

WiSeNet

Journal



*Women
in
Science
Enquiry Network*

WISENET
Journal

CANBERRA
EDITION

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WOMEN IN SCIENCE ENQUIRY NETWORK

OBJECTIVES

- to increase women's participation at all levels in the sciences where they are now under-represented;
- to examine the education and employment structures which currently restrict women's opportunities in the sciences;
- to gather and disseminate data on women in science, the sciences here including the physical, social and life sciences, mathematics, computing, medicine, engineering and associated technologies;
- to explore linkages between the different disciplines and promote communication between scientists and the community on social and environmental issues;
- to examine the relationship between scientific research and technology and promote research and technologies more appropriate for world needs;
- to explore programs for change in the sciences and support more democratic and participatory systems as an alternative to the male-dominated tradition;
- to build an active network of people interested in these issues and to liaise with other interested groups;
- to support appropriate action to achieve these objectives.

Women in Science Enquiry Network (WISENET) Inc was established to increase women's participation in the sciences and to link people in different branches of science and those who are working towards a more participatory and socially useful science.

WISENET was formed through the establishment of a series of state branches. Regional groups, such as those based in Wollongong and Lismore in NSW have also been formed. Interest groups, such as that responsible for the historical exhibition on Australian women in science, have also been active. State and regional branches act autonomously, focusing activities primarily at a local level but also joining with other groups for more general issues.

WISENET is open to women and men who are involved or interested in the sciences and are interested in working for change in line with the objectives. New members are welcome. If you would like to join please complete and return the application form on the inside back page of this issue.



PO Box 647, Glebe, NSW 2037, Australia

EDITORIAL

CONTENTS

- 4 Judith Whitworth Profile
- 6 Science meets Parliament
- 9 Employment of Women in CSIRO
- 12 Professor Jennifer A. Graves
- 14 5th Int. Symposium on Fertility
- 16 From Laboratory to Computer Screen
- 18 Felice Driver Interview
- 19 SET Report
- 20 Bruce Chapman
- 21 Women & Health Seminar
- 22 WAIS
- 23 Video Histories
- 27 Membership Form
- 28 Contacts

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When ACT WISENET accepted the invitation to compile this edition of the WISENET Journal, I'm not sure we realised just how much outstanding scientific research is being done by women in the ACT. Constraints of time and other commitments prevent us from providing a more comprehensive overview – but I hope our selections make for enjoyable and inspiring reading.

What is clearly reflected in these pages is the wide spectrum of scientific endeavour that is being undertaken by women in science. They have variously demonstrated courage to overcome adversity, innovation in pursuing their passions, quiet insistence on facts and figures for career guidance and very clearly, the love of science and its importance to our everyday lives.

However, statistics show that real inequity still exists and Sara Ryan's assessment of women employees in the CSIRO makes compelling reading. I would also like to recommend the feature article *Women in the life sciences* in the second edition of EMBO's new journal EMBO Reports (Volume 2, Issue 8 August 2001) – a synopsis is presented in this Journal. The article seeks to explain why there is such a slow rise of women in higher positions in scientific institutions in Europe. I met the Editor of EMBO Reports, Frank Gannon, at the recent Frank Fenner Conference held at the Academy of Science here in Canberra, and he said he would be very interested in hearing how their analysis compares to the Australian experience. Perhaps we could integrate this into our next WAIS Conference 2002 and prepare a comparison. We may discover that it is time to review our own workplace practices precisely because some women are succeeding – why not more? I often wonder whether we concentrate on the wrong problems too often. Is it only sexual harassment or sexuality in the workplace that causes such real problems? Do we have such a low profile despite high public rating because we don't have the tradition of being involved in broader sections of society in the higher echelons? Why do so many women lack confidence in applying for positions or becoming involved at higher levels? In particular, is the problem one of low earnings sapping confidence? After participating in Science meets Parliament Day and the SET Summit, I cannot understand why our earnings as scientific researchers – male or female – are so low compared with our professional counterparts. On the one hand we are being confronted with a veritable *free-for-all* in terms of expectations and demands because of our outstanding capability and qualifications. Yet we are paid on significantly lower scales than people with far less.

One more thing: after meetings with Carmen Lawrence and Michelle O'Byrne, Frank Gannon and others in influential positions, it is becoming clear that people cannot respond to endless bemoaning, and would appreciate factual presentations with clear policies or codes of practice to guide onward discussion about requested change. Our present aims and objectives are admirable, but how do we want them translated?

In keeping with recent calls from WISENET about re-appraising who we are and what WISENET now stands for, this is also an opportune time for us to reassess our value to the Australian economy as well as our position in Australian society. I hope it is that we stand and be counted for the significant and impressive contributions that we make.

Anna Robinson.

Front Cover Photo: At WISENET ACT lunchtime meet: from left – Lyn Hinds, Anna Robinson (standing), Rosemary White, Sue Brown, Rowena Ball (guest), Karen Edwards, Sarah Ryan and Janet Salisbury. The additional chair had just been vacated by Sue Serjeantson who had to get back to the Academy.

PROFILE

– PROFESSOR JUDITH WHITWORTH

*Interviewed by
Anna Robinson*

Professor Judith Ann Whitworth, AC, DSc, MD, PhD, BS (Melb), FRACP is currently Director of the John Curtin School of Medical Research (JCSMR), Head of the High Blood Pressure Research Unit (JCSMR) and Howard Florey Professor of Medical Research at the Australian National University in Canberra, ACT. She is also President of the High Blood Pressure Research Council of Australia, Co-Chair of the WHO/ISH Guidelines Global Advisory Committee on Health Research and a Member of the WHO Global Advisory Committee on Medical Research.



Judith graduated in Melbourne from the University of Melbourne, where she was also awarded the degree of Doctor of Medicine in 1974, a PhD in 1978 and a Doctor of Science in 1992. She has practised medicine and carried out research extensively in Australia and overseas. On the 11 June, 2001 Judith was made Companion (AC) in the General Division, Order of Australia for service to the advancement of academic medicine and as a major contributor to research policy and medical research administration in Australia and internationally.

H T T P : / /
jcsmr.anu.edu.au

Previously:

- Cwltth Dept of Health and Family Services, 1997-1999
- Professor of Medicine, University of NSW, 1991-99
- Head, Dept of Medicine, St George Hospital, 1991-97

- Deputy Director, Dept Nephrology, Royal Melbourne Hospital, 1990-91
- Honorary Consultant since 1991
- Professorial Associate, University of Melbourne, 1987-91
- Visiting Scientist, MRCH Blood Pressure Unit, Glasgow, 1985
- Naturalia et Biologia Fellow, Tenon Hospital, Paris, 1985
- Chairman, Board of Postgrad Education, Royal Melbourne Hospital, 1983-91
- Nephrologist, Royal Melbourne Hospital, 1982-91
- Physician, Royal Melbourne Hospital, 1978-81
- NHMRC Scholar, Howard Florey Institute, 1975-77
- Visiting Registrar, Guys Hospital, London, 1974-75
- Research Fellow, Tenon Hospital, Paris, 1973-74
- Senior Registrar, Queen Elizabeth Hospital, Adelaide, 1972
- RMO/Registrar, Royal Melbourne Hospital, 1968-71
- Councillor, International Society for Hypertension, since 1992 and Vice President 1998-2000
- President, High Blood Pressure Research Council of Australia, 1999-2001
- Chairman, NHMRC Medical Research Committee, 1994-1996
- Nominating Committee, International Society for Nephrology, 1990-93
- Councillor, Royal Australasian College of Physicians, 1984-93
- President, Australian Society for Medical Research, 1984
- Royal Australasian College of Physicians Medal, 1994
Howard Florey Medal, 1990
- Smith Kline and French Award, International Society for Hypertension, 1984
- Winthrop Travelling Fellowship, RACP, 1973
- Life Member, Australian and New Zealand Society of Nephrology, 2000-
- Member, WHO Advisory Committee on Health Research, 2000-

Judith, you have a distinguished career history that reflects continued great achievements, particularly for a woman in your time. Were there any specific self-motivating factors in your life?

I had polio when I was a small child. This shaped my interest in medicine and how research could improve health. I couldn't walk for two years and had to have several

operations to correct deformities. I did read a lot at that time.

Did you experience and overcome any particular hardships or, conversely, do you think you were particularly privileged in any way?

Dealing with the polio was sometimes hard. But when you are young, you accept things and just go along with what is needed and make the most of things.

As to privileges – I do consider myself very lucky to have attended college at Janet Clarke Hall while I was at the University of Melbourne. College life was just wonderful and I made a number of life-long friends.

Are there any aspects of your career that have been particularly fulfilling at a personal level?

With respect to medicine, feeling you may have helped patients is very high on any list. One thing working in medicine brought home to me was that often, the most grateful people were those we did least for. It showed me that people feel about things differently, and how they feel relates more to their attitudes and expectations than anything else.

As for scientific research, it is good knowing that our early work on protein restriction and converting enzyme inhibition in chronic renal failure has helped delay or prevent people going on dialysis. I'm also pleased about the international guidelines for hypertension – that work has the potential to improve outcomes for a lot of people worldwide.

Do you have any comments on the present culture/histories of women-in-science compared to women-in-medicine?

My childhood hero (along with Don Bradman) was Marie Curie. I loved the way she got in there and did so much. I think that both science and medicine are good careers for women because one's colleagues focus on your science or medicine first, rather than your gender. In medicine particularly, difficulties for women relate to time and commitments. I didn't feel the discrimination that other professional workers complain of because there was so much more focus on the job. In fact, my experience was quite the opposite. When my daughter was born, my male colleagues took me off the on-call roster

which meant they had to do more work. They were very kind and supportive.

I was also influenced by Priscilla Kincaid-Smith, who has combined enormous professional success with bringing up three children very successfully as well. Priscilla is a greatly distinguished physician and medical scientist. She was a great inspiration to me. (*Professor Kincaid-Smith's wonderful story is on the Academy of Science web-site, www.science.org.au/scientists/pks.htm* Ed.).

Would you like to share any special stories, experiences, ideas and/or suggestions with WISENET Journal readers?

I think I was lucky to have established a career before having a family and I admire young women who manage to have families while getting qualifications and careers on track. Problems for women in both medicine and science are more societal than professional. In any competitive environment, time out will set anyone back. Until that is dealt with, anyone in that situation will carry a handicap.

The need to take time out makes some women make choices of career versus family – men usually don't have to do this although I am very aware that single fathers do have the same sort of problems. It is important to recognise that these problems exist for anyone in this situation and we need to be creative in thinking about how we, as a society, can resolve them.

I have no time for the culture of complaint. If people see themselves as victims, they behave accordingly. I see the problems of women in medicine or science as problems for society as a whole rather than just for women. We can't afford as a society not to make use of our best minds. Women also have some advantages that men don't – men have societal needs and demands as well. It shouldn't be a "them and us" culture. We're all in it.

Overall, I think academic environments are very positive places for women. Universities have a real commitment to EEO. I'm also impressed by the capable women in the Australian Public Service but puzzled as to why we don't have more women as departmental heads. I hope that will turn around before too long.

SCIENCE MEETS PARLIAMENT

**Anna
Robinson**

On Tuesday and Wednesday, 21 and 22 August, Carolann Wolfgang and I attended Science Meets Parliament Day. I circulated an anecdotal email earlier. The following is a more comprehensive report.

The first day's briefing was at the National Press Club. At registration, we were presented with a folder containing an outline of the day's activities, a booklet of participants' biographies, and some handouts that contained very relevant and comprehensive information – please let me know if anyone would like copies of any of the documents¹⁻⁵.

Presentation Summaries

Craig Cormick of Biotech Australia talked on statistics, how they are gathered, how they are interpreted - including some myths. Salient points: people obtain information about science and technology primarily from the media. However, they are also looking for new forms of information from the internet, libraries, and science magazines. Scientific issues of greatest concern are human tampering, pesticide use, food poisoning – more so than genetically modified foods specifically. Of the latter, gender was identified as the largest discriminator with women (21-39 year age group, child bearing) being more concerned than men as to whether risks outweigh the benefits and effects. In terms of trust, the public had greatest confidence in CSIRO/University scientists (85% and 82% respectively), farmers 61% and government officers least (Federal Government 29%, State Government 27%). It looks like scientists have a good image but the public wants more information, consultation, regulation, consumer choice and consumer benefits before genetic engineering will be more accepted in the community.

National Press Club Luncheon with televised address by **Peter Wills** (Chair, ARC). Very commercially oriented talk - scientists are expected to understand the meaning of the word 'dollar' from now on. *And* still do outstanding science. *And* understand marketing and commercialisation *and* patent law as well. *And* network *and* ... The clear

message to scientists was learn to sell your science. It will no longer be treated as only an academic pursuit.

Margo Kingston (MK), the Political Correspondent of the Sydney Morning Herald chaired a panel discussion with **Senator Natasha Stott Despoja (NS)**, Mr **Martyn Evans (ME)** MP and Government spokesperson, **Grant Chapman (GC)**. The discussion became a bit party political but remained financially oriented. **MK** raised the issue of Robyn Batterham's much publicised "scientists had to learn to use a balance sheet" comment. Is there too much weight on scientists? **NS** "search for truth rather than funds; remove disincentives; withdraw HECS from science as apart from engineering, law etc, what about salary supplementation, and welcoming science into the political agenda; elevate the portfolio". **ME** "scientist's have a bad image – no porsches in the back yard!; insufficient teaching, not enough students qualified in maths and science the real problem; do we need a *sea change* in the way we do science? And put some money back into teaching; look at MIT - need to keep science on the front foot; public has opposed every major advance – chlorination, fluoridation, vaccination – value of science clear". **GK** "Scientists need to distinguish between pure and applied science and business/job creation outcomes. Need to improve science's communication, too much misinformation. We need increased funding. ..." the last comment being agreed on by all. In concluding, **MK** restricted questions to women scientists. Two asked about entrenched education issues that unfortunately invited only political rhetoric in response. It made me realise that we need to learn this political language to impress.

Peter Cullen (President of FASTS) said he wanted to maintain science as a key issue during the election. The politicians are listening and looking for smart ideas to get re-elected. Re-election for politicians was dependent on what goes on in their own electorates.

Issues

- ☞ How to bring employment into the electorate.
- ☞ More cash? What drives it, what does it deliver?
- ☞ Science underpins the new economy which underpins the entire future of this country.
- ☞ Governments need to invest in specific things: provide answers not problems.
- ☞ Know your MP – make sure they know where to find scientific advice; tell stories; invite them over; find out what science interests them; what is useful to them in terms of the election.

We were presented with the FASTS document “Four big issues before Australia”

- ☞ Innovation and Commercialisation.
- ☞ Education – at school, in industry and in the general population. Lift the level of employment of science graduates in business; help change the culture.
- ☞ Higher education. Are standards falling?
- ☞ Initiatives within Government. Appoint scientists to Parliament as interns?

Concluding statement

This Liberal Government released its first set of policies under the title Backing Australia's Ability. Coming out of the Innovation Summit and the review by the Chief Scientist, this provided a number of policies to encourage basic research. Backing Australia's Ability was widely supported by FASTS when it was released.

Important elements are:

- ◆ the doubling of funding for basic research through the Australian Research Council
- ◆ enhancement of the CRC program
- ◆ new places to support innovation in science and technology offered on a competitive basis to Universities
- ◆ support for new Centres of Excellence in biotechnology and information technology
- ◆ some changes to tax concessions for R&D.

The Labor Party has released Knowledge Nation, endorsed by many as an exciting broad-brush vision for Australia. Labor now has to identify the investment policies that will achieve the Knowledge Nation. Australia has the capacity to be an international leader in the new economy; and the challenge for us as a country is to be smart enough to realise this potential.

The view for the Department, **Ms Patricia Scott**, Economist and Deputy Secretary, Department of Industry and Scientific Resources: talked about policy trade-offs that involve exchanging one parcel of money for another; that science and innovations are NOT at the top of political priorities. Scientists need to seek support of other stakeholders and community groups, need to be aware of current ideas that can be captured – show what has worked overseas, or cost-effective solutions, successful models. Be aware of how to brief the Departmental heads so they can brief the Minister. Ideas filtered through FASTS or the Academy of Science signifies their support. Before talking to government representatives be aware:

- ◆ Are there central agencies, proposals, tax options involved?
- ◆ Are there clear market possibilities? Is there a role for the private sector?
- ◆ Should government fund the proposal? Is it a Federal or States issue?
- ◆ Are there already existing government measures? (...tricky, this one! Often there are, we just don't know about them. Ed.)
- ◆ What is the net impact on a budget?
- ◆ Should it be now or later?
- ◆ What does the model say?

(I felt exhausted after this talk. I find being a scientist is pretty much a full time life experience let alone job. How we are to fit in all this additional research feels daunting! Ed.)

Communicating with Parliamentarians – the view of the staffer with **Kieran Schneemann**, Chief of Staff to Senator Nick Minchin, **Sean Battern**, Chief of Staff to Michael Lee, MP as well as **Robbie Swann**, putting the case of how an atypical industry successfully lobbies Parliament to get results!

Main points:

- ◆ Prepare well
- ◆ Talk to advisers first and be aware of protocols
- ◆ Provide a summary (A4 page) of your presentation, if possible, find out what appeals to the politician first and draft accordingly.
- ◆ Quantify – state the value of your representation.
- ◆ In conclusion, follow up with a letter of thanks, create an opportunity for follow-up invitations; try to establish a relationship beyond the meeting.

Next day, I met Michelle O'Byrne, Labour MP for Bass in Tasmania - my partner for the meeting (determined by FASTS) was Chris Harwood, CSIRO Forest Products. The meeting was direct but informal. We had general discussions about women's under-representation in scientific areas (in particular the upper echelons) and Michelle suggested I meet with Joan Kirner to discuss this further. Michelle also gave me some more contacts for WISENET. I invited Michelle to visit some WISENET members at their research posts. Chris Harwood also extended the invitation for her to visit CSIRO which Michelle responded to positively as forestry issues were of importance to her electorate. She suggested she could make visits to more general areas of scientific research after the election.

We were also addressed by Kim Beazley, Vicki Sara and Nick Minchin, and Margaret Reid at various times. Other politicians mingled during drinks on Saturday evening - the event was well supported by politicians and was clearly high on their agenda.

Key points:

1. Australian scientists are held in high regard and have great credibility
2. Science is on the political agenda - people want to know
3. While we are being expected to explain and account for who and what we are as well as how much we spend, Kim Beazley and Nick Minchin showed great respect in their addresses to the group for both numbers and

standard of attendees. (I must mention that most of the scientific community was very well dressed and, in that image-conscious environment, the showing made quite an impact.)

It was a pleasure to be at Science meets Parliament Day, representing WISENET. Our Parliament House is a very beautiful and impressive building and being there with such a sense of purpose after the excellent preparatory session organised by FASTS was an extraordinary experience. Most of us work in an environment that is government funded in some way or other - and the message to us all from the politicians? It is time for scientists to move to more specific and tangible policies that can be brought to the political agenda - if we want a voice, we must be prepared to participate in politics and clearly communicate our vision.

Publications:

1. *Australian Science: An investment for the 21st Century*, FASTS (2001)
2. *Four big issues before Australia*, FASTS (2001)
3. *Your Key to the House, a Guide to your House of Representatives*, Department of the House of Reps (1999)
4. *Who is Studying Science?* (ACDS [Australian Council of Deans of Science] Occasional Paper No 1, 1999)
5. *A New Economic Paradigm? Innovation-based Evolutionary Systems*, Dept of Industry, Science and Resources Science and Technology Policy Branch (1998-1999)

A Student's View

As a representative for WISENET on Science Meets Parliament Day, I met with two parties: (1) the Hon. Margaret Reid (President of the Senate) along with her assistant advisor, Ms. Caryl Haslem and (2) the Hon. Dr. Andrew Theophanous, Federal member from Calwell.

The Hon. Margaret Reid knew about many national science and technology issues and was receptive to our discussion. I talked with her about the need to increase the number of women in academia as well as getting young girls excited about sciences and maths early on, at the primary school level. One of the other scientists who I was partnered with during the discussion asked me why women were not advancing in academia and even seemed slightly defensive about it! This was an inter-

esting side outcome to me since he came from a research setting, was fairly young, and frankly I had assumed that university and research organisation staffs would be well educated on this issue.

During the meeting with Dr. Theophanous, we discussed interests in groundwater and water resources management as well as pest control and biotechnology, things he was interested in. He thought these issues were very important to his electorate and would have a renewed interest in any upcoming science news.

The overall impression from the FASTS day was certainly one of success, at a minimum raising the awareness of science to members of parliament.

Carolann Wolfgang

ANALYSIS

— EMPLOYMENT OF WOMEN IN CSIRO

Sarah Ryan Sue Keay's article in the last WISENET journal ("Mentoring and Women in Science") ended with the heartfelt "*Either there is a significant problem with the way the current academic system is promoting women within its ranks or we are left with the proposition that women PhD graduates are somehow 'inferior' to their male colleagues. How else can the gender imbalance in science faculties in the current university system be explained?*"

Where I work in CSIRO, we wouldn't even start with the promotion of women as a possible explanation – whether promotion rates are high or low doesn't make much difference if there are hardly any women in the system at all. In 1999, several women research scientists left our CSIRO Division of Wildlife and Ecology (as it was then), and we began some searching to try and understand our own poor showing in the statistics. (In CSIRO the terminology "research scientists" roughly equates to PhD level trained.) The departures of these women left us with just 9% of our research scientists being women, not far behind CSIRO's overall ratio of 11%, but well behind most other organisations with staff trained in similar disciplines. A spot sample of similar departments



at 7 universities at the time suggested women represented about 17% of their academic staff. Even these figures lagged well below the 41% of women amongst postgraduate students in similar departments at 4 universities.

In trying to understand our own "leaky pipe", I looked at the makeup of people applying for and being appointed to jobs in the Division in the previous year (1998/9). These data showed that women research scientists were being appointed at about the proportion that they applied in: around 20%. This suggested to me that we were being fair to women in the selection process, but that we were not attracting them in the proportion that they were presumably emerging from their PhD studies. Assuming that completion rates of PhDs are similar for men and women, the 41% quoted above should represent their availability as young research scientists. (Most of the research scientist positions we advertise are for more junior levels.) Because we don't have many vacancies a year, we needed to be careful about drawing too hard a conclusion from this one year's data.

I have just updated the data with that from the past two years, and am pleased to see that the application rate has risen to about 30% women and the appointment rate to 55%. A direct comparison with the previous data is complicated because we were merged in 2001 with part of another division of CSIRO, and again, we have to be careful in dealing with small sample numbers. Nevertheless there are clear signs that the selection process remains very fair to women. Our attractiveness as an employer of women still seems to be lagging the graduating rate, although it is improving. The impact can be seen in the current composition of our staff; women have grown from the 11% three years ago to 14% today. I've recently improved the validity of the graduating rate by taking DETYA data for the science disciplines we're most likely to recruit from. Covering disciplines like zoology, agriculture and environmental science, the proportion of women amongst 591 PhD graduates in 2000 was 42%.

Because of the small numbers of women research scientists in the Division, it is practically impossible to say anything about relatively rare events like promotions and resignations. First we have to get them in in larger numbers and the key seems to be in understanding our attractiveness, or lack of it, to women applicants. Things we've discussed that might contribute to this include: our long lists of "essential" selection criteria might be off-putting to women who are more likely to under-rate their capabilities; images of CSIRO scientists in the media and at professional conferences are highly male; and CSIRO is sometimes perceived from outside as arrogant. It would be fruitful to do some survey and focus group work with postgraduate students on this topic.

As you might expect, the corresponding data for women in our support areas is better. Women currently represent 32% of staff in our science-based support positions. Taking all the last three years' appointment data together, women represented 50% of applicants for these types of positions and were appointed at 55%. The pool of bachelors and Masters graduates in 2000 was 54% female, so new appointments here seem to be in reasonable equilibrium with the available population.

In the non-science support areas (library, IT, communication, business, administration)

women were 68% of applicants, 72% of appointments and currently represent 72% of our staff in this area.

Taking all the work areas together, and acknowledging we're making some progress in terms of appointments, it is clear that the picture is still one of the more senior, prestigious and better paid jobs being highly occupied by men.

*Sarah Ryan
CSIRO Sustainable Ecosystems
Canberra*

EMBO Reports, Vol 2, no. 8, 2001

A Synopsis of the Editorial and feature article about women in science

I met the Editor of EMBO Reports, Frank Gannon, at the recent Frank Fenner Conference held at the Academy of Science here in Canberra, and he said he would be very interested in hearing how their analysis compares to the Australian experience. If WISENET want to accept this challenging task – EMBO would like to hear what we have to say.

COMMENT

The latest edition of my own undergraduate alumni magazine from the University of Pennsylvania in Philadelphia is devoted entirely to "Celebrating 125 years of women at PENN". I add some comments from this magazine for the general interest of WISENET members. A large article by nuclear physicist Fay Ajzenberg-Selove defined some of the trials that earlier women scientists went through including overt discrimination in the laboratories. She claims that when she started in 1952 only one in 40 American physicists was a woman (2.5%), and now that number is still only 22%. She had to file a complaint with the Equal Employment Opportunity Commission just to obtain a tenured position at PENN as late as 1973.

The overall conclusions of the magazine articles are: (1) discrimination in universities against women tends to be less overt now, and therefore is subtle and harder to quantify and (2) "junior women faculty felt well supported and confident that their careers would not be affected by gender bias", but as they progressed, this was not the case and they felt excluded and unsatisfied.

Carolann Wolfgang

Editorial: "Data from many sources show that the overall gender distribution in the life sciences starts with equal numbers at the level of the first degree, but that the percentage of women at each of subsequent rungs in the career ladder diminishes. Eventually it ends with a situation where only 10% or even less of the most senior positions in the life sciences are held by women.

Nobody would argue that women scientists are less capable than men, so there is a challenge to understand how this situation arises and – more importantly – how to correct it." The editor goes on to ask whether it is decision or discrimination and if the former, why are those decisions made. There appears to be complex and individual reasons for women's choices. Some find the male dominated world is too aggressive, competitive, self-promoting with an excessive focus on work and opt for something else. Others who stay find that subtle forms of discrimination appear, such as male domination in all areas of scientific research which, by definition, tends to exclude women.

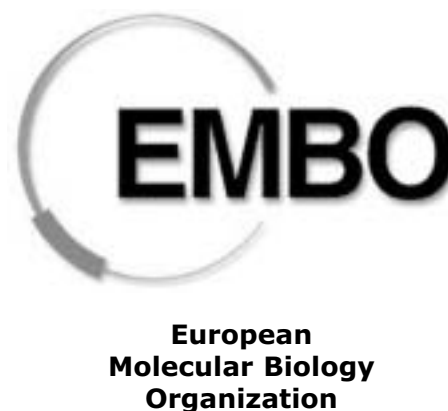
Then "The needs, possibilities and benefits of research in the life sciences are expanding rapidly at a time when there is a trend among young people to choose not to start their careers in this area. This is not restricted to women but the subsequent fall-off in the number of women in science adds an extra dimension to the problem."

Frank Gannon is to be congratulated for this impressive attempt to make employment a science industry rather than gender base issue presenting such a factual and sensitive appraisal.

Article: **Losing them is not an option** which summarizes the proceedings of a meeting (The glass ceiling for women in the life sciences) organised by EMBO and held in Heidelberg Germany in June 2001. More than 100 women, most in leading positions in the European and United States scientific environment, and ten men met and discussed the gender debate. "In contrast to anecdotal evidence that suggests women are achieving well, and there are some outstanding examples in this Journal, the facts and figures tell a very different story. It was good to read that there is a perception of progressive change mingled with some of the hard realities.

- ◆ "We lose a lot of power at the highest echelons where the critical decisions are being made." – Wanda Ward, US National Science Foundation.
- ◆ American scientific women decided not to support any conferences or meetings that did not have women speakers; the policy has now also been adopted by the NIH.
- ◆ On lower funding - women scientists in general actually ask for less research money when they apply for grants; of those eligible, fewer apply.
- ◆ "...female scientists tend to be more modest about their career options.
- ◆ "...women are often not aware that many funding agencies provide additional money for female scientists with children..."the greatest discrimination that I can see is self-discrimination" – Elena Conti, EMBO Laboratory, Heidelberg on the experience of younger scientists in middle positions.
- ◆ The notably high number of female professors in Turkey and many other Mediterranean countries is due to scientists being paid relatively low salaries which turns many men away from a career in academic science (Aslihan Tohum for Bogazici University in Istanbul, Turkey).
- ◆ "...Nowadays women are in general regarded as equal professionals..... a greater awareness of gender issues as well as more support for young women have removed many of the obstacles that older women had to face in their careers.

Very interesting, Anna Robinson



PROFESSOR JENNIFER GRAVES

*Compiled by
Rosemary
White*

Earlier this year, Professor Jenny Graves moved her group of nearly 20 postdocs and students to join RSBS in Canberra. She was invited to this position by the Director of RSBS, Professor John Hearn. Graves was induced to move from La Trobe University by the potential to follow promising lines of research in a new, well-funded lab with more expectation of long-term stability than can be attained by relying on competitive grants schemes. She commutes each week to her home in Eltham, on the fringes of Melbourne, where her immediate and extended family is based. As ever, this means long hours in the lab, though now it's to get the work done in her 4 days in Canberra each week. An appointment as Professorial Fellow at the University of Melbourne, where she is to be found on Mondays, allows Graves to maintain collaborations with colleagues in Melbourne as well as see family on weekends.

Some prominent scientists showed a penchant for science early, but in primary school, Jenny Marshall was only sure that she did not want to be an air hostess! Her parents were both scientists – her father was head of Soil Physics in the CSIRO, and her mother a lecturer in Geography at the University of Adelaide, so science was something ordinary people did. But she was encouraged to follow her interests; the science road was not promoted above others. When Graves relayed the question from school about what she should be when she grew up, her parents said, well, you're good at maths and art, what about Architect. Indeed, she comments that she never had so much fun as in designing their house at Eltham. Her answer to this question switched to Meteorologist a few years later, after she topped the state in Geography. The future seed was sown in her last year of high school when a very good biology teacher introduced Graves to genetics which, to her, was the most interesting and fun part of biology.

At the University of Adelaide, Graves was most fascinated by the more experiment-oriented aspects of genetics – gene structure and regulation, what we now call molecular biology. Her second year was spent at UC Berkeley where her parents took sabbatical leave. Here, Graves encountered Daniel Mazia's course on Physicochemical Biology which inspired her to continue taking courses in physical chemistry and genetics back in Adelaide. Although an unusual course combination at the time, this would prove an excellent foundation for future work in molecular biology. After Hons and MSc with David Hayman



Professor Jennifer A. Graves, Research School of Biological Sciences, ANU, Canberra.

working on marsupials, her spontaneous reply to the question – what will you do next? was, oh, I'll go and work with Dan Mazia at Berkeley. Dan was a hero of cell biology, one of the pioneers in the study of cell division and its regulation. He continued to be a most supportive teacher, mentor and colleague when Graves moved into the next door laboratory of Morgan Harris (an early hero of epigenetics) in order to pursue her interests in mammalian genetics. The new Molecular Biology Department at Berkeley was an exciting research environment, with 5 Nobel laureates on the staff. Graves also met her husband, John, there, when they were cast as the lovers in "Nucleoside Story", a molecular interpretation of West Side Story, put on by the postgrad students for an inter-departmental Christmas party. She has continued singing throughout her career, in lectures as well as after work.

The conditions of her Fulbright grant meant that Graves had to return to Australia after completing her degree. She applied for a lectureship at La Trobe (before her PhD thesis was quite finished), and took up the position in 1971. The new Genetics Department at La Trobe, in a young university full of bright young faculty, provided an exciting and stimulating environment. Graves initially intended to continue her PhD work which first identified factors that control the mammalian cell cycle (the fore-runner of the work that earned this year's Nobel Prize). But a colleague, Des Cooper, goaded her into picking up from her

Adelaide work, in which she showed that one X chromosome is inactivated in marsupials, as in other mammals. This meant she would need to map which genes were on the X chromosome, for which her experience in cell fusion at Berkeley was very useful. Graves soon realised that comparing gene position and regulation between marsupials and placental mammals provided a powerful tool for asking evolutionary questions. The significance of this work was recognised when she became part of the comparative gene mapping committee of the International Workshops on Human Gene Mapping (the backbone of the Human Genome Project) during the 1980s and 1990s.

This extensive comparative mapping of genes on the X and Y chromosomes also led to crucial work that contributed to the identification of the sex determining gene. In his last week as a PhD student in Graves' lab, Andrew Sinclair showed that a gene on the Y chromosome initially thought to be the male-determining factor was not on the Y chromosome in marsupials, so was not the sex-determining gene. Sinclair then moved to Peter Goodfellow's lab in the UK and with colleagues including another of Graves' students, Jamie Foster, identified the SRY gene as the human testis-determining factor (TDF). Apart from showing the evolution of sex, the gene maps allow identification of other sex-linked traits and disorders, for example, genes responsible for certain birth defects.

At RSBS, the Comparative Genomics group will continue investigating the organisation, function and evolution of mammalian sex chromosomes and sex determining genes as well as comparative genome mapping of other interesting regions of the mammalian genome. Graves also plans to expand some branches of research, such as X chromosome inactivation, isolating and mapping important control genes in placental mammals and marsupials, for which it was difficult to get support in the past. In response to the push for scientists to pursue more applied research, her group will put some time into medical and other practical applications of this work. Her goal is to initiate an Australia-based Kangaroo Genome Project, which would deliver sequence comparisons on all these interesting regions of the genome, as well as being a resource for scientist all over the world. Graves comments that all the most exciting and significant discoveries from her research in marsupial genetics were completely unpredicted, reflecting the potential value of good basic research in less obviously "applied" areas.

In her new position she also has the freedom to choose what courses to teach. Former students remember her as a superb teacher – supportive, full of enthusiasm and always with an open door. Her graduate "children" are scattered all over the world, and she still collaborates with many of them. "Jenny is a great colleague; she has very novel and thought-provoking ideas," says former student, Andrew

Sinclair. "And she was an inspirational graduate supervisor, because she was so enthusiastic and obviously really excited by her research". Graves also enjoys undergraduate teaching, although it requires a huge amount of energy. She laments the increasing teaching load placed on university scientists, especially with the seemingly endless reporting and accounting for one's every activity that is now a universal feature of academic life. "They are killing the goose that lays the golden eggs". The ability to choose research and teaching with minimal extraneous administration were strong factors determining her move to Canberra.

Graves also raised a family, initially living in a commune in Melbourne, while establishing herself as an independent scientist. To get through the early years was 'just plain hard work', especially looking after her first daughter in the days before maternity leave. With her second daughter, Graves was able to use maternity leave to return to work part time when her baby was very young. She comments that women will always do it tough managing two full-time jobs – career and family. Her husband also has a science degree, but he now juggles careers managing his vineyard and winery, in transportation planning and is very active in local politics.

The scientific life hasn't all been smooth sailing for Graves. She suffered a severe illness in 1992, which coincided with losing research grants that resulted in having to let lab members go, with no funds to support them. But she kept the lab alive, writing five grants from her hospital bed, and the following year, all Graves' grant proposals were funded. An up and down existence that even the most successful and productive scientists have to contend with.

Graves does not seem to have felt any overt discrimination in her career, just lots of covert expectations and a host of minor disincentives. She has served on many committees on how to encourage women in science – which she is not sure have been very effective. She feels that really the only solution is to grant women an extra decade of life, say having their thirties over again! Although it is scientific curiosity, not feminism, that has driven her interest in the decline and fall of the Y chromosome, she takes wicked pleasure in promoting her concept that "the Y is a wimp". Her "feminist" view of sex determination is outlined in recent invited lectures – to the Society for the Study of Reproduction published, according to the Editor, "as submitted"; and to the Royal Society of Victoria. Indeed, in an interview with Professor Roger Short, Graves said she would like to be remembered for her ideas, which she is incorporating into a forthcoming book.

Graves, Jennifer A. Marshall (2000) Human Y chromosome, sex determination and spermatogenesis – a feminist view. Biology of Reproduction 63: 667-676.

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science.org.au
/scientists
/jg.htm*

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sciencevictoria.org.au
/ord0601.htm*

5TH INTERNATIONAL SYMPOSIUM ON FERTILITY

Lyn Hinds 5th International Symposium on Fertility Control in Wildlife, Skukuza, Kruger National Park, South Africa, 19-22 August 2001

I was among several Pest Animal Control CRC scientists from CSIRO Sustainable Ecosystems who attended the recent Fertility Control in Wildlife Conference in Kruger National Park. My group had organised the previous conference held at Great Keppel Island in 1996 so we were all looking forward to the offerings of the venue in South Africa.



I'll come back to the actual conference content and impressions shortly – but first, what did we all see? Some lucky people managed to see all of the Big Five (elephant, lion, leopard, rhinoceros, buffalo), though not all of them in Kruger National Park. Although I managed to see only the lions and elephants, the hippos more than made up for missing the leopard etc. I also saw giraffe, zebra, serval, hyena, wildebeest, impala, springbok, steenbok (but no reeboks) and lots of interesting birds of various shapes, sizes and colours, not just LBJs. The morning and evening game drives were great fun although there were too many images to search for – large and small rocks suddenly looked like beasts! Also it was hard to remember that you couldn't just open the door of the vehicle and wander

around in the bush Oz-style – the grizzly stories of the consequences were a great deterrent!



The conference was attended by about 70 people, including researchers, animal welfare lobbyists, philosophers, park rangers and wildlife managers.

The opening address was given by Dr Richard Leakey who is a well known anthropologist and more recently a vocal senior government administrator in Kenya. He described the dilemma of managing elephants throughout Africa, and noted that there was not much progress in the development of fertility control for this species. While it is recognised that the impact of the elephant is high, there are conflicting views on how they should be managed. Animal rights are considered important, but must be balanced with conservation of other species and the landscape – many people are advocating that there are universal rights and expectations for future generations which outweigh the immediate concerns of animal welfare and animal rights for elephants. In Kruger National Park, the number of elephants threatens the biodiversity of the park as a whole. Should animals be translocated? There are many areas that, in the colonial era, were national parks which now have no wildlife (due to poachers). But, is translocation more stressful than humane culling? If there is culling who pays? Can

the carcasses be used as a source of protein? Culling may become politically unacceptable soon, given the "awareness" of death within elephant groups. Another ongoing dilemma outside fenced parks is that subsistence farmers need to be protected from various wildlife depredations – therefore wild animal movements need to be restricted but this then increases local habitat destruction. There is no easy solution!





accepted by many of the conference participants!

The Pest Animal Control CRCs work on the use of biological vectors for broad scale delivery of fertility control agents generated much interest and, as expected, some concerns about safety and ethics. The various studies on modelling of fertility control reported by both the Pest Animal and Marsupial CRC scientists were well received.



Throughout the world, many native species are considered either as a commercial resource, worthless pests in intensive agriculture or priceless wildlife in national parks. Introduced pests have a poorer profile again! Development of fertility control for the management of pests has progressed marginally since the 1996 conference – many international groups are using whole porcine zona pellucida (PZP) proteins (the complex of proteins that surround the oocyte) to immunise animals to induce infertility. While PZPs are generally effective in several species (eg white-tailed deer, horses, elephants), individuals to be immunised must be captured to be treated (and this may be required 2-3 times with boosts given every year). It was agreed that single shot treatments would be more desirable and cost effective, but they are still to be designed and still need to be delivered in a cost effective manner. For native pests this may also need to be reversible contraception. Some interesting and useful results using long-acting anti-gonadotrophin releasing hormone or progesterone implants were reported – again these techniques are appropriate for enclosed and accessible populations.



At the beginning of the conference the Humane Society US indicated that it will not support research on the development of oral delivery of fertility control (because it may not be species-specific), fertility control for predators (management of other species is preferable to predator control), or the use of transmissible viruses. This view was not



Unfortunately there was too little opportunity to debate the ethical and safety concerns about the various techniques – partly because of the structure of the conference program, and partly because key participants were not always present during critical papers to defend their points of view. As one scientist from the UK said "Australia must deal with its introduced pest problems given their rigorous legislation and processes for approval why do they need the approval of the US Food and Drug Agency?"

All in all an excellent experience!

*Dr Lyn Hinds
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FROM LABORATORY TO COMPUTER SCREEN

HOW TO KEEP ONE STEP AHEAD OF THE NEWS

**Janet
Salisbury**

Janet Salisbury is the Director of Biotext, a Canberra-based small business that researches, writes and edits bioscience information. Here she writes about her business and a career change that has taken her from the laboratory to the place where science meets policy and practice.

'If you hear it on the TV, you will have heard it first at Biotext!' This is the rather presumptuous motto in the offices of my science information consultancy, Biotext, which is based in the backgarden of my home in Canberra. We think it is true because in the last year my team have been involved in projects about variant Cruetzfeldt-Jakob disease (the human form of BSE, or mad cow disease), genetically modified food, drugs-in-sport testing, antibiotic resistance, foot-and-mouth disease, anthrax, passive smoking, environmental degradation and its effect on human health, xenotransplantation, drinking water quality.... and the list goes on. Our suspicion that we really are one step ahead of the news was further confirmed last week when the ABC's Health Dimensions featured an item on nuchal translucency testing (a form of ultrasound screening in pregnancy) only minutes after I had put down my pen from editing a highly technical report on the subject!



So what exactly is 'science information consultancy' and how did I get to be doing it? It is, of course, quite a long story but, to be brief, I graduated with a BSc (Hons) in zoology from at Durham University in the UK in 1973 and then moved to Manchester where I did a PhD at the Paterson Institute (cancer research). I postdoc'ed from 1976 to 1989, first in London at St George's Hospital Medical School, then in Melbourne

at the Department of Medicine, Melbourne University and finally at the John Curtin School of Medical Research in Canberra. My research took me from chemical carcinogenesis and DNA polymerase, through cell membranes to haemopoietic stem cells but I always had a bit of an eye on 'the big picture' which I suspected all along was where I really wanted to be.

Like many young women struggling to juggle a research career with motherhood, by 1988, with a six-year-old, a four-year-old and one on the way, the going was getting tougher and I decided that this was the time to make a change of direction. Not away from science — not at all — but into a work environment that was more flexible and family friendly and one that allowed me to explore the bigger picture that so much attracted me. Almost immediately, I was able to get some consulting work from the department of health, evaluating safety assessment data submitted with marketing applications for agricultural and veterinary chemicals. This was my first taste of what would become a significant interest for me — the way that science information is translated into policies.

In 1991, my husband gallantly converted our garage into a large office and moved his DIY activities to a much smaller shed down the back. I moved in and have never looked back. Initially, I traded under my own name, advertising my services as 'data evaluation, writing and editing, specialising in the medical and biological sciences'. The early consulting work was quickly followed by writing and editing assignments — numerous reports, manuals, conference proceedings, summaries and technical papers on issues related to various aspects of health and clinical practice, food and nutrition, biotechnology, agriculture and environmental issues. Most of the work has been for Australian government departments and agencies, including the departments of health, environment and primary industries, the Australia New Zealand Food Authority (ANZFA), the National Health and Medical Research Council, and the Australian Centre for International Agricultural Research.

From quite early on I enlisted the help of subcontractors to help with the editing, proofreading and formatting aspects of the work. In 1997 I registered the business name 'Biotext', becoming incorporated as Biotext Pty Ltd in 1999. At about this time I met Hilary Cadman at a WISENET dinner and offered her a job. After ten years as a lecturer/senior lecturer in biochemistry /immunology and biotechnology at the University of Zimbabwe, Hilary had just completed a MSc in science communication at Imperial College, London and was looking for work. Hilary's arrival meant that the offices needed to be expanded and the builder convinced us to knock down the existing garage and rebuild. We now have a 'suite' of three offices, complete with kitchenette, bathroom and a general purpose/meeting and store area. We also have an office manager who comes three days per week to keep all the administration tasks on track. Our subcontractors team is steadily expanding and we regularly collaborate with other scientists for particular projects.

So, what exactly is the bigger picture? Through projects on biotechnology, toxicology, pharmacology, communicable diseases, environmental health, medical technologies and clinical practice, I have developed a strong interest in the interaction between scientists/scientific evidence and regulators/policy makers, which I have nicknamed the 'science-policy interface'. Science is moving forward all the time opening up new and exciting possibilities with great potential to improve our lives. However, by its very nature, science cannot deliver absolute answers or risk-free solutions to problems. To use new technologies wisely, society must weigh up benefits, assess risks and make decisions about what is acceptable and what is not. Such debates should ideally involve the community at all levels thus avoiding the 'them and us' scenario that has so afflicted debate on issues like genetically modified food. There is a huge responsibility for scientists to enter into a dialogue with the community, imparting clear information about their science and responding to the concerns expressed, rather than adopting a 'we have all the answers' approach. However, time does not stand still and every day decisions have to be made — will we allow this or that additive in food, will we allow a clinical trial on xenotransplantation to go ahead, will we spend X million dollars on this or that measure to reduce dryland

salinity, will we fund this drug over that one with a limited health budget, and so on, and so on. It is easy to stand outside this process and cast the people who make these decisions as 'baddies', blaming them when something goes wrong down the track, but it's a pretty tough job. I think that the media should sometimes focus on what is really involved rather than constantly whipping up more conflict!

In this connection, two areas have particularly attracted my attention and interest. These are risk analysis and evidence-based medicine, which can both be considered to be tools in the toolbox of science decision making. Risk analysis is a three-pronged approach involving risk assessment (the process of bringing together all the information relating to a particular risk activity and assessing it to determine the actual risk in qualitative or quantitative terms), risk communication (engaging stakeholders and the community in debate about the acceptability of the risk) and risk management (putting in place measures to minimise the risk).

'Evidence-based medicine' is the term given to an approach developed over the last 20 years to collate and assess evidence relating to clinical practice. Under this approach, decisions about individual patient treatments, adoption of new technologies and population-based approaches to health (such as screening programs for cancer and other preventive health measures) are based on careful assessment of the best available evidence rather than on a trial and error, expert opinion approach. The latter was common in medicine until the evidence-based approach started to catch on and is still prevalent in other disciplines, such as environmental management.

To conclude, life is pretty interesting in the science information business. Some may see us as 'Jacks (or Jills) of all trades', having lost any real connection with the cut and thrust of the research world, but I am happy exploring the bigger picture and I believe that working across disciplines gives us rare insights that researchers in narrow projects do not have.

AN INTERVIEW WITH FELICE DRIVER OF C-QENTEC DIAGNOSTICS

*Andrea
Mettenmeyer,
CSIRO
Entomology*

As a recent Science graduate, now working for CSIRO, I have a great interest in the career paths of fellow female scientists. In a recent interview with Felice Driver of C-Qentec Diagnostics I discovered that not all women in Science follow a direct path through postgraduate research degrees to postdoctoral and higher research positions in academic environments.

Felice Driver is the R&D Manager of C-Qentec Diagnostics, a newly formed subsidiary of Aventis CropScience. Their business is to produce diagnostic tests and techniques for Australian farmers, being involved in all stages of research and development through to production and marketing. To pursue her current role, Felice left behind a research position at CSIRO Entomology, where she spent 10 years working with a team on a project that led to the formation of C-Qentec Diagnostics. She sees her new role in research and development as a bridging position created for the purpose of transferring technology from the laboratory to the marketplace.

Felice began her career by studying toward an Honours Degree in Science at the Australian National University in Canberra, in the field of Biochemistry. After graduating she combined work as research assistant at the ANU with raising two young children. She later commenced a PhD at the Research School of Biological Sciences at ANU during which she studied oncogenes in relation to Burkitt's lymphoma. During the thesis writing phase of her PhD (which became an unfinished symphony), Felice was appointed as a technical officer at CSIRO under John Curran. She quickly applied her energies to her new field, working with a team that involved staff at CSIRO and SARDI (South Australian Research and Development Institute) developing a range of DNA-based diagnostic tests for soil pathogens which are now marketed by C-Qentec under the name PreDicta B.

PreDicta B is a set of root disease tests which provide a risk management tool for farmers of broadacre crops by identifying which of a range of soil pathogens are present in a soil sample. The name C-Qentec was formed from sequence technology, referring to the DNA sequence technology on which the tests are based, and the B in PreDicta B refers to broad-

acre. The PreDicta B tests grew out of investigations into diagnosis of entomopathogenic nematodes. An obvious link to nematodes that parasitise plants arose and the development of DNA sequence databases used to characterise soil-borne pathogens began. The goal of this research was to develop diagnostic techniques based on DNA sequence technology. The next step was to measure the levels of disease-causing organisms present and to associate this with the risk of crop damage. In this way PreDicta B tests are a world first – they aim to quantitate risk, to diagnose potential problems before they occur.

Felice stresses the importance of understanding the relevance of scientific developments to the Australian economy. In the knowledge-based market of the future, Intellectual Property will feature more and more strongly as a marketable resource of increasing economic importance. In the future agricultural diagnostics will play an increasingly important role in crop management, enabling fast and accurate diagnosis of problem pests, providing means for better risk management and planning, and increasing our understanding of the distribution of pest species.

Her belief in the technology and its importance has led Felice to move from the laboratory to the office, and to relocate to Sydney from Canberra. Although she found it difficult at first to let go of hands-on-laboratory-based research, she is excited by the opportunities that change and challenge provide. For Felice, the CSIRO environment allowed career development and opportunity. The flexibility in the system allowed her to build a job that didn't entirely fit the conventional scenario. As R&D Manager of C-Qentec, Felice is taking her career development even further, learning about the other side of science: budgets, commercial realities, project management. Felice also acknowledges that the reward structure in the commercial environment means that the potential exists for higher personal returns than available to scientists in the laboratory, although this is coupled to greater personal risks. Along the way she is appreciating that her new role enables her to follow the technology she helped to develop.

SET REPORT AND SUMMIT

**Anna
Robinson**

I was invited to the launching of the SET (Science Engineering and Technology) for Life Report by the (then) ACT Chief Minister, Gary Humphries, and Professor Sheryle Moon on 4 September 2001. The report was prepared by the University of Canberra and is the result of a comprehensive survey of Year 9 and 10 students in the ACT to evaluate

(a) the current participation of this group in the Science Engineering and Technology disciplines
(b) the image and culture of SET amongst this group, and influences on the decision making process in subject and career choices.

The project was initiated because women continue to be under-represented in science, engineering and technology courses and careers. This report included views of young men in order to provide insight into why males do choose to study the units they do and why females do not and vice versa. Copies of the report are available from Professor Meredith Edwards, Deputy Vice Chancellor, University of Canberra. Following release of the Report, a Summit was held on 6 September, and brought together key stakeholder groups to review the recommendations of the SET for Life Report.

Some of the salient points from both the recommendations and discussion groups:

- ◆ The ACT Government be requested to form an Advisory Committee to report on all programs to leverage current activities in the SET career arena.
- ◆ That the Advisory Committee work with educational groups to develop programs that promote inclusive curricula and culture in secondary institutions and University undergraduate courses, particularly demonstrating social and life relevance of those courses.
- ◆ Work to renew focus on maths and science in school curricula.
- ◆ Install mechanisms which would facilitate more information flow between schools, workforce, industry associations and stakeholder groups for more organised and accessible work experience placements and more informed career choices.

- ◆ Use databases like PINTO and A Taste of Industry to provide insight into careers.
- ◆ Develop a database of SET professionals who are willing to speak at schools and career fairs.
- ◆ Devise project work so that students see a range of technology uses and careers.
- ◆ Develop role models in the image that appeals to the Year 9 and 10 students: younger females, well dressed, assertive, socially active and professional – and well paid.
- ◆ **Recommendation 12: That the Advisory Committee determine a method to promote SET careers through the popular media such as television and radio, in a popular format with which young people will identify.**

We particularly discussed Recommendation 12 at our recent ACT WISENET lunch and no-one could think of any scientists, let alone female scientists, portrayed as characters in any of the popular television series, radio culture, TV commercials, soap operas, films or videos. Scientists did not even feature as parents or relations in peripheral roles. Yet the impact of this type of exposure is becoming quite evident.

Shayla Bosnia, a Year 12 ACT student who spoke at the Summit said that a lot of girls wanted to be doctors as the result of television programs like ER. The characters there that the girls could relate to “seemed so happy and had so much control over everything”. We can see this analogy in the legal environment where female lawyers/ judges/ police are very well represented and reflected in television series such as The Bill, Law and Order, Judge Judy and even SeaChange. All show women in respected, influential positions. There is now even an increased demand for courses in Forensic Sciences (see University handbooks), apparently as the result of the number of younger female pathologists being cast in television series (Silent Witness, The District, Inspector Morse) and in books written by authors such as Patricia Cornwell and Kathy Reichs.

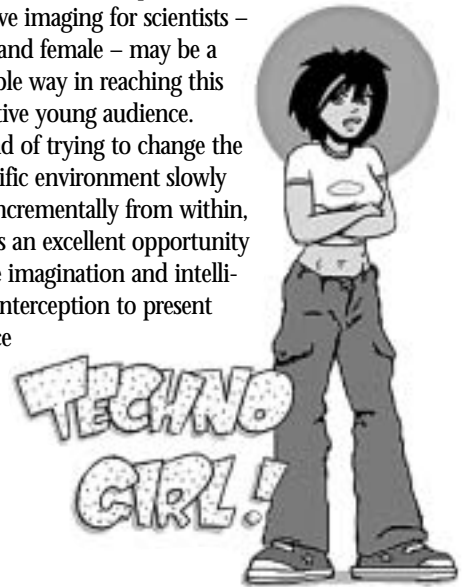
What is different about these characters that makes them so attractive to young women.

Perhaps the answers lie in the analyses presented by The Women in Science, Engineering and Technology Advisory Group to Department of the Prime Minister and Cabinet (WISSET 1995:3) regarding women in SET disciplines. Common elements in this behaviour by men and boys is that it represents a strong sense of masculine ownership of the whole area of SET, as an area of knowledge, as an area of research and as an area of employment. A second characteristic of the behaviour is that it consistently emphasises solidarity and shared identity, values and interests between men and boys in such a way that it excludes, alienates, marginalises and isolates girls and women who are by definition, the outsiders.

One particularly poignant aspect of this investigation was that students in both Victoria and ACT said they did not have sufficiently relevant information sources to assist them early enough in making career choices. Decisions being made about what subjects to choose in later school years to prepare them for ongoing studies were based on what was available to them rather than what actually exists. The

studies found that both parents and career advisers in schools lack confidence in providing guidance and advice to young people about their options outside of their immediate experience. The changes in technology are occurring so rapidly that no-one seems to have a clear picture of the world beyond their personal experience will be.

Using the media to present some positive imaging for scientists – male and female – may be a valuable way in reaching this receptive young audience. Instead of trying to change the scientific environment slowly and incrementally from within, here is an excellent opportunity to use imagination and intelligent interception to present science as it could be.



TechnoGirl by Streetwise Comics
from WISENET Journal 51
<http://abc.net.au/science/technogirl>

BRUCE CHAPMAN AT THE PRESS CLUB

*Miriam Balltuck,
(NASA Representative)
who went on WISENET's behalf.*

*W W W.
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/avcc_media](http://www.avcc.edu.au/news/public_statements/media_releases/2001/avcc_media)*

Professor Bruce Chapman (Australian National University) the architect of the Higher Education Contribution Scheme (HECS) spoke at the National Press Club on October 16. In his presentation (The Higher Education Financing Debate: Returns to Educational Investments, Current Pressures and Some Suggestions for Reform) Professor Chapman highlighted how partial indexation since 1995 has meant that public sector outlays for universities have not matched general Australian improvements in wage and salaries.

Prof Chapman elaborated that the situation leads to consideration of what might be the correct role for government in this area. If there are societal benefits resulting from

higher education, what form do they take and how important are they? Policy debate in the area should also address who should pay and how much should be paid by the respective parties. Finally, he made several recommendations concerning appropriate and inappropriate potential financing policy reforms.

A copy of Professor Chapman's presentation may be found at:
http://www.avcc.edu.au/news/public_statements/media_releases/2001/avcc_media_

WISENET SEMINAR ON WOMEN AND HEALTH

*Summary by
Diana Temple*

Rebecca Mason, with assistance from fellow WISENET member Meloni Muir, arranged an excellent workshop-discussion meeting on women's health in Sydney on August 23. It was held in Rebecca's Department, Physiology, at Sydney University, in a splendid Victorian-era common room on a cold winter's evening. With plenty of questions and comment, it was a most enjoyable and informative session.

The topics and speakers were:-

Nutritional guidelines - Joanna McMillen

Joanna McMillen BSc (H1) is a researcher in the Human Nutrition Unit of the Biochemistry Department where she is completing a PhD. She is also a Registered Fitness Leader.

Joanna spoke of the significance of food intake to the Energy Balance Equation which controls our weight, and types of diet. Fat-free diets, high in carbohydrate, are unsuccessful, she said, because of modern human's inactivity. High protein diets may be successful, though not for vegetarians; they may work by lowering insulin levels. She spoke of the importance to women's health of calcium intake to inhibit osteoporosis, and iron, being best absorbed from meat. She recommended the book by her supervisor, Jenny Brand Miller

Phytoestrogens - Dr Meloni Muir

Meloni Muir PhD is a member of Rebecca Mason's research team in the Physiology Department and is an ARC Post-Doctoral Fellow (Industry).

Meloni told us of plant oestrogens, with structural similarity to oestrogens (phenolic A-ring of oestradiol). Classified by chemical structure, they occur in soy products, chick peas, whole grains, sprouts, seeds, vegetables (carrots, onions, garlic), fruits (apples, pears), olive oil.

Such foods are beneficial to women as sources of oestrogenic activity, and there is some evidence they may inhibit bone density loss. Meloni's work studies phytoestrogen effects on mineral uptake by components of bone in vitro.

Hormone replacement therapy - Dr Bronwyn Crawford

Bronwyn Crawford, MBBS, PhD, FRACP, is an endocrinologist at the Royal Prince Alfred Hospital.

Bronwyn spoke of post-menopausal problems, which are osteoporosis, cardiovascular disease (prime cause of death), Alzheimer's disease. All are helped by oestrogen (HRT). The risk of fractures is serious with increasing bone brittleness (lifetime risk of death from hip fracture is 2.8 times that of breast cancer); HRT protects by > 50%. CV disease is promoted by smoking, high blood pressure and cholesterol, and by low oestrogen; HRT protects women from CV disease and lowers cholesterol. She spoke of HRT's disadvantages, particularly the slight increase in risk of breast cancer.

Bone turnover and osteoporosis - Dr Rebecca Mason

Rebecca Mason, PhD, MBBS, is an Associate Professor of Physiology and Deputy Director of the Institute for Biomedical Research.

Rebecca summarised the evening's themes, using a diagram of bone physiology. The balance between bone resorption and formation tends to resorption after age 20-35, when peak bone mass occurs; after menopause, bone resorption increases but is not matched with an increase in formation, so bone mass declines. The determinants for increased bone formation are: load-bearing exercise, increased oestrogen and adequate calcium intake and Vitamin D, which stimulates Ca absorption. Low calcium absorption stimulates parathyroid hormone that in turn promotes bone resorption. Paradoxically, intermittent injections of parathyroid hormone, rather than continuous exposure, actually stimulate bone formation. Bone formation is suppressed by corticosteroids, especially when taken orally.

WISENET thanks all those involved, and particularly Rebecca, for providing a memorable event.

WOMEN ACHIEVING IN SCIENCE

*Compiled by
Diana Temple*

Catherine Livingstone is the new Chairperson of CSIRO, who was appointed to its Board on January 1 this year. Her appointment, which is part-time, was welcomed by the new chief executive Dr Geoff Garrett. Catherine Livingstone made her name as Chief Executive of Cochlear, the company which commercialised the bionic ear and holds 65% of the world market. She retains her membership of other boards - Telstra, on whose board she is a government appointee, also Goodman-Fielder, Rural press and Q-Vis. She is the second woman to chair CSIRO; Professor Adrienne Clarke had this honour some years ago.
Source: Weekend Australian Sept 29, 2001

Dr Mary White of Sydney has been awarded the 2001 Mueller Medal by the national Council of ANZAAS. This medal, named after Ferdinand von Mueller, has a record of famous recipients, having for many years been awarded annually to a distinguished Australian natural scientist. Mary White is a palaeobotanist, well known as the author of splendid books on the prehistory of Australia: *The Greening of Gondwana; After the Greening; Listen, Our Land is Crying; Running Down, Water in a Changing Land.* Mary worked as a consultant for the Bureau of Mineral Resources and for companies exploring for coal, oil and gas; she was also curator of botanical fossils at the Australian Museum. She commenced her career as an author and lecturer at a stage in her life when most scientists retire. The Mueller Medal will be presented to Mary White at an ANZAAS ceremony in Hobart on November 1; it is planned that she will also speak in Sydney at a later date.

Professor Kerin O'Dea has been appointed as new Director of the Menzies School of Health Research in Darwin. Dr O'Dea's studies have centred on research and education programs related to Aboriginal people, and tropical health in rural and remote communities, which have been undertaken during her tenure of senior positions at Deakin then at Monash Universities. She is thus a most suitable appointee. Congratulations to Professor O'Dea.
Source: Today's Life Science, 13, July/Aug 2001

Professor Dame Julia Higgins, FRS is an eminent English scientist visiting most states of Australia in November this year as Solomon Lecturer, sponsored by the Australian Academy of Technological Science and Engineering and the Royal Australian Chemical Institute. WISENET will be reporting her visit in the next Journal.

Obituaries

Judy Mackinolty

JUDY MACKINOLTY

A great debt is owed by WISENET to Judy Mackinolty, who died on August 2. Judy helped this network, mostly in an unpaid capacity, for nearly 5 years from 1995.

She was not a scientist but an academic historian with editorial experience, which was most valuable. This liaison started after WISENET received in 1995 a modest grant from the Office of the Status of Women and Judy overheard a casual remark about WISENET needing a part-time officer. She expressed interest and was employed on an hourly basis as Administration Officer for a period of less than a year; when the money ran out, she stayed on, acting as a membership secretary - clearing the Post Office box, banking subscriptions and sending receipts, as well as contributing to the Wisenet Journal. WISENET won another grant in 1998 from the Science and Technology Awareness Program, to produce a publication for schools on science careers ("Science Futures"), and Judy came back on the payroll.

For five years, Judy was a member of the volunteer Editorial Committee for the WISENET Journal. She collected and compiled items of news for the Journal and wrote a number of articles, commentaries and book reviews - in fact in the November 1998 and February 1999 issues of the Journal, Judy was responsible for between a quarter and a third of the content. She wrote so well, she put most of us more amateur science-writers to shame.

When she retired from this work late in 1999, prior to a long visit to France, her emailed comment was "You don't need to thank me, I enjoyed it all!"

What an asset and a good friend Judy was.

Diana Temple

Dr Marie Louise UHR was a biochemist who lectured at University of Canberra until the early 90s, and a long-term member of WISENET. Her Obituary in the Sydney Morning Herald of 23 August was headed "A Mission to open Catholic Priesthood to Women".

Helen Leonard died while this journal was being compiled. An article about Helen's life and times will appear in the next Journal.

*W W W .
canberratimes.com*

VIDEO HISTORIES OF AUSTRALIAN WOMEN SCIENTISTS



*Marian Heard
is the new
Development
Manager at the
Academy of Science,
Canberra*

The Australian Academy of Science's Video Histories of Australian Scientists project provides a valuable resource, including video interviews, online transcripts and teachers notes. The Academy established the project in 1993 to record interviews with outstanding Australian scientists for this and future generations. The scientists talk about their early life, development of interest in science, mentors, research work, and other aspects of their careers.

To date, 66 interviews have been completed, 31 of them with women. The website at www.science.org.au/scientists is becoming increasingly popular and now receives over 5,000 hits per month.

Dr Shirley Jeffrey, marine biologist and a Fellow of the Australian Academy of Science, was interviewed in 2000 by Dr Trevor McDougall. The interview was funded by the National Council for the Centenary of Federation as part of the Academy's '100 Years of Australian Science' project. Following is a summary of Dr Jeffrey's career and an excerpt from the edited transcript of the interview. The complete edited transcript of the interview appears on the Academy's website at www.science.org.au/scientists/sj.htm.

Summary of career

Shirley Jeffrey was born in Townsville, Queensland in 1930. She received a BSc from the University of Sydney in 1952 and an MSc in 1954. For her PhD, she went to King's College Hospital Medical School in London and worked on the effect of aspirin on carbohydrate metabolism. She returned to Sydney in 1951 to work with Dr George Humphrey at CSIRO Division of Fisheries and Oceanography. This was the beginning of her lifelong career in marine science. Her work involved finding a chemical method for measuring microscopic algae in the ocean. Her approach was to separate the pigments in microalgae and to purify the major marine chlorophylls.

From 1962 to 1964, Jeffrey was at the University of California, Berkeley, as a

research fellow funded by the Kaiser Foundation. Here she learned new photo-synthetic techniques and became aware of new methods that allowed the discovery of two new chlorophyll c pigments. In 1965 she was invited to join the maiden voyage of the Alpha Helix, the research vessel of the Scripps Institution of Oceanography at the University of California, which was coming to Australia to study the ecology of the Great Barrier Reef. On this trip she investigated the pigments in the microalgae that are symbiotic in tropical reef animals.

Jeffrey was a principal research scientist at CSIRO's marine biochemistry unit between 1971 and 1977. From 1977 to 1981 she was a senior principal research scientist at CSIRO Division of Fisheries and Oceanography and then acting chief of CSIRO Division of Fisheries Research (1981-84). In 1991 she became a chief research scientist.

From 1978 to 1995 Jeffrey was in charge of developing the CSIRO Collection of Living Microalgae (also known as the Algal Culture Collection), a valuable resource for both research and industry, and helped design the facilities that now house the collection. In 1996 UNESCO published *Phytoplankton Pigments in Oceanography* which Jeffrey co-edited.

Jeffrey received the inaugural Jubilee Award of the Australian Marine Science Association in 1988. She became a Fellow of the Australian Academy of Science in 1991. In 2000 she became a Foreign Associate of the American National Academy of Sciences, and received the Gilbert Morgan Smith Medal for research in algae. Jeffrey became a Member of the Order of Australia in 1993.

Excerpt from interview "Beginning to be inspired by science."

Interviewer: What led you to study science? Was it your school experience, perhaps?

My father was an executive in an American oil company. He was always being moved

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around Australia as he 'climbed the ladder', and so I went to 14 different schools. The one which had the most positive effect on me was the Methodist Ladies College in Melbourne, where I was for four years (1942-46). That wonderful school developed all aspects of the children, from the academic to music to sport, art, craft and business. At the age of about 15 I did a general science course there, with an absolutely marvellous teacher who inspired me with the wonder of the natural world and how it worked. I became interested in general biology and the function of the cell and how the animal body worked. It was the functioning of the animal body that inspired me – and the character of Miss Connie Glass, who was our science teacher. At this time, too, I was inspired by reading a book on the life and work of Marie Curie, who worked in a lab with her husband. I thought in my romantic, young way how wonderful it would be to have such an experience myself.

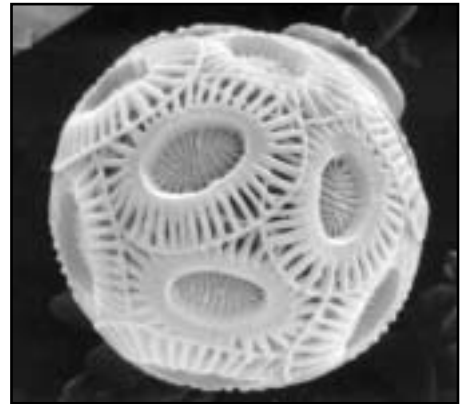
For several years in the 1970s, your group – while remaining part of the CSIRO – was moved from Cronulla to the University of Sydney. Would you tell us about that?

The CSIRO Executive, reviewing the Division in the 1970s, decided that Dr Humphrey should set up a new Marine Biochemistry Unit. We eventually settled in the Botany Department of Sydney University, where I met Dr Maret Vesk, an expert electron microscopist who was looking for a new field to study. Although our Algal Culture Collection was still only small, about 30 strains, those cultures of microalgae and their unique cell ultrastructure inspired her, and with her excellent techniques we were able to do a lot of collaborative new work with microalgae. That allowed us to expand into the field of microalgal taxonomy, where you need to have ultrastructural details of the cell surface and internal structures to establish species concepts.

What caused your group to move back to Cronulla, in 1977?

A new Chief, Dr K Radway Allen (a fisheries scientist) had been appointed in the 1970s to revitalise the Division at Cronulla. There was a gap in the food chain studies because all the algae work had been moved to Sydney University, so we were reviewed again by CSIRO and they decided to send me back

with the Culture Collection, to Cronulla in 1977-78. To establish microalgae work again in the Division, Dr Radway Allen gave me a lot of resources, particularly money, to set up a good algal culture facility. Instead of the usual air-conditioned room with a few lights, a few shelves and no back-up, we designed new facilities to have three walk-in algae growth rooms, six cabinets all temperature-controlled with duplicate compressors, and back-up machinery in case anything went wrong. So the facility was much safer, and being able to grow algae under any temperature, from 5°C for polar organisms to 30°C for tropical organisms, allowed the scope of our work to take off. That was a wonderful period – and a Dutch postdoctoral fellow, Dr Gustaaf Hallegraeff, who came just for eight months to learn techniques, is still here, now Professor of Plant Science in the University of Tasmania, over 20 years later!



Scanning electron micrograph of golden-brown alga (coccolithophorid), Emiliana huxleyi (5 mm diameter)

After four years of rapid growth of the Algal Culture Collection, and of work on phytoplankton ecology and electron microscopy, you received a phone call from the Executive of CSIRO. What was that about, Shirley?

Early one morning (in late 1981), the phone rang, and Dr Ken Ferguson, our Institute Director, asked me, 'Would you become Acting Chief of the Division of Fisheries for six months?' My response was, 'How can I, when I know nothing about fish?' But I did say yes.

That was a time of great expansion for CSIRO in marine science, including a new research vessel, the Franklin, and my six months as Acting Chief became three tumult-

tuous years while the Division moved from Sydney to Hobart.

Let's look now at your scientific research achievements. To turn the clock back to the early days in Cronulla, when as a fresh research scientist you were given the task of purifying chlorophyll: just what was the task and how did you go about it?

There had been some attempts to purify the marine chlorophyll, known as chlorophyll c. Chlorophylls a and b are found in green leaves and had been extensively studied by the early pioneers, but the c compound was only found in marine forms and needed urgent study for helping to assess algal biomass in the sea. In order to do that you had to have the pure compound, but getting enough material from microalgae would be difficult so I decided to use seaweeds growing off the laboratory at Cronulla. I used to go down and collect a few fronds of Sargassum, extract it in the lab and separate the various fractions of pigments by chromatography. It was a long, long development, because the problem with the chlorophyll c was getting rid of all the polar lipids that were in the fraction, and I had to use the technology of the day (not very advanced) for lipid fractionation. After many months of struggle I thought my preparations were very close to crystallisation – by now my tests for detecting the presence or absence of lipid were showing me that my purified extracts should be pretty clean.

I set the flasks in a special configuration in the freezer and used the appropriate solvents for crystallisation to happen, achieving a lovely dark emerald green–red fluorescent solution. But next morning a desperate sight awaited me: the green had turned to a yellowish colour and there was a lot of red material at the bottom of the flask. I was devastated. I thought all the chlorophyll must have broken down, because chlorophylls are very sensitive compounds, highly reactive, and the littlest thing such as traces of oxygen or acid can destroy them. I thought the washing-up assistant had not cleaned the flasks properly, leaving on them traces of the chromic acid that we used for cleaning the glassware. So I offered to do all my washing up for the next couple of months, doing the rinsing and everything, and set off down the hill again for my next batch of seaweed.

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science.org.au
/scientists**

I went through the same purification processes in the ensuing weeks and got to the same stage, only to find the emerald green solutions turned yellowish again, with a red sediment on the bottom. But then, when I examined the red material under the microscope to see what it was, there was the answer: the most beautiful green–red fluorescent crystals I had ever seen! We had done the job but I hadn't recognised it the first time round.

So they had gone down the sink the first time?

Yes. I was expecting green or black crystals, not red. Chlorophyll is a compound for absorbing light and transferring the light energy on to other compounds. I hadn't realised that when it was pure it would also emit absorbed light (at another wavelength). It was showing its potential characteristic as a highly reactive light-absorbing compound, but of course I hadn't thought of that. Nature had to show it to me. That was a great moment.

Over the past 15 years your work has been very beneficial to the aquaculture industry. Perhaps you could say how that came about.

Before we came to Hobart, our Culture Collection was used very actively by many institutions in Australia for research and teaching. But then, when we transferred to Hobart in 1984 we immediately were asked to assist the Tasmanian aquaculture industry. Tasmania has a flourishing aquaculture industry – fish farming, oysters, mussels, salmon and so on – which use microalgae in mass cultures for feeding larval fish and shellfish.

In those days, however, some algal cultures would 'crash' unaccountably overnight – a devastating financial disaster for farmers who had millions of, say, oyster larvae needing their daily food. So one thing we were looking at was the health of the cultures: the procedures used for maintaining sterility, freedom from bacteria, and the correct light, nutrients, aeration and temperatures for growing the particular microalgae. As a result, we put in proposals to the Fishing Industry Research and Development Council (FIRDC) for money to help the aquaculture

industry by looking at the nutritional qualities of microalgae grown under different conditions, and searching for new Australian strains suitable for Australian conditions. We were able to do very rigorous nutritional work on our microalgae strains and to recommend to the industry better, more useful strains, as well as Australian isolates.

That has been a great use of our Culture Collection: for the first time it could be used not only for research but in an industry that was very important to Tasmania. We were able to get the early stages of fish farming husbandry onto a good footing.

The Algal Culture Collection has been used also for the study of toxic dinoflagellate blooms. How did that work begin?

In Hobart in 1984, our new Chief no longer gave us responsibility for offshore work, so we were looking around for new things to do. One day Dr Gustaaf Hallegraef took a plankton net down to the CSIRO wharf to see what he could find of interest. Within half an hour he came back saying, 'The river's full of toxic algae.' (Having held an international algae workshop in Cronulla just before we moved to Hobart, we could easily recognise the strains.) So Dr Hallegraef received FIRDC funds to study how and

why these toxic algae came to be there in fish farming areas. They seemed to have been a recent introduction, and Gustaaf's careful work and lateral thinking led him to think that some of the overseas ships (for instance the Japanese woodchip ships that came to Triabunna and Hobart) might have emptied out their ballast water, complete with toxic algae which were normally present in the highly polluted Japanese waters at the ports of origin.

We now have a lot of those strains in our Culture Collection. Dr Sue Blackburn, in our laboratory, has succeeded in working out the life histories of these species. We have been able, by genetic mapping, to find out which of the strains we have here are compatible with which overseas strains, and there certainly seems to be a linkage between the Tasmanian and the Japanese strains. It is highly likely that they were a recent introduction.

The way to cope now, since we'll never get rid of these microalgae, is to know their life cycles, to have very rigorous monitoring programs and to have the oyster farmers very clued up about it all. The local State Fisheries now do a lot of monitoring, both of the algae and of the toxins they can put into the food chain.



A videotape of Dr Shirley Jeffrey's interview can be purchased from the Academy or borrowed from Cinemedia. For ordering details and a full list of videotaped interviews, transcripts and teachers notes available in the Video Histories of Australian Scientists series, see the website at www.science.org.au/scientists.

With colleague Jeannie-Marie Leroi in the CSIRO Algal Culture Laboratory, Hobart (1990).

LETTER FROM HAWAII

Nancy Lane has left the Academy of Science and ACT WISENET and moved to Hawaii. She sends this note about her new life.

Since leaving the Academy of Science in Canberra, I am really enjoying work at PREL (Pacific Resources for Education and Learning - see <http://www.prel.org>) where I am Director of Communications. I think I could easily get used to the climate – every day the weather report reads a low of 71 and a high of 85 degrees Fahrenheit. The trade winds keep it from being humid and sultry, the rain sprinkles while the sun shines and rainbows sparkle against the green hills. And going for a swim after work is habit-forming! My routine: about 6 am I usually go jogging up from the city to the Punchbowl Crater. After some exploration I've managed to find a route where I can keep running by using overpasses and quiet streets. The problem is that even at this hour of the morning, the city is full of traffic and I was always having to wait at stoplights. I pass by several mango trees, and collect the fallen fruit before the birds get to them.

What I found strange was seeing the trees I'm used to in Australia, but totally out of context - clinging to the sides of steep rainforest canyons, rather than growing in flat, dry, sandy soil. At the start of the trail was a grove of Norfolk Island pines, and later we passed through casuarinas (called ironbark here). But the weirdest was

seeing silky oaks, stunted and twisted by the wind, along the top of the ridge. With friends, we also discovered the Bo Tree in the Foster Botanic Gardens. This was propagated from a tree in Sri Lanka, brought from India in 288 BC, from the tree under which Buddha received enlightenment.

I've discovered the gardens in the Museum of Contemporary Art, with sculptures scattered throughout a picturesque quasi-Japanese landscape and a special theatre setting designed by David Hockney, the view towards downtown Honolulu from the Punchbowl National Cemetary, and the even more spectacular view towards Waikiki from Mt Tantalus. On Queen Lili'uokalani's birthday, we went to three concerts of her songs -and there were no repeats. The queen was overthrown in 1893 and imprisoned for two years - giving her plenty of time for composing. The first two concerts, held on the Iolani Palace grounds under the banyan trees, featured Dennis Kamakahi on slack key guitar by a local glee club. The third was held at the Kawaiaha'o Church (construction started in 1837, using blocks of coral weighing more than 1000 lbs., which were hacked from the reef by divers), and featured the Kawaiolaonapukanileo (no, I can't pronounce it) Vocal Ensemble, a hand-picked a capella choir.

Aloha WISENET Australia, Nancy

The membership form can also be printed from the WISENET Web Site at: <http://www.usyd.edu.au/wisenet/>

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