and Training	10,000
Feb 2005	Pan evaporation workshop	Australian Greenhouse Office	16,000
May 2005	Review research grants of the NSW Environmental Trust	NSW Department of Environment and Conservation	33,000
May 2005	Assistance with AGM symposium on 'Recent advances in stem cell research and therapies'	Biotechnology Australia	4,000
June 2005	High Flyers Think Tank on 'Biotechnology and the future of Australian agriculture'	Biotechnology Australia	63,000
June 2005	A decadal review of Australian astronomy and astrophysics	Australian Research Council	50,000

Start date	Title	Awarded by	Amount (\$)
June 2005	A national strategic review of mathematical sciences	Australian Research Council	77,000
Aug 2005	A strategic framework for the population and environment nexus in Australia: A whole of knowledge approach	Australian Research Council, Linkage–Learned Academies Special Projects	110,000
Aug 2005	An Australian policy framework for systemic assessment of emerging risks (NAF)	Australian Research Council, Linkage–Learned Academies Special Projects	110,000

Appendix 4

Conferences and lectures 2001–2005

Conferences

2005

Bio-engineering and nanotechnology

Sir Mark Oliphant International Frontiers of Science and Technology Conference Series, University of Queensland, 5-7 December

Epigenetic regulation in development and disease

Sir Mark Oliphant International Frontiers of Science and Technology Conference Series, CSIRO Discovery Centre, Plant Industry, Canberra, 29 November-2 December

Cellular signalling and human disease

Boden Research Conference, the Garvan Institute of Medical Research, Sydney, 6-8 November

Monitoring and understanding a dynamic planet with geodetic and oceanographic tools

‘Dynamic Planet 2005’ conference sponsored by the Academy, Cairns, 22-26 August

Biotechnology and the future of Australian agriculture

A Think Tank hosted by the Academy with support from Biotechnology Australia, 26-27 July, 2005

Recent advances in stem cell science and therapies

Annual symposium, 6 May 2005

Australian Frontiers of Science, 2005

12-13 April 2005

After the tsunami – harnessing Australian expertise for recovery

National Academies Forum symposium, 31 March 2005

2004

Emerging diseases – Ready and waiting?

High Flyers Think Tank, 19 October 2004

Measuring excellence in research and research training

National Academies Forum symposium, 22 June 2004

Understanding the population–environment debate: Bridging disciplinary divides

2004 Fenner Conference on the Environment, 24-25 May 2004

A celebration of Australian science

Annual symposium, 7 May 2004

2003

Salinity mapping methods in the Australian context

17 October 2003

Australian Frontiers of Science, 2003

31 July-1 August 2003

Nanoscience – where physics, chemistry and biology collide

Annual symposium, 2 May 2003

Safeguarding Australia

High Flyers Think Tank, 4 April 2003

2002

Research priorities nominations

High Flyers Think Tank, 8 August 2002

National research priorities strategic forum

26-27 June 2002

Transition to sustainability

Annual symposium, 3 May 2002

Lectures and speeches

2005

From hell to the Himalayas

A public lecture by Professor Mark Harrison, The Shine Dome, 18 August

Tomorrow's agriculture – we need to work things out!

Address to the National Press Club by Dr Jim Peacock, 27 July 2005

President's address

A presentation to Fellows and guests at *Science at the Shine Dome* by Dr Jim Peacock, 5 May 2005

2004

The changing atmosphere in 2005

Public lecture by Professor F Sherwood Rowland, 21 February 2005

Humanity's heritage: The human genome and stem cells

Professor John Shine's address to the National Press Club, 21 July 2004

President's address

A presentation to Fellows and guests at *Science at the Shine Dome* by Dr Jim Peacock, 6 May 2004

2003

GMOs, gene technology and the troubles with food

Telstra Address to the National Press Club by Dr Jim Peacock, 16 July 2003

2002

Research priorities for Australia: Setting our future

Telstra Address to the National Press Club by Professor Michael Barber, 26 June 2002

President's address

A presentation to Fellows and guests at *Science at the Shine Dome* by Professor Brian Anderson, 2 May 2002

2001

Educational challenges for future Australia (by Professor Michael Barber)

Paper given at the Business/Higher Education Round Table summit meeting, 31 October 2001

National science and industry policy – balancing the centrifugal tendency (by Professor John White)

11 October 2001

Priorities in science, mathematics and technologies (by Professor Robert Porter)

Paper presented to Education Queensland, 2 August 2001

Australia and the ICT revolution

Telstra Address to the National Press Club by Professor Brian Anderson, 25 July 2001

Appendix 5

Support for overseas research collaborations

Objective

The objective of the Academy of Science's program of international scientific and technological collaborations, is to improve Australian access to global science and technology. This is achieved by individual exchanges, postdoctoral fellowships, awards and workshops. The majority of these activities are funded as part of the Department of Education, Science and Training's (DEST) International Science and Technology Networks, a project supported by the International Science Linkages Programme established under the Australian government's innovation statement, *Backing Australia's Ability*.

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

While the majority of the visits are successful and productive scientifically, the economic consequences of most visits are longer term and diffuse. By maintaining our science base at world's best standards, international connections play their part in supporting the economic and social benefits that other Australian organisations can extract from that knowledge and skill base.

On behalf of DEST, the Academy of Science administers a fund of \$815,000 per annum for international exchanges with North America, Europe and North Asia.

Overview of activities

Individual visits

Approximately one hundred Australia researchers and thirty foreign scientists participate on an annual basis in the program.

The Australian participants in the Academy of Science's international activities are chosen against selection criteria developed by the Academy, primarily based on scientific merit, and also in accordance with the contractual requirements of DEST.

The Academy's programs, awards and fellowships funded are advertised nationally in the press, on the Academy's website, email database and electronic newsletters. Information is also sent to science departments and grant offices at all Australian universities, and to government and private research institutes, which advertise the programs internally, and scientific societies.

Committees comprise distinguished scientists, who are Fellows of the Academy of Science and the Australian Academy of Technological Sciences and Engineering. They evaluate applications and select successful candidates based on a qualitative assessment of the scientific or technological value of the proposal to Australia.

The Academy's Postdoctoral and Awards Committee has a representative from the Australian Research Council (ARC). The representative reviews applications to the Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship, which is a joint Academy and ARC program with JSPS.

Participants of the programs receive a grant-in-aid to a maximum of \$11,000, as a contribution towards the costs involved with the visit. The amount is based on the cost of a return international economy airfare up to a maximum of \$2,600, and a living allowance of up to \$200 per day for a maximum of 42 days (maximum of \$8,400).

Bilateral activities

Academy of Science officials and staff regularly host visitors and officials from foreign academies, science institutions and government departments to promote and encourage cooperation and to discuss international relations matters. The Academy's officers and staff have represented the Academy at various international meetings and visited foreign academies, and similar institutions.

Workshops

From time to time, the Academy organises workshops at the request of DEST. For example, in October 2004 the Academy of Science and the Australian Academy of Technological Sciences and Engineering organised a workshop with the Chinese Academy of Sciences on the topic of sustainability. The Academy received funding of \$80,000 for this meeting, which promoted science and technology between Australia and China, identified mutually agreeable priorities for long-term cooperation, and recommended additional support for existing areas of cooperation.

The two Academies are organising a second workshop on behalf of DEST with the Chinese Academy in Beijing in October 2005 on the topic of biotechnology and nanotechnology.

Other programs managed by the Academy of Science

The Academy's track record and its capacity to administer programs of a high standard led the French Embassy in 2002 to request that the Academy manage two of its funding programs for researchers to travel to and from France. This collaboration continues and it is so strong, that the Embassy will sometimes fund many additional Australian researchers.

Additionally, the Academy of Science manages The Adam J Berry Memorial Fund, established in memory of an early-career Australian researcher. The fund assists one young Australian scientist to travel or work in the USA at one of the institutes of the National Institutes of Health (NIH) each year. To date, the Academy has been able to provide this service, including the assessment of the applications by a Fellow of the Academy, free of charge.

Appendix 6

Nova: Science in the news

(www.science.org.au/nova)

The Academy of Science developed its educational website, *Nova: Science in the news*, to help overcome the curriculum gap between textbook theory and real-life applications of science and technology, and to assist Australian scientists to communicate their achievements more readily.

There are currently over 80 topics available on *Nova*. Each topic includes a key text which provides a balanced summary of the main points in non-technical language; boxed information that provides case studies or explains Australian research and applications; and a glossary of commonly used scientific terms. All material is reviewed by experts who have been nominated by the Academy.

Links are provided to relevant student activities, including discussions, practicals and fieldwork. Suggestions for further reading and links to other high quality, useful sites on the web are assessed and annotated.

Nova is marketed energetically to schools and libraries, through promotional cards, mailings, announcements on email lists, and articles in educational journals. The Academy of Science also provides information and graphics for sponsoring organisations who wish to publicise the site to their client groups. Media releases are distributed to appropriate education, science, environment and health journals each time a new topic is posted and numerous articles about *Nova* topics have been published. Announcements are routinely sent out on email lists to science teachers, science communicators and librarians. Users can register free of charge on *Nova's* home page to receive email notification whenever a new topic is added.

Nova and the Google search engine

Since its establishment in 1997, the award-winning *Nova* website has continued to gain recognition. From overseas Encyclopaedia Britannica Online and SciCentral recommend it as an outstanding site and the search engines Yahoo! and Google include it in their directories. *Nova* also ranks consistently in the top ten sites located using key words on the search engine Google. In 2004, *Nova* had approximately 2,000,000 hits. The five most popular topics in order are:

- Kissing the Epstein-Barr virus goodbye?
- Harnessing direct solar energy – a progress report
- Earth's sunscreen – the ozone layer
- Enhanced greenhouse effect – a hot international topic
- Monitoring the white death – soil salinity.

Funding

A major source of funding for *Nova* was a grant from the Department of Industry, Science and Resources to support the Science and Technology Awareness program. The grant provided \$56,300 from November 2000 to December 2002 for the development of ten topics in the areas of technology and innovation.

Each *Nova* topic requires funding of \$5,000 from a sponsoring organisation. To date, these organisations have included state and federal government agencies, research institutes, philanthropic foundations, corporations, Cooperative Research Centres and universities. A total of 35 topics were developed from 2000 to 2005, 33 of which were sponsored, providing an additional \$165,000 in funds.

Nova received funding of \$390,000 from two principal sponsors in the years 2000 to 2005. Telstra funded *Nova* for three years from July 2000 to June 2003 to a total of \$240,000. The Commonwealth Bank Foundation is currently the principal sponsor for *Nova*, providing \$150,000 over three years from July 2003 until June 2006.

A stable source of funds from principal sponsors plays a crucial role in providing the security necessary to plan topics for development and for the continual revision of existing topics. Funding also allows for the independent selection of topics based on interest or appeal, rather than addressing the needs of specific sponsors.

Appendix 7

Reports and submissions 2001—2005

2005

25 July

Human cloning and embryo research

A submission to the Committee Reviewing the Human Cloning and Embryo Research Acts of 2002

26 May

Australia's Relationship with China in Science and Technology

A submission to the Senate Foreign Affairs, Defence and Trade Committee on Australia's relationship with China

22 April

Maximising the benefits from Australia's formal linkages to global scientific activities

A report funded by the ARC Linkage–Learned Academies Special Projects Grant

28 April

Establishing a Research Quality Framework

A submission to the Department of Education, Science and Training
Summary of the workshop held at the Academy on 11 February 2005

25 February

Australia's Major National Research Facilities

A submission to the National Collaborative Research Infrastructure Strategy Advisory Committee

2004

16 December

Opportunities to promote mathematics and science education in Victoria

A submission to the Victorian government's Review of Education in Mathematics and the Sciences by the National Committee for Mathematics

3 July

Australian Space Research, 2002-2004

A report to the Committee for Space Research (COSPAR) by the National Committee for Space Science

25 June

Submission to the Alpine Grazing Taskforce (Victoria)

A submission prepared by the National Committee for Geography

4 June

Submission to the Inquiry into the Office of the Chief Scientist

A submission to the Senate Employment, Workplace Relations and Education References Committee

25 February

Submission to the Inquiry into the adequacy of funding for Australia's Antarctic Program

13 February

Nanotechnology Benchmarking Project
Report

31 January

Salinity mapping methods in the Australian context

Results of a review facilitated by the Academy of Science and the Academy of Technological Science and Engineering

2003

18 December

International Climate Change Science: Australia's role, links and opportunities

A report prepared for the Australian Greenhouse Office

4 December

The National Committees on Antarctic Research (NCAR) submission to the Inquiry into the adequacy of funding for Australia's Antarctic Program

1 December

Investment Review of Health and Medical Research

A submission to the Investment Review of Health and Medical Research

24 October

National strategic plan for the geosciences: Geoscience – unearthing our future

A submission to the Australian Research Council

10 September

Policy statement on research and innovation in Australia

27 August

Review of closer collaboration between universities and major publicly funded research agencies

A submission to the Commonwealth Department of Education, Science and Training's Research Collaboration Review

23 July

Australia's Major National Research Facilities: Issues to consider for the next phase of *Backing Australia's Ability*

A submission to the Taskforce on Major Research Infrastructure

19 May

***Science and the 2003-04 Budget* (by Professor Kurt Lambeck)**

Article published in Campus Review

2002

4 October

Review of teaching and teacher education – Strategies to attract and retain teachers of science, technology and mathematics

A response to the Commonwealth Department of Education, Science and Training's Discussion Paper

13 September

The funding of research and research training in Australian universities

A response to the Commonwealth Department of Education, Science and Training's issues papers

7 September

Australian Space Research, 2000-2002

A report to the Committee for Space Research (COSPAR) by the National Committee for Space Science

20 August

Providing the machinery of science: Defining a whole-of-government strategy for securing access to critical research facilities

Australian Research Infrastructure Project discussion paper

28 June

Higher education at the crossroads

A submission to the Commonwealth Department of Education, Science and Training's Higher Education Review

5 June

Human Cloning and Research Involving Embryos Bill 2002, Exposure Draft, 20 May 2002

4 March

***Owning a mobile phone isn't everything* (by Professor B D O Anderson)**

Article published in The Australian

12 February

Priority setting in science and innovation

31 January

Issues paper on Protection of Human Genetic Information

2001

18 December

Review of the External Earnings Targets Policy applying to the Science Authorities (CSIRO, ANSTO and AIMS)

14 October

Priorities in research and innovation for the next Australian government

16 August

Science and engineering faculties – from Federation to today and beyond (by Professor Brian D O Anderson)

26 April

The capacity of public universities to meet Australia's higher education needs

A submission to the Senate Employment, Workplace Relations, Small Business and Education References Committee

18 April

Human stem cell research

16 March

Review of the Academy's International Exchange Programs

Response to an invitation to comment on the Technology Diffusion Program

22 February

Enterprising Australia – planning, preparing and profiting from trade and investment

A submission to the Joint Standing Committee on Foreign Affairs, Defence and Trade inquiry

14 February

A submission to the Knowledge Nation Taskforce established by the Leader of the Opposition

Appendix 8

Setting national priorities in research

The Academy of Science, in liaison with the other academies, directly assisted the Australian government's taskforce in the process of setting the national research priorities (NRP) in 2002. Several contributions were made to this priority-setting process.

- Hosting a National Priorities Scoping Workshop for key policy-makers on 29 May 2002. This workshop was attended by the Chief Scientist Dr Robin Batterham together with twenty of the most senior science policy experts in Australia, representing a range of organisations, including representatives of all four learned academies. A transcript of the proceedings is on the Academy's website (www.science.org.au/events/priorities/workshop.rtf).
- Organising a Strategic Forum for policy-makers on 26-27 June 2002. Fifteen speakers addressed research priority-setting issues. The Science Minister, the Hon. Peter McGauran MP, gave an informal speech on the research priority challenge at the Forum dinner. As with the Scoping Workshop, a transcript of the proceedings was placed on the Academy's website – providing a useful resource for all the stakeholders in the priority-setting process. The full text of talks and presentation slides are available at www.science.org.au/events/priorities.
- The Academy of Science's Secretary, Science Policy, Professor Michael Barber, gave a televised address to the National Press Club on 26 June 2002. He sought to re-enforce the message that research excellence, judged on an international basis, is a pre-requisite for meeting our national research priorities (the transcript is available at www.science.org.au/events/npc2002.htm).
- The Academy's High Flyers Think Tank held on 8 August 2002 enabled early-career researchers to give their perspectives on national research priorities. The report from this workshop provided a highly commended submission on suggested research priorities (www.science.org.au/events/priorities/highfly.htm).
- Other submissions recommending specific research priorities were made by individual National Committees. The following Committees chose to make submissions: Earth Sciences, Astronomy, and Crystallography.
- The Academy of Science's President, Dr Jim Peacock, accepted an invitation to chair the committee responsible for recommending the set of specific research priorities to Cabinet.
- The Academy's secretariat provided the NRP Taskforce with information, data and advice on a range of detailed matters during the priority-setting process.

The priority-setting process provided an exemplar of how the learned academies can work – both in their individual capacities, and in liaison with each other – in order to assist government in policy formulation. The Taskforce made clear their appreciation of the Academy’s efforts in assisting in this process. The outcome is a set of priorities that is comprehensive in addressing major policy concerns in Australia whilst re-stating the importance of underpinning academic research.

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

(t)he priorities provide great opportunities for exciting, fundamental science at a world-class level and will further enhance Australia’s presence as an important player on the international stage. The research community will be delighted that the government has recognised that science is now at the centre of government policy-making, and can make a vital contribution to the quality of all our lives.

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

In 2003 and again in 2005, Dr Peacock was involved in the high-level expert committee that reviewed implementation plans for the national research priorities, as developed by twenty-two of Australia’s leading government research agencies and funding bodies. The committee was chaired by the Chief Scientist, Dr Robin Batterham. The Hon. Peter McGauran MP stated in a November press release that ‘Australian Government research organisations have demonstrated a strong commitment to aligning their activities to the national research priorities, providing a firm basis for Australia’s future prosperity.’

The Academy of Science has continued to support the subsequent activities related to the national research priorities. For example, the Academy has arranged follow-up High Flyers Think Tanks on *Safeguarding Australia* (2003), *Emerging Diseases* (2004) and *Biotechnology in the Future of Australian Agriculture* (2005), in order to provide additional inputs to this process. The 2004 High Flyers Think Tank, *Emerging Diseases – Ready and Waiting?*, targeted Australia’s preparedness to deal with the increasing threat of new diseases in today’s world of increased global trade, tourism and bioterrorism. The event brought together fifty of Australia’s brightest young minds – early- to mid-career researchers from a broad range of science, technology, communication and social science disciplines. Proceedings are available at www.science.org.au/events/emergingdiseases.

Appendix 9

An international science–industry partnership brokered by the Academy of Science

Press release 9 February 2005

BHP Billiton and the Chinese Academy of Sciences reach agreement in a world-first for the resource and energy sector

The Chinese Academy of Science (CAS) and BHP Billiton have reached agreement for joint research, development and education in scientific and technical areas of relevance to the minerals and energy industry.

The agreement will involve an academic and scholarship program with the Graduate School of the Chinese Academy of Science (GSCAS), collaborative research with relevant institutes and joint efforts to commercialise research results in the global market.

BHP Billiton is the largest diversified resource company in the world and is a major supplier of mineral and energy resources to China.

BHP Billiton has developed leading technology in the areas of exploration sensing, mining, mineral processing, environmental technology and energy resources. “This agreement extends our relationship with China as a supplier of mineral and energy raw materials to a partner in research and development in our industry. As the largest research organisation in the natural sciences and high tech. Innovation in China, we see the Chinese Academy of Sciences as a strong partner for the development of future technology in our sector,” said Dr Megan Clark, Vice President of Technology, BHP Billiton.

CAS Deputy Secretary General Dr. Guo Huadong stated “I welcome the agreement and partnership between CAS and BHP Billiton which fits very well with the strategy of CAS to strengthen cooperation with leading international corporations. In addition to the cooperation in education, collaborative research and technology development, we see this agreement as important in transferring lab research into the international market”.

About BHP Billiton

BHP Billiton is the world’s largest diversified resources group, operating a unique mix of high-quality assets across the globe. BHP Billiton has 35,000 employees working in more than 100 operations in approximately 20 countries. The portfolio of assets is structured into seven Customer Sector Groups: Petroleum; Aluminium; Base Metals; Carbon Steel Materials; Diamonds and Speciality Products; Energy Coal; and Stainless Steel Materials. For more information see www.bhpbilliton.com.

About the Chinese Academy of Sciences

CAS was founded in 1949 and is the highest and most comprehensive research and development centre in natural science, technological science and high-tech innovation in China. It has 89 research institutes and a staff of 46,000. For more information see www.cas.ac.cn.

Appendix 10

Events held at the Shine Dome, 2004–2005

Date	Function	Organisation
4–6 May 2004	Science at the Shine Dome	Australian Academy of Science
11 May	The Blackburn Lecture	Law Society of the ACT
12 May	Equine Information Night	Canberra Veterinary Hospital
24–26 May	Fenner Conference	Australian Academy of Science
27 May	Dining Club	The four learned academies
1 June	Launch of Resource Book	Australian Science Teachers Association
1 June	New Conveyancing Regulations Seminar	Law Society of the ACT
22–23 June	Measuring Excellence in Research–Public Forum	National Academies Forum
23 June	The Sir Roland Wilson Annual Lecture	The Sir Roland Wilson Foundation
24 June	Council meeting	Australian Academy of Science
24 June	Informal dinner	US Graduates Exchange Program–Australian Academy of Science
25 June	Informal luncheon and address by Dr Michael Barber	US Graduates Exchange Program–Australian Academy of Science
28 June	Award Ceremony	Faculty of Economics and Commerce–Australian National University
5 July	Dinner	Faculty of Law–Australian National University
29 July	Dining Club	The four learned academies
30 July	Science Forum–The Practice of Human Health Risk Assessment in Australia	Office Chemical Safety–Therapeutic Goods Administration
16 August	The Ig Nobel Awards	Australian Science Festival
17 August	National Science Week Lecture	Australian Academy of Science Speakers Program
26 August	Public lecture	Economics Program, Research School of Social Sciences
8 September	Symposium and Lecture on the occasion of Professor Lew Mander’s 65th birthday	Research School of Chemistry, Australian National University
9 September	Public lecture	Department of Physics, Research School of Physical Sciences and Engineering, Australian National University

Date	Function	Organisation
15 September	Primary Connections Professional Learning Team meeting	Australian Academy of Science
16 September	Public lecture	CRC for Greenhouse Gas Technologies
17 September	Primary Connections Reference Group meeting	Australian Academy of Science
23 September	Dining Club	The four learned academies
28 September	Stanhope Oration	CONASTA
30 September	Council meeting	Australian Academy of Science
7–8 September	Spanish Film Festival	Embassy of Spain
13 October	Major National Research Facilities Roadshow	Australian Academy of Science and Australian Phenomics Facility, John Curtin School of Medical Research
17 October	Open Day at the Shine Dome and Ian Potter House	Australian Academy of Science
29 October	Primary Connections Reference Group Meeting	Australian Academy of Science
8–9 November	Annual General Meeting and associated activities	Academy of Social Sciences
10 November	Annual Geoffrey Sawer Lecture	Centre for International and Public Law, Faculty of Law, Australian National University
11–12 November	The Role of Antarctic Research in Australian Science and Policy Advice	National Committee for Antarctic Research and Australian Antarctic Division
16 November	Annual General Meeting	Australian Foundation for Science
16 November	Lecture on Walter and Marion Griffin	Walter Burley Griffin Society
19 November	Council meeting	Marine Science Council
22–23 November	Pan Evaporation Workshop	National Committee for Earth System Science
23 November	Pan Evaporation Discussion	Science, Engineering & Technology Network
2 December	XIIth Biennial Conference of the Film and History Association of Australia and New Zealand	ScreenSound Australia
3 December	Dining Club	The four learned academies
9 December	Council meeting	Australian Academy of Science
11 December	80th birthday celebration for Professor Joe Gani	The Gani family
14–15 December	CMA National Research Symposium—A Celebration of Modelling and Applied Probability	Mathematical Sciences Institute

Date	Function	Organisation
16 December	Primary Connections Professional Learning Team	Australian Academy of Science
17 December	Primary Connections Reference Group Meeting	Australian Academy of Science
3 January 2005	National Youth Science Forum–Opening session	National Youth Science Forum
6 January	Australian Science Olympiads–Opening session	Australian Science Olympiads
17 January	National Youth Science Forum–Opening session	National Youth Science Forum
17 January	Primary Connections Professional Learning Workshop	Australian Academy of Science
3 February	Council and Sectional Committee meetings	Australian Academy of Science
16 February	Public lecture	National Graduate School of Management, Australian National University
21 February	Public lecture	Australian Academy of Science
21 February	Dining Club	The four learned academies
23 February	Public lecture	Australian and New Zealand School of Government
2 March	Marketing Strategy Session	Child Support Agency
8 March	Public lecture	Australian Cancer Research Foundation Genetic Laboratory, Australian National University
10 March	Council meeting	Australian Academy of Science
12 March	Film evening	National Film and Sound Archive
16 March	Reel McCoy Film Society	National Film and Sound Archive
22–23 March	International Conference on Governance and Legitimacy	National Europe Centre, Australian National University
30 March	Reel McCoy Film Society	National Film and Sound Archive
31 March–1 April	Recovery from Disaster Forum	National Academies Forum
5 April	Public lecture	Asia Pacific School of Economics and Government, Australian National University
6 April	Executive meeting	National Academies Forum
7 April	Executive Committee meeting	Australian Academy of Science
11 April	Cocktail party for Lord May of Oxford	Australian Academy of Science
20 April	Green Chemistry Symposium	National Committee for Chemistry
27 April	Public lecture	Australian and New Zealand School of Government

Appendix 11

Request for increase in the grant-in-aid

Highly valued initiatives with limited or precarious funding support

Priority	Purpose	Amount (\$)		Notes
		Requested	Academy contribution	
1	Resource twenty National Committees	200,000	40,000	
	Maintain heritage meeting venue	200,000	44,500	Essential recurring operations
	<i>Sub-total</i>	400,000		
2	Young Australian Researchers Program	250,000	staff support	One-off funding in 2000 and 2003
	Summer Program with NSF	80,000	extensive staff support	Three-year funding ends June 2006
	Frontiers of Science	50,000	50,000	
	High Flyers Think Tank	50,000	50,000	
	<i>Sub-total</i>	430,000		
3	<i>Nova: Science in the news</i>	100,000	staff support	Three-year funding ends June 2006
	<i>Sub-total</i>	100,000		
	Total	930,000		