

THE ANZAAS Mercury

ANZAAS: Communicating Science to the Public

Issue No. 3, June 1999

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Editor's Edict

This third issue of the ANZAAS Mercury is jam-packed with special features to get your brain cells buzzing about improving science and its social impact.

Ann Westmore reports on the need for greater transparency over conflicts of interests in scientific publications in the **ANZAAS Debate**, Paul Adam talks up consensus conferences in **Adam's Airing**, and we have reports on the Federal Budget, Agriculture and the Environment, and the debate over Genetically Modified Food. Regular features include **News From The Divisions**, and **Book Bite**. This issue also carries a report on the ANZAAS AGM held on April 28th.

We would like to hear from you, please send any comments on the newsletter or ideas for future articles to the Production Editor at

rouchd@ozemail.com.au, or to the postal address in the box below. -*Duncan*

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Adam's Airing

Comment From The Chair

By Paul ADAM

Science Week

Science Week seems to have been a considerable success this year. A number of Divisions were involved in activities, and these are reported in News From The Divisions. I know that the NSW Division's activity, the walk through 200 million years of history, was very successful, attracting numbers beyond our wildest dreams. There is clearly a demand for, and interest in, scientific activities that are targeted at appropriate audiences. For many years the RSPCA used to point out that "a pet is not just for Christmas": the challenge for us is to demonstrate the science isn't something which happens in just one week in May. The public is enthusiastic for science, but with the vast range of competing interests it has proved difficult to attract audiences for other events throughout the year. The problem is not unique to ANZAAS, but is experienced by a range of other societies. Science Week provides the opportunity to kindle a few sparks but what we need to discover is the fuel to sustain the fire. I know that several Divisions are working hard on various fronts. Strategic alliances with other societies to host particular events has proved successful on a number of occasions, and more initiatives on these lines are being planned. I would welcome any suggestions on how best we should advance the aims of the Association and demonstrate the relevance and excitement of science.

Promoting Dialogue Between Scientists and Society

This discussion was originally prepared for IFAAST.

One of the most remarkable features of the last few hundred years has been the rapidity of the transfer of new scientific understanding into the stuff of

everyday life. Modern society would not be possible without developments in medicine, engineering and communications which themselves grew out of advances in basic science.

Certainly the benefits of these developments are not equally available to all but no associations committed to the promotion of science would lack convincing examples of the value of science to the enhancement of society. Scientists are not some special sort of beings, independent of the society in which they live. Science has always developed within the constraints of the social systems in

which it was set. Prior to the late eighteenth century western science was limited in its impact by the influence of ruling religious and political oligarchies. The agricultural and then industrial revolutions were dependent on science but also made possible a great increase in scientific research. This great and continuing explosion of scientific research was not undirected; as science became more complex, research became more expensive, and more dependent on either government or large corporations. Public funding requires public accountability, and is responsive to political direction. Funding policies of government, while seen by many scientists as capricious, have rarely been developed from the "bottom up", rather they have reflected the opinions of senior scientists, bureaucrats and politicians as to what is good for a country and its people. Wider community concerns have been filtered through the elite, rather than being a direct part of the process.

For most of the time this process has seemed to work well. Although opposition has been expressed to particular consequences of scientific advances, in general the acceptance of innovation has frequently been greater than initial predictions, for example the growth of personal computers, the internet, mobile telephones has been beyond the wildest dreams of even a few years ago.

Nevertheless these are increasing signs that, at least in particular areas, the ready mass adoption of new innovations will be more difficult. The two obvious areas where this is so are nuclear technology and gene technology. Both technologies advance what, to their proponents, are obvious benefits; "cleaner" energy supplies, greater and better food supplies, new medicines,

but it is clear that in many parts of the world there is profound public suspicion that these technologies should be pursued. In part this suspicion reflects a lack of understanding of the science, but it also reflects worries that the risks, even if small, are not worth taking and involve processes which, for a range of reasons, are not acceptable to society.

In western countries these suspicions are increasingly reflected in an alienation of society from science a view which ignores the scientific foundation of modern society.

If we are to reverse this trend there needs to be greater dialogue between society and scientists. On the one hand there needs to be greater public understanding of science. This is clearly an area where associations for the advancement of science have a key role. The process will require improved science education, in schools, which will demand the recruitment and retention of the best possible teachers and provision of adequate resources, and an improvement in the ability of scientists to communicate with the general public using all the resources of modern communication media. On the other hand scientists need much greater understanding of public opinion, and to recognize the need for partnership between science and society. Public support for science will be enhanced if it can be demonstrated that there is meaningful public involvement, and not mere public relations exercises, in scientific processes. There are already good examples of this with animal ethics committees, where lay people have a role in determining what society as a whole regards as acceptable conduct, but we need to regard such involvement not as a special case but as the general model. This is not to advocate expansion of bureaucracy for bureaucracy's sake, but to develop mechanisms whereby the broader society be involved in addressing issues which, for better or worse, have impacts on all of us. The expansion of science has inevitably led to increasing specialisation and the demise of the polymath. Scientists today should not be expected to be the source of all wisdom. Furthermore, processes by which scientists can be challenged by non-scientists should not be seen as an undermining of science but, on the contrary, as a means by which issues can be clarified and from which, as a whole, society benefits.

Associations for the advancement of science can provide a forum for interchange between scientists and the public, which has the advantage of being independent of government and other perceived vested interests. Issues of immediate relevancy will vary between countries, but one advantage of the linkages provided by ANZAAS and IFAAST is the opportunity to identify common grounds for public concern and to pool experience on how these may be best addressed.

One model for promoting dialogue is the consensus conference. The first Australian example of a consensus conference was held recently in Canberra on the subject of genetically modified food*. The most recent issue of 'Australasian Science incorporating Search' contains a discussion about the conference and it attracted wide media coverage. Is the model appropriate for clarifying a wide range of issues or is it likely to be of limited use? Is it possible for a lay jury to properly appreciate complex scientific arguments in a relatively short time: will scientists respond effectively to the determinations of the jury? Consensus conferences will not be cheap, although they don't need to be held in Old Parliament House, but they may be cost effective. We need to give consideration to a range of mechanisms, both formal and informal, to promote greater mutual understanding of issues between scientists and the wider public.

**, See the article on Science and the Media, in News Analysis, for further comment on the Canberra Consensus Conference.*

I would welcome any comments and suggestions for issues that could be addressed (e-mail: p.adam@unsw.edu.au,

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The XIX Pacific Science Congress

The XIX Pacific Science Congress to be held at the University of New South Wales from 4-9 July will be a major international event. We are planning to hold a Youth ANZAAS in conjunction with the Congress, and also to hold a number of the Association's named lectures (For details see <http://www.icmsaust.com.au/PacificScience/>).

ComBio 99

Combined Conference of the Australian Society for Biochemistry and Molecular Biology, the Australian and New Zealand Society for Cell and Developmental Biology and the Australian Society of Plant Physiologists. To be held at

Conrad Jupiters, Gold Coast, 27 to 30 September 1999 inclusive. Please look up our Web Site for further information:

<http://www.sct.gu.edu.au/ASBMB/ComBio.html>, or contact Sally Jay at the conference secretariat: Phone(08)8362 0009, Email: asbmb@camtech.net.au.

The ANZAAS Debate: Publish and Perish

- Should Conflicts of Interest in Science be Treated More Clearly?*

Paul Adam has previously discussed the need to provide a professional ethics framework for scientists that is publicly accountable. Here Ann WESTMORE, Chair ANZAAS (Vic) and seasoned medical writer, continues the ethics debate with a report on conflicts of interest in scientific publications. As commercial involvement in scientific innovation and diffusion increases, can scientists help formulate policies that treat conflicts of interest in a clear and consistent fashion?

Peer-reviewed scientific and medical journal articles are crucial to science because they are assumed to be trustworthy sources of information. If their objective status can be doubted, then the value of scientists and science to the community can be further questioned at a time when public disquiet about some major scientific applications, such as gene technology, is substantial. Unlike many press releases or articles produced by companies, governments or even research institutions, journal articles are not seen as primarily motivated by commercial or political gain.

Scientists themselves and journalists who report on science and medicine rate journal articles in reputable publications as highly credible since they have successfully negotiated the demanding process of review by scientific peers and usually include declarations regarding conflict of interest and funding support.

In short there is still a widespread perception that science has certain moral and social standards such as those Robert Merton described in 1942¹ and that have been refined subsequently under the acronym CUDOS (Table 1)². These standards underpin practices that help ensure science retains its credibility.

At the annual meeting of the Australian Medical Writers Association (AMWA) in Melbourne late last year, journalists and representatives of the

pharmaceutical industry discussed practices that may yet undermine the trust long associated with journal articles.

What got the debate sizzling was reference to commercial involvement in the preparation of scientific manuscripts, particularly the practice of drug companies employing medical writers or agencies to prepare journal articles from raw data collected by scientists. This includes tabulating and graphing data and interpreting the results.

The outcome, a well-written manuscript that presents the data in a manner suited to the needs of both the sponsoring drug company and the journal still has to be approved by the investigators prior to publication, and it remains subject to peer review and a declaration of interests. But those who actually wrote the manuscript are either not credited in the paper or are named in fine print in an acknowledgment at the end³. They are not listed among the authors who traditionally are regarded as the major contributors to the writing up, analysis, execution and design of scientific studies and who share responsibility for what is published.

Some scientists go along with the practice because they gain a publication that may be important for their career advancement without the time-consuming and often tedious work of preparing and analysing statistics, writing numerous drafts, and negotiating with journals about length, style and content. And some journals happily accept such submissions because of confidence that the drug company or agency will deliver a timely, well-written manuscript containing clinically-relevant results. It's all part of "publication planning", Dr Stephen Downes informed the AMWA audience. Dr Downes, the medical and creative director of international health care communications company, OCC, said publication planning was "very widespread, generally at the international product management and marketing level. Communications companies that specialise in the science of publication planning will assess the raw clinical trial data from a series of clinical trials and look at where, when and by whom those data would be best presented at meetings and published in order to achieve the effects they are looking for."

This might entail ensuring that several phase II trials (intended to demonstrate an agent has a beneficial effect and is safe for short-term use) are published

in peer-reviewed journals shortly before submission of data to regulatory bodies such as the United States Food and Drug Administration (FDA). Then once the drug is under FDA consideration they make sure that reports of phase III trials (performed on a large number of people and designed to prove safety and efficacy and to assess a drug's usefulness as a treatment) are ready for publication around the time the drug is to be launched. The weight of good publicity in credible journals is designed to influence the prescribing habits of doctors.

If commercial involvement in the preparation of manuscripts meant solely increasing their readability of information, it might make good sense. After all scientists as a whole don't have the greatest reputation for communication skills. Some are "stuffy writers" who use abstract nouns stacked in a precarious sequence, few verbs, a relentless passive voice, and strings of phrases joined by prepositions⁴. For other scientists, neglecting punctuation is a favourite pastime and using jargon can border on an obsession. But it would be naive to think that accessibility of information was all that was at stake. The author of a first draft manuscript controls its shape, content and style, even if collaborators add their input later. A scientist producing a first draft may have biases - overemphasising the importance of a particular finding because it supports a favourite theory, for example. But once commercial interests control the writing process, the powerful influence of financial reward adds a whole new dimension to the problem of bias.

Renowned cancer researcher Professor Donald Metcalf from the Walter and Eliza Hall Institute of Medical Research in Melbourne has had the experience of a pharmaceutical company sending staff to check on research data they were funding. He said that one time when he was working closely with a particular pharmaceutical company, they had their staff members "checking on the data" although "they never once attempted to write the text". He said he would never allow that sort of activity because "the next thing you'd have is someone massaging the data. As scientists we can't allow others to control the presentation of data. We're the ones who are responsible for it."

Another example of where commercial interests threaten to undermine the notion of scientific impartiality occurred about 20 months ago when the grand

dame of British medical publishing, The Lancet, was charged with a failure regarding exposure of a conflict of financial interest. Two researchers from the Jawaharal Institute of Medical Research in India criticised the well respected medical journal for neglecting to pass on to readers details of a financial conflict of interest⁵. The author of a drug study was part of a group that marketed the drug, but this was not published although the authors had made this known to the Lancet editor. Critics argued that the journal's policy of allowing the editor to decide whether or not to disclose conflicts of interest prevented readers from making up their own minds on whether the conclusions of research papers might be influenced by other than scientific criteria.

"The reliability of results depends on various factors of which credibility is one," they said. "We, like many others, give most credence to papers published in reputable journals by academics working in institutes of excellence. The credibility rating goes down when a project is funded by a drug company that has an interest in its outcome."

In calling for total transparency, the pair were reflecting the weight of opinion about such conflicts, that is that they should be disclosed to editors and readers alike. The international medical scientific press supports full disclosure, but editors have some latitude in declaring known conflicts. In his defence, Lancet editor Richard Horton said there were many kinds of conflict of interest just as important as those of a financial nature -academic, personal and political rivalries for example - and focussing on one type without considering the others was liable to be misleading.

In conclusion, industry-sponsored research is a reality in academic institutions across the world and much good has come from this arrangement. But there are risks. A pleasing outcome of the continuing discussion is that some Australian biomedical organisations have taken steps recently to minimise the occurrence of conflict of interest and ensure transparency should they occur.

These actions are timely because today's scientists, like those on whose shoulders they stand, rely on the support of a public who expect more from scientists than research driven by personal or financial gain. In an age of commercialisation, the relationships between

scientists and private sponsors must be thoughtfully entered into, transparent and open to scrutiny. What better way to increase public awareness of the scientific enterprise and its relation to the community?

Table 1 CUDOS

- **COMMUNALITY**; Scientific knowledge is public knowledge because, in part, it is conducted collaboratively as a social enterprise by the scientific community.
- **UNIVERSALITY**; Scientific reports should be objective and impersonal. The race, nationality, class or personal characteristics of an individual scientist are irrelevant to the science he or she does.
- **DISINTERESTEDNESS**; Scientists should be motivated by the search for truth and not be biased by thoughts of personal or financial advancement.
- **ORIGINALITY**; Science makes progress because researchers enjoy the academic freedom to choose for themselves their research studies and techniques.
- **SCEPTICISM**; Scientific claims must be subjected to open scrutiny by a process of public verification.

Notes and references

* Based on "The Hippocritic Oath", a series of three articles by Ann Westmore that appeared in Australasian Science, March, April and May 1999. ¹, Merton RK, "Science and Technology in a Democratic Order", Journal of Legal and Political Sociology 1 (1942), 115-26. Later published in Robert K Merton, The Sociology of Science, University of Chicago Press, 1973. ², Ziman J. Post-academic science: constructing knowledge with networks and norms, Royal Society Medawar Lecture, 29 June 1995. Later published in Lancet 1996, 347, 1308-11. ³, As an example see the Canadian Amiodarone Myocardial Infarction Trial (CAMIAT), Cairns JA et al. Lancet 1997; 349: 675-82. ⁴, See V Lawson, The dismal language of science in "Australian Style into the Nineties", edited by P H Peters, Proceedings of Style Councils 9 and 91, pp 142-50, Macquarie University Dictionary Research Centre: North Ryde 1992. ⁵, Raveendran, R and Gitanjali, B (1997) Conflict of interest. Lancet 349: 1173-4.

Please join the debate,

by sending your response to Prof. Graham Johnston: Email-

grahamj@mail.usyd.edu.au; Post- Honorary Editor ANZAAS, Department of

Pharmacology, The University of Sydney, NSW 2006. Responses will be posted on the ANZAAS web site.

NEWS Analysis

Federal Budget

Don't Stop The Fight for Science

By Paul ADAM

The Treasurer's second reading speech on the 1999 -2000 Budget mentioned science and research several times, a welcome change from recent years. Although the several new funding initiatives are welcomed there are several worrying omissions. The Budget proposes a major increase in funding for health and medical research and new initiatives for biotechnology. These are important areas in which Australia has a high international reputation and the increased funding should help to maintain our high standing and produce tangible benefits for society and the economy.

The Treasurer indicated the need to build "the nation's education and research capacity", but the Budget conspicuously fails to address the damage to the foundations of that capacity which has occurred in recent years. For the Universities there is an increase in the research infrastructure Grants, which restores some cuts, but still represents a drop in real terms from earlier years and promise of some new lectureships in science. There is no increase in general funding for general purposes. The failure to provide supplementation for salary increases places continuing pressure on university finances and will do nothing to dispel the gloom which prevails at most institutions. Libraries and teaching facilities remain under resourced. The ingenuity and resourcefulness of staff has kept many courses running with fewer and fewer resources each year, but without some increase in funding it seems inevitably that standards will drop. Without a strong university system our long-term ability to sustain world-beating research is questionable.

The Budget starts to address some of the problems in primary and secondary education but does nothing to help the tertiary sector, either universities or TAFE. On the research front, there is no indication of any increase in funding for the ARC. This is marked contrast to the situation overseas where the USA, UK and Japan, despite their economic downturn, are all making massive investment across the whole range of science and technology sectors, not just in one.

It is curious that the Government has gone for growth in medical research before the long awaited Green Paper on research funding has been released. The Green Paper should provide an opportunity to take a broad strategic overview of the whole of science and technology, but the Budget decisions may have pre-empted the discussion. Another long awaited document is the Marine Science and Technology Policy. While it essential to maintain our public science infrastructure the involvement of the private sector needs to be increased. The tax regime for industry R&D remains unchanged by the Budget, and measures to stimulate non-government research are lacking. Budgets are necessarily curate's eggs, but while this latest Budget appears to have attracted almost universal praise from an economic perspective there is considerable reason for concern about the long term implications for science, and hence also the economy.

The Green Paper on research funding is likely to be released in the near future. When it is available it is important that it be widely read and subject to comment. I hope that ANZAAS, on the basis of the breadth of scientific experience and knowledge represented in the membership, will be able to make a considered response.

GM Foods

The Debate Continues

By Duncan ROUCH

There have been many media reports in the last year about genetically modified (GM) food, giving this technological subject a highly controversial

profile. For example a public debate about GM food was broadcast on 13th May on 3LO; presented by Jon Faine, with T.J. Higgins (Program Leader, CSIRO Division of Plant Industry), Scott Kinnear (Member, Organic Federation of Australia), and a sequence of public citizens via telephone calls. While Higgins said Australian scientists were doing their best to ensure GM foods were properly tested before reaching market, Faine responded that the perception of safety requirements were different between scientists and the public (which echoes Paul Adam's comments on differential perceptions of ethics; ANZAAS Mercury, December 1998). Some members of the public were not satisfied by current safety regulations. Indeed most of the public calls centred on safety questions about GM foods, what is it? (what has been modified?). Is it safe? Has it been fully tested? (is it really safe for humans?). Kinnear attempted to argue that organic farming techniques render gene technology unnecessary, however, he failed to realise that this technology is capable of not only improving agricultural production but also the qualities of the food produced.

An important part of the discussion was about providing more information through labelling, since gene technology is currently associated with the manufacture of about 500 food products that are on sale in Australia. The Australian and New Zealand Food Authority (ANZFA) recently decided that GM foods that were substantially equivalent to non-GM Foods did not have to be specially labelled. Some callers said this did not go far enough, and one caller, who was clearly anti-GM food, wanted a GM label if anything to do with making a food involved gene technology, even if the final product contained no modified component, such as sugar from GM sugarcane.

Another caller proposed an independent body should be set up to oversee development of regulations and education of the public about GM foods. ANZFA was criticised by that caller for its lack of independence in testing, as it asks the companies making GM foods to supply the data on safety testing. This at first sight appears to be a clear conflict of interest. ANZFA can, however, receive available tests performed by overseas bodies, such as the US Federal Drugs Administration. Furthermore, while ANZFA falls under the purview of the Department of Health and Aged Care it can be seen to have

an appropriate focus, on food safety, rather than say food production if it was under an industry portfolio. So, if we want an independent body to run safety tests it would make sense to upgrade ANZFA with the necessary resources to perform the job itself.

Faine also pointed out that public fears in a number of previous technology-based issues had proved to be unfounded, including the introduction of antibiotics in hospitals, and fluoride in drinking water. There is, however, no room for complacency for those that support GM foods, who would be wise to provide the public with more information about how GM foods are made, and related safety issues. Moreover, scientists should support the ongoing public debate since most people are asking genuine questions for which they are keen to receive answers. We are not seeing a sterile argument between polarised opposites.

Public debate on controversial technology-based issues offer very good opportunities for organisations like ANZAAS to inform people about the scientific aspects involved, so that as scientifically-informed citizens they can more readily make choices based on the facts. Indeed the ScienceNOW! program in Melbourne during Science Week contained a public forum on 'Science and the Media' that included discussion of GM foods. Moreover, on 15th May ANZFA responded to public disquiet on labelling by advertising a request for submissions on labelling of foods made using gene technology that are substantially equivalent to conventionally produced foods. So, the public debate is moving forward.

Science and the Media

Let's Change The Culture

By Duncan ROUCH

The public forum on 'Science and the Media' in the ScienceNOW! program during Science Week focussed on how the media shapes technological issues such as GM foods and cures for cancer. From the discussion it was clear that the media in general still favours whiz-bang stories about science, and has

trouble reporting the scientific aspects of mainstream issues (also see 'Peter Doherty and the Press'; ANZAAS Mercury, March 1999). Moreover, the media environment tends to favour science 'experts' who are controversial, who can speak half-truths without criticism in the realm of scientifically-illiterate journalists. Indeed, there was a similar problem with the recent consensus conference on GM foods held in Canberra, in that there was no mechanism for checking the veracity of statements made by participants claiming expertise. As a solution we could push for newspapers and other media to expose the science and technology in mainstream stories. One way to do this would be to allow the most scientifically-literate staff, the science reporters, to report on page one, main-stream, issues.

Sustainable Agriculture

Farm and Save the Environment

By Elisa RAULINGS and Duncan ROUCH

Continuing the theme on environmental policy begun in the first issue of ANZAAS Mercury we report here on a lecture entitled "Agriculture & Environment: Can They Have a Blissful Marriage?", given by Paul O'Connell, Natural Resources Economist for the World Bank, in Melbourne last month. O'Connell first discussed the role of the World Bank in providing finances and knowledge on a wide range of topics, such as agriculture and policy reform, to aid countries in transition. He then presented the Chesapeake Bay Watershed on the east coast of the United States as a model for how agricultural and environmental goals can be merged. To reduce the flow of nutrients and toxic farm chemicals into local waters four core farm-management strategies were promoted by the six states in the watershed. The strategies adopted by farmers, as 'stewards of land and water resources', were;

- (1) **Nutrient Management**, that includes development of a detailed nutrient management plan similar to a financial plan, which is produced annually with the help of a certified specialist,

(2) Integrated Pest and Weed Management, that anticipates problems and encourages the use of on-farm solutions to the fullest feasible extent, such as crop-rotation, to break disease and weed patterns. This approach minimises the requirement for chemical pesticides and herbicides,

(3) Minimum Tillage, where sufficient crop residues are left after harvesting to protect land from erosion and degradation. Moisture is also better retained, promoting crop growth in dry seasons, however, a drawback is that more herbicides may be required to control weeds,

(4) Conservation Buffers, that include the planting of trees, shrubs and grasses as filter strips to intercept farm contaminants before they reach flowing streams, to reduce soil erosion, and to improve livestock and wildlife habitats. This strategy requires a partnership between farmers and the general public.

The first three strategies have proven win-win approaches for farmers, as their net income is increased while few nutrients and pollutants enter water bodies. In contrast, success of the conservation strategy requires all beneficiaries to share the costs, as the result is for the public good. In this case cost sharing involves a conservation payment by government to farmers, to account for lost cropping areas due to adopting the conservation practices. There is a strong overlap between these strategies adopted by conventional farmers and those used by organic farmers.

The key factor in turning around the environmental state of the Chesapeake Bay watershed was the creation of a concerned and educated public that was induced to action because of the value of the local environment to them, and which they wanted preserved for their children and grandchildren. A major contributor to public education was the not-for-profit Chesapeake Bay Foundation, which worked through public education, research studies, lobbying legislators, legal action and on-ground action programs. Through an effective public awareness campaign many people became committed to saving the Bay area from pollution, both through individual actions and the ballot box. Moreover, in 1983 a unique partnership arrangement was begun between federal and state agencies responsible for environment, marine, agricultural and urban waste issues in the region.

O'Connell then talked about the implications of US agricultural improvement experiences for Australia. He said the Landcare movement has been effective in joint action at the community level, but it is time to further develop its capabilities. To obtain adequate funds to tackle issues of resource degradation and environmental compatibility of agriculture Landcare needs to form partnerships with government, while retaining local control. Partnerships could be accomplished through Regional Management Committees, with majority Landcare membership, based on political/catchment boundaries. The Sustainable Research and Education program in the US provides an effective model for this.

The cost of correcting the major land and water degradation problems that have occurred over the last 150 years in Australia requires a partnership of all citizens, both urban and rural. Pollution sources should be clearly identified, with a close partnership between specialists, land users, and concerned advocates. An example is the immediate need to price irrigated water at a level to encourage farmers to use this scarce resource efficiently, while not exacerbating salinity problems. To mobilise public support and action the public need to be shown how their well-being, and that of their children and grandchildren, is tied to production on the land, in terms of a supply of high quality food, clothing and shelter at a reasonable price, and the maintenance of a quality environment. This is the prerequisite for a blissful marriage between agriculture and environment. Surely there is a role for organisations like ANZAAS in creating effective public awareness on such issues.

Technology Is?

When You Don't Know What You're Doing

By Duncan ROUCH

Ray Willis, the overseas guest for Science Week invited by ANZAAS Vic, said during his visit that technology is science for which we are not sure about the applications. Once we are sure about the applications it is no longer technology, but a seamless part of life. So, GM foods are controversial

technology, while hybrid plants (from human-directed genetic engineering) simply are, and can be found in many suburban gardens without drawing any comment. Most people are so willing to accept established 'technology' that they do not see or question the science that is behind practically every aspect of modern life. It is up to organisations like ANZAAS and the science museums to expose the hidden scientific aspects of every day life, to persuade people on their own terms that it is important for the modern citizen to know something about science.

News from The Divisions

Divisional reports were received from NSW, SA. and Vic.

NSW

By Bob VICKERY

ANZAAS(NSW) has been involved in two activities in the last month, Operatic Tour de France and Corridor Through Time.

Operatic Tour de France. Members of ANZAAS, The Australian-French Association of Scientific and Technical Specialists (AFAS), the Royal Society of NSW, and the Francophone Medical Society, met on Thursday 29 April 1999 to hear Mr Fred R. Blanks, AM speak about an *Operatic Tour de France*. The distinguished track record of French opera dates back to the court of Louis XIV, le roi soleil, where the composer Lully held sway, followed by foreigners like Gluck and Rossini, then native composers such as Meyerbeer, Berlioz and, in the 19th century, Gounod, Massenet, Thomas and Bizet. French opera was carried into the 20th century by Debussy and Ravel, and developed by Milhaud and Messiaen.

This talk follows the tour and offers musical excerpts from its highlights. Mr Blanks was born in Germany in 1925, arrived in Australia in 1938, and is a B.Sc (Hons) graduate of the University of Sydney. Music has always been his

special hobby, and he was music critic for the Sydney Morning Herald from 1963 to 1998, and Australian Correspondent for the Musical Times (UK) from 1997 to 1992. He has written and lectured widely on musical subjects. He was awarded the AM for services to music in the 1998 Queens Birthday Honours.

Corridor Through Time. ANZAAS(NSW) joined with the Friends of Galaringi, the Carlingford Botanic Parkland, on Sunday May 2 for a celebration of Science Week. A walk entitled *Corridor through Time* started from Eric Mobbs Lookout in Carlingford, a suburb of Sydney, and ended at the Sir Thomas Mitchell Reserve the site of the old Dundas Quarry. About 400 people enjoyed the outing on the first fine day in Sydney for some weeks. The walk was lead by Dr David Branagan. It duplicated, in part, an excursion in the forthcoming revised edition of his book *Field Geology*. It followed one of the tributaries of Ponds Creek downhill to the quarry site. Insights were obtained into the changing geology and vegetation. The route passed through two threatened ecological communities. The geology and hydrology determined the location of the first Crown Grants in this area as early white settlement attempted to ward off starvation. The quarry was first operated in 1832 after being identified by Surveyor-General Thomas Mitchell as a suitable source of blue metal for Sydney's roads. An exhibition was held in the Sir Thomas Mitchell Reserve. Items included: old photographs of quarry operations, diagrams of the quarry from various publications, a couple of old plans of Dundas Valley illustrating the quarry location among the farms. Aerial photographs - stereoscopic 'pairs' of the Valley with stereoscopes.

Youth ANZAAS. This will be held from 4 to 7 July in Sydney. The program will include visits to the Australian Nuclear Science and Technology Organisation (ANSTO) laboratories and reactor at Lucas Heights, to Galaringi the Carlingford Botanic Parkland, and lectures of the Pacific Science Congress at the University of New South Wales. See the advertisement in the May issue of Australasian Science incorporating Search.

Internet. ANZAAS will be cooperating with the Basser Department of Computer Science of the University of Sydney to present an evening symposium on 18 August 1999 about *Uses of the Internet*. Speakers will

cover: the development of the Internet and the use of Internet for Education and Commerce.

Future meetings still in the planning stage include the subjects; Gene Technology & Food, Using Memory Enhancing Drugs in Exams, Optimal Population for Australia, and Sports Science (to precede the Sydney Olympic Games next year).

SA

By Robert Perrin

The Divisional AGM was held on 28th April, immediately prior to the National AGM. With great regret the Division noted the decision of Professor David Boyd not to continue as the Divisional Chairman. Mr Ian Withall had previously indicated his intention not to continue as Treasurer. The following committee and officers were elected: Chairman, Robert Perrin; Deputy, David Boyd; Secretary, Lindsay Richards; Treasurer, Ashley Dunn; Youth Affairs and Newsletter, Sian Spencer; Committee, Russ Sinclair, Joe Wiskich.

Divisional members were active during National Science Week in a number of areas, including starting a cult radio feature in Adelaide. ANZAAS provided some quizzes to the local media: ABC Radio 5AN's Alison Rogers, an ANZAAS member, ran a daily science quiz on her "Drivetime" show during the week preceding National Science Week as well as during National Science Week itself. The slot quickly developed cult status and the ANZAAS office received numerous calls complaining that the quiz was only broadcast in the Adelaide metropolitan area. ANZAAS also provided a "silly science" quiz to the local newspaper, which generated some quite bizarre answers.

The Division also assisted at the SA launch of National Science Week in Rundle Mall with youth member Sian Spencer manning a bookstall and Robert Perrin conducting a live silly science quiz. Also at the launch were retiring SA Divisional Officers, Prof. David Boyd and Ian Withall. ABC Radio 5AN broadcast the "Drivetime" slot live from the launch with Alison Rogers again giving science a boost over the airwaves. ANZAAS also collaborated with ASC and the Skeptics in staging a very successful "Science in the Pub"

event when the subject for debate was " Why should we believe what scientists tell us?"

VIC

By Duncan ROUCH and Ann WESTMORE

For the ScienceNOW! program in Science Week, we organised two events, a forum, "Business for the 21st Century: Hatching New Businesses With Technology Precincts", and a tour to the new Docklands Stadium, which is being built with new technology.

The forum at the Melbourne Exhibition Centre contained presentations by an international expert panel on technology precincts. This marked the decision of the Melbourne Docklands Authority to go ahead with plans for a technology precinct, which is close to the central business district and two universities. The forum was also of strategic value, in promoting links between ANZAAS Vic., and the Department of State Development, Victoria, which is responsible for S&T policy in this state, and is the main sponsor of ScienceNOW! The five speakers and their topics were; **Dr Ray Willis**, Vice President, Thermogen, Chicago, *"The US Experience with the World's Largest Technology Precinct"*; **Angus Robinson**, General Manager, Australian Technology Park, Sydney, *"The ATP Experience"*; **Andrew Gibb**, Director for Marketing and the Technology Precinct Project, Docklands Authority, Melbourne, *"The Docklands Technology Precinct in the Making"*; **Dr Andrew Conway**, President of Silicon Genetics, California, *"Advantages of Starting a Business in Silicon Valley"*; **Dr Tony Finney**, Principal of Finney Whelan International, Science & Technology consultants, Melbourne, *"The key features of good technology incubators and their crucial role in supporting development of innovative products and services."* The session was chaired by **Prof. Margaret Britz**, Former Victorian Principal Policy Adviser, Science, Engineering and Technology. The moderately sized but select audience, which included the Principal S&T officers of three State Governments, showed a great interest. After the forum Andrew Gibb took participants on an guided tour around the Docklands to see the new stadium, which as its construction takes form is

becoming a showcase for Australian building technology. The impressive tour was sponsored entirely by the Docklands Authority. The whole Docklands area, which by comparison is about five-times larger than Darling Harbour in Sydney, is currently under redevelopment.

ANZAAS invited, and partly sponsored the visit of, Dr Ray Willis from Chicago, who also took part in three workshops on technology precincts in Melbourne, one of which drew participants from the Federal Department of Industry, Science and Resources and other interstate organisations. In his first visit to Australia Ray also visited Tasmania to talk with scientists at the CSIRO Antarctic Division.

Due to our policy of seeking to educate the public in part through controversial science-based issues, in late May we collaborated with the University of Melbourne Faculty of Science to hold a special forum, the *"Winter Energy Summit"* on the issue, *"How secure is Victoria's energy infrastructure?"* This was held as the peak energy consumption period for 1999 was about to begin, following the gas explosion at the Esso plant at Longford in September 1998. Speakers at the meeting were Dr John Tamblyn, Victoria's Regulator-General; *"How secure are Victoria's gas and electricity distribution channels?"*; Assoc Prof John Price, Monash University (Engineering), *"How are Victoria's electricity-generating power stations performing post-privatisation?"*; and Prof Bill Charters, University of Melbourne (Engineering), *"How can renewable energy options improve security of supply?"*. The forum was very successful and a full report will be given in the next issue.

Report From The Annual General Meeting

Our annual general meeting was held on Wednesday, April 28th at 8pm EST; 7.30pm CST and 6pm WST. Because arrangements had been made to convene meetings in all States and Territories linked by telephone, every member had an opportunity to attend, cast a vote or make a contribution. Agendas, resolutions and proxy forms had been sent to all members well ahead of the meeting so that every member could participate in the direction of ANZAAS. This arrangement required a special resolution under section 121(1) of the Associations Incorporation Act 1991 to be put to the meetings. This resolution had been sent to members prior to the meeting, with their proxy forms.

At the commencement of the meeting, Divisional convenors reported a total of twenty-eight [28] members present and voting. The Secretary declared that a quorum had been found and the first resolution was put to the meeting and passed unanimously. The Chairman then put the second procedural motion to the meeting, which was also passed unanimously.

The two motions were:

1 *"That the meetings convened as Annual General Meetings in ACT; NSW; Victoria;*

Tasmania; South Australia; Western Australia; Queensland and the Northern Territory shall be part of the same Annual General Meeting separated by distance and connected by telephone or other electronic means and shall have equal status in the conduct of the business of a general meeting."

2 *"That the minutes of the Annual General Meeting held on 30th September 1997 and the Special General Meeting held on 19th December 1997, be taken as read and are accepted as a true record of those meetings".*

There then followed some discussion on the report of the previous Chairman and Council, and it was pointed out that the previous Treasurer, Mr. Neville Taylor, had resigned the position in December, 1997, and that Brig. Don Tier had resigned as Secretary during January, 1998. The records were amended to reflect these changes.

The current Council took office on 1st April 1998 following elections held during February/March 1998. The report of our present Chairman, A/Professor Paul Adam, follows in full.

Chairman's Report

The period under review has been one of the most traumatic in the long history of the Association.

The 1997 Congress was held in Adelaide and had an excellent programme incorporating a number of significant papers. The organising committee is be congratulated for bringing together such a distinguished group of speakers. Unfortunately, the trend of recent years of small attendances at Congresses was continued, and attracted much adverse comment in the media. The Youth ANZAAS event running concurrently with the Adelaide Congress was a *great success* and was much appreciated by all attendees, particularly those from the United Kingdom. The low attendances at recent Congresses has been a major drain on the resources of the Association, and it became clear to the Council, meeting at the Adelaide Congress, that the Association was living beyond its means and that urgent and drastic action was needed. Council determined that the membership should be informed of the financial situation at the 1997 Annual General Meeting and recommended that the Association be wound up.

It was necessary to convene a Special General Meeting to debate and vote on a series of resolutions related to this resolution. The Special General Meeting was held on 19th December, 1997 by telephone conference connecting all Divisions. The Special General Meeting was attended by many more members than would ordinarily have attended an AGM, and was long and arduous. It is a matter of history that the motion to wind-up the Association did not succeed ANZAAS did not die! Following the SGM, the incumbent Council resigned, with the Executive remaining in office on a caretaker basis until the new Council, elected on 13th February 1998, took office on 1st April, 1998.

The incoming Secretary, Robert Perrin, immediately arranged for an ANZAAS office at the University of Adelaide. We are grateful to the University of Adelaide, and particularly the Vice-Chancellor, Professor Mary O'Kane, for generously making this possible. With a new office in Adelaide, it was possible

to immediately reduce costs by closing the Canberra office located in the Academy Dome, eliminating rent and wage payments.

Arrangements were made to archive the Association's papers and records in the National Library, and only essential working files were transferred to Adelaide.

There is widespread agreement across the disciplines that the aims of ANZAAS are as relevant today as they have ever been. The difficulty is to convert sympathy for these aims into positive action and membership. This dilemma is not unique to ANZAAS: it is a problem, which is faced in varying degrees by a number of non-specialist national science societies.

Unfortunately, ANZAAS does not have the substantial non-membership income enjoyed by AAAS and 'Science' or the institutional and government support, which has enabled BAAS to prosper in even the leanest years. This makes our problem more difficult and harder to resolve.

During the past year, a great deal of effort has necessarily been expended on the mechanics of relocation and simple survival. The task now is to move forward and put the aims of the Association into effect - in the broadest sense to advance science - and to rebuild the membership base and the financial reserves. The policy of Council is to encourage an active Divisional base and several Divisions have conducted varied programmes. It is difficult in the metropolitan centres to compete with other attractions, but with good topics, adequate advance publicity and competent speakers an audience can be won. There is considerable merit in co-operating with, or supporting, other science-based organisations in presenting events to the public or to other scientists.

Although the concept of a non-specialist national Congress is currently not a practical proposition, the Tasmanian Division showed that there is still scope for thematic meetings. The Tasmanians conducted a successful symposium for the International Year of the Oceans during September 1998 - an event which illustrated the value of ANZAAS by providing a multi-disciplinary forum which attracted substantial media coverage and comment. Held concurrently with the Oceans symposium was a successful Youth ANZAAS event, which for the first time for many years attracted participation from New Zealand. The

Association owes a great debt of gratitude to the Tasmanian Division for its endeavours in staging these events.

What is past is past - and we should remember it only as an aide memoire to prevent repetition of past mistakes. As we move into the next century, the activities of the Association must be relevant to the needs of scientists and to the needs of the broader community. The task for the future is to develop a new relationship between the Association and its membership; this Annual General Meeting being part of a new outlook which brings the members into the decision making processes. Council is currently voting on a series of constitutional amendments which will make the Association more democratic and responsive to the needs of the membership at large.

It would be remiss of me not to acknowledge the work of the previous Council and Executive during a very difficult time. The report of the outgoing Council is made available at this Annual General Meeting.

In particular I would like to thank (Brig.) Don Tier whose meticulous record keeping, file management and co-operation did so much to facilitate the transfer from Canberra to Adelaide. -*Paul Adam, Chairman.*

The motion: "*That the report of the Chairman and Council for the period July 1997 to June 1998 be accepted*", was passed unanimously.

There was considerable discussion on the accounts as presented to the meeting. The accounts showed a deficit of \$58,861 for the year in question. The Secretary pointed out that Divisions, with the current exception of SA, had contributed 10% of their assets during June/July 1998 to ensure the immediate continuation of ANZAAS as a national body. The Secretary also pointed out that the "budget" referred to on p3 of the Accounts was drawn up to show that with careful management of funds, ANZAAS would not only survive, but would prosper. The Secretary stated that the current budget was still in preparation and that the Treasurer would not have had time to prepare a budget for presentation to this meeting. However, on the basis of the income/expenditure figures and the current bank balances, the Secretary stated that he was prepared to recommend to the meeting a \$5000 budget for publicity and recruitment.

There was discussion on the level of expenditure incurred by Youth ANZAAS, which was considerably above the amount of funds supplied by DETYA, the balance being met from the reserves of the Tasmanian Division.

The Chairman pointed out that the Hobart conference had at least broken even.

The reserves of the various Divisions were discussed and it was agreed that the accounts as presented by each Division, including those from ACT and WA where only two transactions had occurred, be included in the consolidated accounts for filing with the Registrar of Associations. This filing was to serve as a record of Divisional assets and would of course be available to all Divisions. The motion: *"That the financial accounts as presented, and as audited, for the period July 1st 1997 to June 30th 1998 be accepted"* was passed with one abstention.

Motions concerning proposed amendments to the objects of ANZAAS were discussed at some length, and the motion: That the phrase: *" to promote public awareness of the role of science and technology in every day life"*[constitution para 2 (b)] **be replaced with the phrase: " to foster public interest in science and technology, and awareness of their role in everyday life."**

was passed with the following voting figures: 20 in favour 10 votes against; 32 proxies in favour 1 against. The object of ANZAAS are amended in compliance with the motion.

There was considerable discussion on motion six, and it was obvious that the result of any vote was going to be close. The Chairman asked the proposer, Mr Eric Webb of the Victorian Division to speak to the motion. After further discussion with inputs from all Divisions, Eric graciously offered to withdraw the motion.

This offer was accepted by acclamation. Therefore, motion number six: *That the phrase: " to encourage the curiosity of young people in science"* [constitution para 2 (c)] **be replaced with the phrase: " to encourage the curiosity of children about the nature of the world around them"** was withdrawn and the objects of ANZAAS are not amended with respect to this motion.

There being no other business the meeting closed at 9.25pm EST, 8.55pm CST and 6.55pm WST.

Book Bite

Flora of Australia Vol. 1. 2nd ed.

Edited by A.E. Orchard, 1999. ISBN 064305965279.95 ABRS/CSIRO
Melbourne

The production of the Flora of Australia is one of the world's great on-going scientific and publishing endeavours. Australia has one of the world's largest and most distinctive floras. The first complete treatment of the flora of the whole continent was George Bentham's *Flora Australiensis* (1863-1878), a masterly treatment for its time and written by someone who, remarkably, never visited Australia. The known Australian flora when Bentham was writing was probably less than half what is recorded today.

The need to produce an updated comprehensive flora was a cause long championed by ANZAAS, since the 11th Congress in 1907. At the 25th Congress in Adelaide in 1946 a Systematic Botany Committee was formed. The Committee established a newsletter, *Australian Herbarium News*, which in its first issue carried an article by William Hartley promoting a new national Flora. ANZAAS, later joined by the Australian Academy of Science, continued to push for a Flora and at last started to make progress in the 1970's. Both sides in the 1972 Federal election made commitments to a national biological survey, and an Interim Council for the Australian Biological Resources Study (ABRS) was established in 1973, but it was not until 1979 that the Bureau of Flora and Fauna was formally created and the Flora of Australia project brought into being. It was planned to launch the Flora at the XIII International Botanical Congress at Sydney in 1981. It is believed that it was the personal support of the Prime Minister, Malcolm Fraser that led to adequate resources

to meet the deadline being made available. Scientists interested in the natural environment have cause to look back on the Fraser years as a golden age. Volume I of the Flora was launched at the International Botanical Congress, and since then some twenty other volumes have appeared, although final completion is unlikely to occur in my life time.

This new edition of Vol I is more than twice the length of the first version. As well as providing an introduction to the Flora, the volume also provides a broad overview of palaeobotanical and climatic history of the continent and a synthesis of the present vegetation and its conservation. Our understanding of the development of Australian flora and vegetation has considerably advanced since 1981 and this new treatment is very welcome.

Despite more than two centuries of botanical exploration there is still much to be learnt about Australia's flora. The recent discovery of the Wollemi Pine illustrates that even apparently well studied area may yield the unexpected. The rate of change in the Australian environment makes it even more important to document its biodiversity. The Flora of Australia project is an essential component of this documentation. The publication of the Flora provides a model for such projects and has a high international reputation. It is something in which the Australian scientific community can be rightly proud. -
Paul Adam.

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Posted on the ANZAAS web site 23 September 1999