

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 at the back of this issue.



GPO Box 106, Canberra, ACT, 2601

WISENET'S NEW Web Site: <http://www.wisenet-australia.org>

EDITORIAL

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Pathways and Passions

Why are there beach boxes on the front cover?

This is the first time that the Victorian group has edited a WISENET journal, so we thought it would be appropriate to use a Melbourne icon. The more we thought about using the beach boxes the more they also seemed to fit with the theme developing through this and many other issues of the WISENET Journal - diversity. We are all women in science, but like the beach boxes we are all unique. We have tried to capture that uniqueness and diversity.

A common response from the women we asked to write articles for us was that they didn't think they were good enough, or notable enough, to be profiled on the pages of a WISENET Journal. Fortunately many of them sent us great articles anyway and we think you'll agree that it's nice to see "everyday" women profiled as well as high fliers. Although these "everyday" women seem quite extraordinary to us, we wonder if women value themselves highly enough, and by what standards achievement is measured. This view led us to change the title of the "Women Achieving in Science" column, contributed for many years by Diana Temple, to "Women Achieving Recognition in Science". Recognition is currently a hot topic for women in science. The articles by Andrea McAdam and Diana Temple on Rosalind Franklin and Women Crystallographers, and indeed Paula Gould's article on the portrayal of women in biographies reinforce that view.

We would like to draw your attention to the many different pathways women have followed after their degrees. We hope that the idea that science, and science-related, degrees, can lead only into careers in research is completely dispelled by the articles presented here. While some women do follow that path, for example the articles by Margery Kennett, Jennifer Newstead, Joy Bear and Alena Glaister, others use their science degrees as stepping stones into fields as diverse as law, conference planning and advocacy; for example Susan Corbett's article on the patent system, Jenny Seabrook's profile and Pauline Gallagher's thoughts on reasonable working hours. Jenny Seabrook writes "that a science degree is definitely a recipe for success, as long as you have the courage to follow where it leads". We believe that science-related degrees can lead to unique and extraordinary lives.

Editing this issue has been a challenge for us. The motto of the family-friendly University featured in this issue, with which we are proud to be associated, is Ancora imparo - which translates as "I am still learning". That is certainly an appropriate motto for us as editors! We would like to extend special thanks to Julie Evans, Rosemary Sutton, Andrew Netherwood and Anna Robinson who helped to demystify the editorial process, to everyone who contributed articles for this issue, and to the people who helped with the proof-reading. We would particularly like to thank the contributing authors and our partners and families for their patience. Putting this issue together has been a lengthy process, but it's been a great deal of fun and provided the wonderful privilege of working with so many fantastic women.

We hope you'll join us in celebrating the diversity of science in the 63rd issue of the WISENET Journal.

Jo O'Neil and Diane Webster

INTERVIEW WITH DIANE WEBSTER: CONVENOR OF WISENET MELBOURNE

*Interviewed by
Jo O'Neil*

JON: Diane, thank you for taking over as Convenor of WISENET Melbourne. Tell us what made you decide to do so and what you hope to achieve in this role?

DW: I decided to get more involved as a way of meeting people. Organisations like WISENET attract a large number of fascinating women from a broad range of backgrounds. Having an active role allows me to get to know these women, and in some cases to work closely with them. What I hope to achieve as convenor is much the same. I'd like to facilitate contact between members. I'd also like to increase the membership base in Victoria to help the branch become a more vibrant and active organisation.

JON: Before you came to Australia, you were very involved with WISENET's New Zealand counterpart, AWIS (The Association for Women in the Sciences). Could you summarise the main similarities and differences between the two organisations?

DW: WISENET and AWIS are very similar organisations with very similar goals and objectives. Both organisations are dependent on a small number of dedicated women for survival, and small to moderate size core memberships. It's been interesting to see WISENET rotate the National Executive to

Canberra from Sydney. AWIS made a similar move some years ago and the National Exec now rotates between the branches on a 3 yearly basis. Every time the committee moves to a new city a fresh batch of dedicated women emerge and infuse the organisation with new energy. An additional bonus is that when the committee moves it leaves behind a large and active branch.

JON: Since you have taken on the job of Melbourne Convenor, with the help of Alena Glaister, the monthly meetings of the Monash

node have been working well. Do you think that pattern could also work well for WISENET members in Carlton/Parkville and other areas of Melbourne?

DW: I think dependence on a small membership base is one of the greatest challenges facing WISENET because of the geographical size of Australia. Jo, your idea to set up small group meetings on various campuses around Melbourne is an excellent solution to this, and it has been working very well. We've seen a lot of interest and energy come from the meetings at Monash, and this is a good opportunity to thank Alena and Jenny for the key role they are playing in organising the meetings. I'd like to get similar groups started in the Carlton/Parkville area and at the Alfred Medical Research and Education Precinct in Prahran. Their success will depend on finding a core group of women to get the groups started and work towards expanding to a sustainable group size.

JON: Tell us about your own background in Science and your current research interests and aspirations.

DW: I've wanted to be a scientist for as long as I can remember. I got my first taste of Botany at University and I've been totally fascinated by the molecular aspects of plants ever since. After completing a PhD in molecular plant virology at Otago University (NZ), I took up a postdoctoral position with Monash University working as a visiting scientist with Plant Industry, CSIRO in Adelaide. The project was to develop a plant-based measles vaccine that could address the limitations of the current vaccine. We've developed a successful model system using tobacco and mice, and our current work is focusing on development of a practical vaccine system. In 2001 I moved to Melbourne to join the rest of the team and my main role now is as the project leader. I enjoy the project I'm currently working on and I hope to continue in this area but I'd like to find a better balance between the time I spend talking to my computer and time at the bench.

Jo O'Neil was convenor of WISENET Melbourne in 2001 – 2002.



Diane Webster

FAMILY-FRIENDLY MONASH UNIVERSITY

*Michelle Waters
& Jo O'Neil*

Monash University is now rated one of Australia's most family-friendly institutions. In a national survey to identify best practice in implementing flexible work strategies Monash was ranked ninth in an Australia-wide benchmarking survey of 205 organisations (www.worklifebalance.com.au). Australia's biggest tertiary institution was also the only university featured among the top 10 in the survey. It came behind the ABC, ANZ Bank, Australia Post, the Federal Police and Ford but in front of 196 other organizations.

"Research shows that organisations with the best work culture attract the most talented staff"

Conducted by the consultancy group Managing Work/Life Balance, the survey ranked the institutions according to criteria that included how they encourage diversity, improved the flow of internal communication, employed a high number of women in senior positions and had some form of paid parental leave. The consultants say that research shows that organisations with the best work culture attract the most talented staff. Those with policies encouraging a balanced lifestyle also reduce turnover and absenteeism, retain staff after parental leave, and improve morale.

Monash offers its women employees 12 weeks paid maternity leave, with up to a year unpaid, while men are eligible for five days paid paternity leave. After this they can access unpaid parental leave for up to a year. Monash also has a pre-natal leave and breastfeeding policy and an Expectant Parent's Kit and a new parent information exchange was introduced last year to assist with the transition back to work for the increasing numbers of staff returning after parental leave. The ratio of staff returning to those who didn't increased from 82 per cent in 1999 to 91 per cent in 2002.

Monash's "Work Life Family Unit" coordinator, Michelle Waters, said more staff are using flexible work arrangements since a strategy to promote this was launched in late 2000. "There has been a 25 per cent increase in the uptake by staff of voluntary reduced working year, with the use of home-based work for general staff, flexible start

and finishing times and job share arrangements also increasing."

"And it's not just women who are taking advantage of flexibility – men are also making more use of these arrangements. The aim is to help staff balance the competing demands of work, life and family while enhancing their effectiveness in the workplace."

For more details, visit the Work Life Family Unit website at:

www.adm.monash.edu.au/sss/pc/equity/worklife/

Michelle Waters, who is quoted in this article, manages the Work Life Family Unit for Monash University, Australia. She is responsible for the development, implementation and evaluation of the university's Work Life Family Strategy, high quality integrated policy, programs, flexible work options, and equity in employment.

'Populate and Publish'

In what is believed to be a first for an Australian university, Faculty of Science academics returning from maternity leave can now apply for a \$15,000 grant to assist them in their research endeavours. The initiative aims to help female academics maintain the momentum of their research programs.

Professor Margaret Clayton, convenor of the faculty's equity committee, said the faculty recognised that the experimental work of science disciplines placed a particularly high demand on staff members' time. "This grant offers targeted support for female academics engaged in teaching and research positions in the faculty that will make it easier for them to take maternity leave without an adverse impact on their careers. At the moment, women are seriously under-represented in the academic staff of the Faculty of Science, and this is one of several initiatives through which the faculty aims to address gender imbalance. This grant creates an environment where young women academics can feel comfortable about having a family and keeping their career" Professor Clayton said.

*Source: Monash Memo, 10 February 2003
Margaret Clayton is a Professor in the School of Biological Sciences at Monash University. She is a WISENET member.*



Michelle Waters

WHAT PRICE INNOVATION?

FEMALE INVENTORS & THE NEW ZEALAND PATENT SYSTEM

Susan Corbett

Although I have a first degree in chemistry I am not a scientist by profession. I studied law and worked as a solicitor for some years before taking up a position as a lecturer in commercial law. However I have always retained an interest in science and I was intrigued when my neighbour at a conference in intellectual property law introduced herself as a patent attorney. I was even more interested when I learnt that she had rarely, if ever, had any female clients. Our conversation led me to begin a research project on women inventors in New Zealand, of which the following article represents a brief summary.

History records few successful female inventors. By 1910, inventions by women accounted for less than 1% of all patents issued in the United States. However, before drawing any conclusions concerning female propensities to invent and female innovative abilities in general, it is necessary to bear two highly significant factors in mind. First, not all inventors will choose to patent their invention. Second, there are a range of possible causes, other than the patent system, for the apparent lack of female inventors, including gender biased education, possible gender differences in creative capabilities, domestic responsibilities and lower salaries. My research demonstrates that both time and money are essential attributes for the successful patentee.

Out of a group of 18,530 initial applications for patents filed at the Intellectual Property Office of New Zealand (IPONZ) between 1998 and 2000, 3,491 (19%) were from males. The majority (80%) were from corporations or research and development branches of manufacturing enterprises. Only 150 applicants, less than 1%, were females. Numbers of female inventors overseas tend to comprise between 3 and 10% of total patentees.

Thirty-eight women patent applicants agreed to participate in the research. Participants' ages ranged from sixteen to late seventies. Sixty per cent had attended co-educational state schools. The remainder were evenly divided between private and state all-girls schools. Several participants in the over 45 age group mentioned their frustrating experiences of former rigid attitudes to 'girls' and 'boys' subjects, observing in particular that girls were not permitted to study carpentry, engineering or technical drawing. Other criticisms of the education system included school policies which channel more academically-able students into the

traditional 'academic' disciplines rather than recognising that they may be equally gifted at more practical creative subjects. The lack of any business training was also criticised.

The inventions developed by the research participants ranged across a broad spectrum of innovation. Fifty per cent of inventions were intended to target the whole population, while only 6% were intended for a solely female market. Eleven participants had invented mechanical items, while ten had invented in the area of fabric technology. Five had developed a new process. Two had undertaken electrical or electronic innovation, while the categories of chemical innovation and food technology had each attracted one participant. Eight claimed 'other categories' of inventions, which included inventions such as health aids, a versatile picture framing system, an aid for teaching reading, and farm equipment for animal husbandry.

Twenty-two women chose not to continue with their patent applications after making the initial application due to the prohibitive expense and the time consuming complexity of the patent system. The inventions of twelve participants who had completed the full patent application process were now being marketed. One participant stated that before she could develop her patented invention for marketing, it was already being manufactured overseas. She suspects that the idea had been copied from the IPONZ Internet database and observes that it is easy for large wealthy corporations to begin development and production well before the individual inventor can raise finance for research and development.

"the entire process (from invention to marketing) is both daunting and time-consuming for the amateur inventor"

Another participant observed that the entire process (from invention to marketing) is both daunting and time-consuming for the amateur inventor. She pointed out that many of the steps require specialised knowledge and skills, which she had had to acquire on her own. She was disappointed in the lack of assistance from government business organisations and suggests that a

specialised agency is required to offer real 'hands-on' assistance. Other participants confirmed that their own lack of experience in marketing and a lack of funds to enable them to employ expert assistance had led them to abandon their hopes of marketing their invention to recoup the expense of patenting.

Not all participants had employed a patent attorney – some were confident of being able to cope with the process on their own. For others, the patent attorney fees were beyond their reach. Those who did employ a patent attorney tended to be somewhat critical of their service. One of the more extreme examples cited was that of a male attorney who informed the participant that 'if [her invention] was such a good idea then someone else would have done it'. While seemingly incredible in contemporary New Zealand this kind of attitude is, apparently, far from unusual and has been termed the 'so what' syndrome by the US researcher, Professor Fred Amram. In Amram's view

"The variety of inventions described by the research participants indicates against any innate female lack of creativity"

the 'so what' syndrome is most likely to be experienced by women and girls: women's work has historically been little valued and so to invent new tools, products or processes to alleviate drudgery or to enhance the quality of 'woman's work' has been deemed unimportant.

Other more general criticisms by participants included a perception of being patronised by male patent attorneys, and an inability of patent attorneys to explain the procedures clearly to their clients. In their defence it should be noted that patent attorneys are very conscious of the cost of their services. For this reason lengthy interviews tend to be discouraged and clients are often referred to explanatory pamphlets that set out the complexities of the patenting process in more detail. One participant explained that she had been able to reduce her patent attorney costs by requesting assistance with the process rather than having it carried out completely.

The tentative conclusion to be drawn from the research is that the expense of the patent system is a significant cause of the lack of successful female patentees in New Zealand. The variety of inventions described by the research participants indi-

cates against any innate female lack of creativity, although lack of confidence, and lack of business and technology skills appear to be factors in the failure of many of the participants to produce a marketable product from their inventions.

However, although the patent statistics indicate a significant difference between numbers of individual female inventors and numbers of individual male inventors, the most marked difference is between the numbers of patent applications from overseas based corporates, and the numbers from local 'small-scale' inventors, be they male or female, or New Zealand based small or medium enterprise (SME). This may indicate that the individual male inventor and the SME are also disadvantaged by the expense of the patent system, although perhaps to a lesser extent than the female inventor. Similar results have been documented in other countries, although many of these countries have now taken positive steps to assist their small-scale inventors.

In particular, many overseas countries are addressing fundamental issues for small-scale inventors (such as a lack of funds, a lack of access to skilled assistance in marketing and manufacturing, a lack of confidence in technical matters, and a fear of the expensive litigation that patenting may invite) by the establishment of:

- ◆ second tier patent systems, such as the innovation patent in Australia which emulates similar systems in 48 other countries,
- ◆ innovation or inventors' centres subsidised by the State,
- ◆ websites that offer inventors alternatives to the traditional intellectual property system, such as the United States based 'Idea Exchange',
- ◆ award programmes such as the prestigious British Female Inventor of the Year Award, now in its fourth year, and
- ◆ workshops and projects such as the Canadian Women Inventors Project, which is aimed at encouraging young women to pursue careers in science and technology and at increasing the numbers of successful women inventors.

Susan Corbett is a lecturer in commercial law at Victoria University in Wellington, NZ. Her research led to a women inventors' support group ("Wominventors New Zealand"), which currently meets in Wellington. They hope eventually to expand their group to include members from throughout New Zealand.

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PRESSURES OF PROFESSIONALISM

A CASE FOR REASONABLE HOURS OF WORK IN SCIENCE

*Pauline
Gallagher*

Professionalism is that intangible quality guiding our practice of work, which speaks to us of education, rationality and impartiality, free from influences outside of work. Scientists aspire to the highest standards of professionalism as a marker of competence without questioning how it impacts on our lives, whether it has a down side or may work against women in scientific careers.

Juliet Bourke challenged perceptions of professionalism at the second Women Achieving in Science Conference (WAIS2) when she presented the notion in terms of long hours of work and, from her study of the legal profession, always being available for work. In science, working hours above and beyond the call of duty has been entrenched in the culture as an indicator of commitment. Scientists say they work long hours because they love the work and choose to do so. Or do they?

In their landmark 1994 study on women in academic science in the US, Etzkowitz et al. defined two distinct patterns of behaviour among the women they interviewed:

- ◆ Instrumentals – women who adapted to a ‘male model’ of competition and unconditional devotion to work, and expected other women to do so;
- ◆ Balancers – women who emphasise co-operation and seek to balance work and non-work roles.

The study noted that not all women who wanted to balance an academic research career with family were able to do so and many who took breaks did not return. It reported that the ‘male model’ included working into the small hours and weekends and social life centred around the lab.

Sandra Eady’s 1999 analysis of gender balance in CSIRO found that women research scientists and research project staff spent less time at work than their male counterparts but achieved equal or greater performance outputs. Willingness to travel extensively is used increasingly in CSIRO as a selection criterion for many management positions and this requirement cannot always be met by those with family responsibilities.

By accepting long hours of work as par for the course, are we propagating a culture damaging to science and to society?

The ACTU have been running a campaign on reasonable hours for the past couple of years (www.actu.asn.au). A major aim of the campaign has been to raise awareness of the damage long hours of work is having on individuals, families and community life. And that includes professionals. Their ‘Fifty Families’ report included interviews with engineers, teachers, technicians in research and doctors; it deals with aspects such as loving your job and the choice of long hours.

‘Fifty Families’ identified exhaustion, loss of creativity, poor sleep patterns, limits on physical activities and hobbies, emotional fragility and vulnerability to ill health as a direct consequence of frequent long hours of work on individuals. For their families, the quality of relationships at home is affected by individual impacts and inadequate time – missing out on key events in their children’s lives, juggling the work at home, disconnection and stress. And then there’s the pressure on the partner’s career, if they can have one, or if they have a partner. Long hours contribute a lot to fighting. Tired workers do not have much sexual intimacy.

“By accepting long hours of work as par for the course, are we propagating a culture damaging to science and to society?”

The review by Barbara Pocock and Lou Wilson (2001) on the effect of long hours on family and community reported that ‘gender equity is undermined by long hours of work because it is women who are most likely to give up their careers for the sake of their children.’ Women in Australia still carry the bulk of home and carer duties, which exacerbates the pressure they feel with a demanding career. Children feel the stress of their parents who are more emotionally withdrawn when they are tired. This review

also considered the feeling of being overworked and the concomitant decline in satisfaction with work as important factors that affect the family.

Sports, community activities, voluntary work and charity work are all victims of long hours. Many people surveyed in the ACTU study described a closing in of their social circle. For women who do not have the same social interactions in the lab as their male colleagues, this can be extremely isolating and damaging to confidence.

Most women scientists do eventually have children and younger male scientists also want to share in the lives of their families and community. Would professionalism be damaged by more of the balancer approach to science?

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Pauline Gallagher is the Assistant Secretary of the CSIRO Staff Association. She convened the two Women Achieving in Science (WAIS 1 and 2) conferences held in Melbourne in 1999 and in Sydney in 2002. These conferences were organised by four partners, the CSIRO Staff Association, the Federation of Australian Scientific and Technological Societies, the National Tertiary Education Union and WISENET

Making a Difference!

WISENET would like to take an active role in nominating women for prizes, awards and honours. As nominations usually have specific criteria and require considerable researching and collaboration, we would like to establish a database of 'self-portraits' of WISENET members.

Self-portraits should be no more than two pages and at this stage without photographs. They can be e-mailed to the National Convenor (currently anna.robinson@bigbond.com, subject line: WISENET: Honouring Women's Program) as an MS-Word documents or or posted to GPO Box 106, Canberra, ACT 2601)

The 2-pages should include your:

1. name and contact details,
2. professional history,
3. community involvement and any special services to industry or Australia,
4. names of one or two people who could act as primary referees, and
5. details of any specific preferences or objections to award nominations.

HAEMOCHROMATOSIS

*Jennifer
Newstead*

Thirty years ago haemochromatosis was considered a rare condition. Medical students were taught that it presented in middle aged males with cirrhosis, diabetes and bronzing of the skin. A few years ago I – an otherwise healthy female in my thirties - was diagnosed with haemochromatosis. There is no greater stimulus for finding out about a condition than having it yourself. I discovered that haemochromatosis was far more common than I had realised and the HFE gene test has revolutionised the approach to diagnosis, making it much easier to diagnose before irreversible complications have occurred. These developments have also generated discussion about population screening for the disorder.

What is haemochromatosis?

Haemochromatosis is an inherited disorder of iron metabolism in which the body accumulates iron. If untreated the excess iron can lead to cirrhosis of liver, cardiomyopathy, diabetes and primary liver cancer. The patient is usually asymptomatic in the early stages of iron overload but as iron stores increase (s)he may report chronic unexplained tiredness, joint pains, abdominal pain, impotence and increasing skin pigmentation. Because the symptoms tend to be insidious and nonspecific, haemochromatosis can be difficult to diagnose and there are many reports of patients being unwell for a number of years and seeing multiple practitioners before the diagnosis is finally made. The treatment of haemochromatosis involves regular venesection to remove the excess iron. Initially this may be performed weekly. When the excess iron stores have been removed, venesections are usually carried out every 3 months for the rest of the patient's life to prevent reaccumulation. Many patients now choose to have their venesection performed through the Red Cross Blood Bank so that their blood can be used for blood products. Patients who are diagnosed early and comply with treatment have a normal life expectancy.

Epidemiology and Genetics

Haemochromatosis is more common in people of Celtic or northern European background. It is thought that having a condition causing iron accumulation offered a survival

advantage for those with a low dietary iron intake or for women who had many pregnancies. This may explain why the incidence in Ireland may be as high as 1 in a 100. In Australia, studies in blood donors show that 1 in 300 have iron overload associated with haemochromatosis.

Feder discovered the HFE gene in 1996. There is now a commercially available blood test for the gene and it was the first gene test in Australia to attract the medicare rebate. Ninety percent of cases of haemochromatosis are associated with the C282Y/C282Y mutation of this gene. In Australia the frequency of this genotype is approximately 1 in 200. The frequency of the C282Y/C282Y mutation is the same in men and women, although

“It is thought that having a condition causing iron accumulation offered a survival advantage for those with a low dietary iron intake or for women who had many pregnancies.”

women usually develop symptoms later than men and are more likely to develop joint pains. However, not all individuals with the C282Y/C282Y genotype develop iron overload - studies of penetrance estimate it to fall between 40 and 70 percent.

Haemochromatosis is an autosomal recessive condition. Individuals who are homozygous for the C282Y mutation have inherited one copy of the abnormal gene from each of their parents. Approximately 1 in 10 Australians are C282Y carriers. Carriers have a single mutation and are almost always asymptomatic.

Investigations

Patients with symptoms suggestive of haemochromatosis should have their fasting transferrin saturation and ferritin levels measured. If the fasting transferrin saturation is greater than 45%, the measurement should be repeated and if it remains elevated the HFE

gene test should be performed. The ferritin level may also be elevated in patients with haemochromatosis but there are many other causes of elevated ferritin. Liver function tests are usually normal in the early stages of the disease but as iron stores rise, aminotransferinase becomes elevated.

In the past all patients suspected of having haemochromatosis needed to undergo a liver biopsy. Since the discovery of the HFE gene, most cases of haemochromatosis can be diagnosed via blood test and a liver biopsy is only performed if liver damage is suspected. In patients with iron overload, the diagnosis of haemochromatosis can be confirmed if the HFE genotype is C282Y/C282Y. Occasionally haemochromatosis occurs with other HFE genotypes such as C282Y/H63D.

The gene test has also made it easier to screen family members for the disorder. It is recommended that all first-degree family members be tested for haemochromatosis.



Jennifer Newstead

Population screening

The realization that haemochromatosis is more common than previously thought, together with the possibility of using blood tests to detect asymptomatic cases, has stimulated vigorous debate about widespread screening for the condition. Haemochromatosis meets several of the World Health Organisation's key public health criteria for population based screening:

- ◆ it is common,
- ◆ it can be identified at an early stage by measuring transferrin saturation (phenotypic screening) or genetic susceptibility (genotypic screening),
- ◆ the burden of disease may be high, and
- ◆ there is an effective treatment, which if commenced early can prevent serious complications.

There have been many debates regarding the merits of genotypic versus phenotypic screening but at this stage there is no support for widespread screening because of significant gaps in our knowledge of haemochromatosis. Further research is needed regarding:

- ◆ the penetrance of the disorder in those with a susceptible genotype,
- ◆ the effect of disease modifiers such as dietary iron intake,
- ◆ the natural history of early stages of iron overload,
- ◆ the evidence of benefit for treating those with early disease,
- ◆ the effectiveness of screening, and
- ◆ optimal screening strategies.

In addition genetic screening raises concerns about the potential for discrimination and the consequences for family members.

The discovery of the HFE gene has greatly simplified the diagnosis of haemochromatosis and furthered our understanding of the condition. Population screening may occur in the future. At this stage doctors should consider the possibility of haemochromatosis in patients who present with chronic tiredness, joint pains or abnormal liver function tests, and offer screening to all first-degree family members.

Jennifer Newstead (MBBS, Grad Dip Epi and Biostat) is a general practitioner who practises in Melbourne. She is co-author of a resource about genetic conditions for general practitioners, which is to be released later this year.

POLIOMYELITIS ERADICATION: THE FINAL HURDLES

*Margery
Kennett*

As a result of global cooperation among the partners of the Global Polio Eradication Initiative, which includes the countries affected by polio, WHO, Rotary International, CDC, UNICEF and many donors, the world is on the brink of eradicating wild poliovirus. Poliomyelitis has been known since biblical times, but its causative agent, wild poliovirus, was only identified in the early 20th century. Although 90% of infected people have no clinical illness, 10% may initially have fever, headache, vomiting, neck stiffness and pain in the limbs. In 1 in 200 infections, irreversible paralysis occurs, usually in the lower limbs, and fatalities may occur if the breathing muscles become immobilised. Two safe and effective poliomyelitis vaccines, Salk inactivated (IPV) and Sabin live attenuated (OPV) were introduced in the mid 1950s and early 1960s respectively. As a result, poliomyelitis had almost disappeared from developed countries by the late 1960s. Further gains in the elimination of poliomyelitis and other infectious diseases were made when the World Health Organisation (WHO) introduced the Expanded Program on Immunisation (EPI) in the early 1970s, providing the means to introduce routine infant immunisation to all children in the world.

Poliomyelitis was chosen as the second virus for eradication after a successful campaign culminated in global smallpox-free certification in 1980. In 1988 the 41st World Health Assembly resolved to eradicate poliomyelitis globally by the end of the year 2000. Poliovirus is a suitable candidate as it occurs naturally only in humans, it does not survive for long in the environment and effective vaccines are available. An eradication strategy involving routine infant immunisation, supplementary immunisation, surveillance and "mop-up" operations was set in place, with funding provided to poorer countries.

However, some children do not have access to routine vaccination programs. There are countries with areas of conflict, some villages or families are too remote from the central administration, births are not registered and some parents are either unaware of, or object to, vaccinations. Therefore, supplementary doses of OPV are given to every child under 5 years, regardless of their previous immunisation history, at National Immunisation Days (NIDS) or Sub National Immunisation Days (SNIDS). Since viruses are not restricted to national borders,

several rounds of NIDS may be coordinated across several countries to reach hundreds of millions of children. Children in conflict areas have been immunised during "days of tranquility" negotiated by the United Nations. The "herd" of susceptible children is thus reduced to a level at which circulation of wild poliovirus ceases.

Surveillance is essential in an eradication campaign. Unlike smallpox where every infected person has symptoms, most poliovirus infections are silent. Acute flaccid paralysis (AFP) surveillance has been proven to be a sensitive indicator of wild poliovirus activity. Case managers are now in place in every country to investigate all reports of AFP. AFP has many causes apart from wild poliovirus infection so each case must be rapidly and fully investigated and virological testing performed. After polio eradication, the work of this network can be extended to cover measles and other vaccine-preventable disease agents.

Once wild poliovirus circulation has ceased or been reduced to a few small foci in a country, "mop-up" campaigns are utilised in areas around a known case and in pockets of high-density urban populations. When a country is certified free of wild poliovirus, immunisation must continue until several years after the last virus has been eradicated globally as the risk of imported cases remains. Numbers of susceptible children can build up very rapidly and negate earlier efforts.

Before a region can be certified polio-free, four conditions must be met. There must be no evidence of wild poliovirus transmission for three years, surveillance must be of certification standard, each country must have a plan in place to detect, report and respond to an importation of wild poliovirus and all pre-eradication tasks on the safe handling of wild poliovirus and potentially infectious materials must be complete. Although the year 2000 target was not met remarkable progress has been made. In 1988 there were an estimated 350,000 cases of poliomyelitis in 125 countries. By the end of 2001 only 453 cases were reported from 10 countries. The Americas were declared polio-free in 1994, the Western Pacific in 2000 and Europe in 2001. In 2002, poliovirus remained endemic

in seven countries with 98% of cases confined to India, Nigeria and Pakistan.

Pakistan's program has been excellent. With the planned rounds of NIDS and SNIDS in 2003, Pakistan may be the first of the remaining endemic countries to stop transmission. Unfortunately, although 10 NIDS or SNIDS were carried out in India in 2000, there were only three rounds in 2001. Cases of wild poliovirus in India increased from 268 in 2001 to 1599 in 2002. The failure to reach adequate immunisation coverage meant that transmission of wild poliovirus was not interrupted. In Nigeria the National government's commitment is high, however, improvements are needed at the state and local government level to eliminate the virus. OPV coverage was still too low to interrupt transmission in 2002.

There are several "end game" issues that are still being addressed. Once human-to-human transmission ceases, environmental sources of poliovirus, including laboratories and vaccine production facilities need to be considered. If there were an escape from one of these facilities into the community once immunisation ceases, we could be back where we started. WHO began consultations in 1997 with scientists from diagnostic, research, control, environmental and reference laboratories, vaccine manufacturers, biosafety experts and the polio laboratory network staff to reach consensus in preparing a global action plan for containment of wild poliovirus infectious materials. These include not only virus cultures but also tissue, faecal or sewage samples collected in a country at a time when poliovirus was endemic. One year after the last polio case has been identified, countries must ensure that all institutions working with wild poliovirus do so using appropriate containment, destroy the material, or remove it to a WHO accredited repository.

The other end game issue concerns the cessation of polio immunisation. The timing and method

of doing so is crucial. Several scenarios are being investigated, including indefinite use of OPV, immunisation of everybody then withdrawal of OPV worldwide on the same day, or to continue with IPV alone. In recent years three small outbreaks of paralytic disease caused by "drifted" vaccine-derived strains have been reported. Although 97-99% identical with OPV strains, these viruses have the transmissibility and paralytic properties of wild polioviruses, and have emerged and circulated where OPV coverage has dropped to low levels. If one country persisted with OPV while neighbouring countries did not, there may be more drifted vaccine strains and thus paralytic disease as levels of immunity fell. More studies into these effects are required before the World Health Assembly can determine a post-eradication policy for polio immunisation.

The strategies employed in eradicating poliomyelitis over the last fifteen years have been proven to work when implemented correctly. The greatest challenge is to ensure that countries are properly resourced to implement these strategies. As is usual towards the end of any race, there are still a few foreseen and perhaps unseen hurdles to jump such as the US \$275 million shortfall in funding through to the end of 2005, due mainly to the depressed global economy. These issues must be addressed or there will be a risk of poliomyelitis re-occurring.

Margery Kennett has worked as a diagnostic virologist since 1961 at Fairfield Hospital and at the Victorian Infectious Diseases Reference Laboratory at the Royal Melbourne Hospital. In recent years, she was the director of both the WHO Collaborating Centre for Biosafety, and the Western Pacific Regional and Australian National Polio Reference Laboratories. The Western Pacific Region was certified wild poliovirus free in October 2000, just prior to her retirement in early 2001. In January 2003 Margery Kennett was awarded the Medal of the Order of Australia for service to public health in laboratory biosafety and polio eradication.



The Australian team at Kyoto in 29 October 2000, when the Western Pacific Region of the World Health Organization was declared Polio-free. Margery Kennett, far left.

TWO GOOD WOMEN, OR TOO GOOD TO BE TRUE?

*Paula
Gould*

It can sometimes seem as if the history of women scientists is little more than a chronology of hardworking heroines. Did any women solve long-standing physical problems while musing in the garden, plagiarize a colleague's data to interpret an unexplained phenomenon, or badmouth the work of a rival to gain glory for themselves? If they did, we don't hear too much about it. Instead, we read how hardworking (and possibly downtrodden) female scholars with a passion for sums, stars, or fossilized shells, toiled long and hard in their chosen field of study to make worthy contributions to the pool of scientific knowledge. These models of scientific purity may have made new discoveries, written authoritative papers, or compiled admirable collections of specimens, but we see their achievements as a simple consequence of unstinting effort.

Take Caroline Herschel (1750-1848) and Mary Somerville (1780-1872), for example, two icons of female scientific heroism. Biographical material for both women is relatively easy to find (1). We read of an honest and almost emotionless devotion to mathematics (Somerville) and astronomy (Herschel), with no hint of blind ambition, enthusiasm, or competitive spirit. Every ounce of energy that they had left after having completed numerous domestic duties appeared to be channeled into scientific study without a whiff of controversy, wrongdoing, or impropriety.

Delving deeper into archives, several biographical sketches can be found of both women published during the late 19th and early 20th century (2). It is here, I believe, that the seeds of martyrdom were sown. Biography was an extremely popular literary genre at the turn of last century. Tales of inspired inventors, eminent statesmen, and brave explorers jostled for space on library bookshelves. Although women didn't tend to feature in these narratives of manly endeavor and genius, they did find a place in "great women" collections. The titles speak for themselves: *A Few Good Women and What They Teach Us* (1886); *Twelve Notable Good Women of the Nineteenth Century* (1899); *Famous Sisters of Great Men* (1905); *The Romance of Woman's Influence* (1906). Readers were urged to follow the example of these heroines, who fit intellectual and social work around existing family commitments and

societal expectation (3). Being good, following the rules, complementing the skills and qualities possessed by their husbands and/or brothers—this was how even emancipated, educated women were encouraged to behave. Caroline Herschel and Mary Somerville proved to be ideal subject matter for authors of such works.

So we have a picture of two diligent, well-behaved women. Their blameless characters contrast sharply with the many men of science who have emerged from the archives with slightly grubbier reputations. How about George Biddell Airy, the former Astronomer Royal, who entered into a prolonged and rather unpleasant rivalry with Charles Babbage (1). And then there's Richard Owen, the glory-seeking anatomist who schemed his way up the

*"Perhaps we should be
applauding their skill in
presenting a vision of
domestic and scientific
harmony"*

scientific greasy pole to become known as the man who named the dinosaurs (4). We may not necessarily like these men, but they were and are still admired.

Caroline Herschel and Mary Somerville, on the other hand, appear guilty of merely bending a few rules of etiquette, rather than outwitting their colleagues in the rush for recognition. Similar behavior from members of the fairer sex would doubtless have been frowned upon. Ladies at this time were expected to learn needlework, not nebular theory, and to amuse themselves by playing the piano rather than solving differential equations. Yet both our heroines appear to have navigated their way around possible objections with ease, silencing any possible dissenting voices by combining an appropriate model of dutiful, ladylike conduct with their scientific studies. Perhaps we should be applauding their skill in presenting a vision of domestic and scientific harmony, leaving critics of women's intellectual activity little or nothing to attack?

We will never know if Caroline Herschel and Mary Somerville were really this worthy and industrious. However, one thing seems certain. No matter how much their lives have been polished into shape for academic history books, research papers, and celebratory Web sites, their life stories are unlikely to feature in glossy hardbacks piled high in book stores. Although narratives of unsung innovators and mathematical eccentrics are once again all the rage, as they were 100 years ago, tales of worthy women have gone out of fashion. Today's readers want a more exciting lead character, not a saintly-but-slightly-dull heroine who succeeded in keeping up appearances. Perhaps it's time to search the scientific archives for a new generation of less well-behaved women.

(1) MacTutor History of Mathematics; available at www-history.mcs.st-andrews.ac.uk/history/index.html.

(2) P.A. Gould, thesis, University of Cambridge (1997), chap. 6.

(3) M. Vicinus, in *Telling Lives in Science: Essays on Scientific Biography*, M. Shortland and R. Yeo, Eds. (Cambridge Univ. Press, Cambridge, 1996), pp. 195-213.

(4) D. Cadbury, *The Dinosaur Hunters: A Story of Scientific Rivalry and the Discovery of the Prehistoric World* (Fourth Estate, London, 2000).

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COSMOLOGY CONFRONTED WITH PHYSICAL HOME TRUTHS

*Reviewed by
Pauline
Gallagher*

"How The Universe Got Its Spots; Diary of a Finite Time in a Finite Space"

By Janna Levin Weidenfeld & Nicolson, distributed in Australia by Allen and Unwin.

We are used to thinking that science is free from the personal, the emotional, and our journey through life. I knew that I was in for a very different experience as soon as I opened this book. Not quite a diary, not quite a series of letters home to her mother, Janna starts out by confronting the reader about her own fascination with the madness of quite a few great mathematicians. With this perspective firmly in mind, she moves into presenting infinity, a mathematical concept, as difficult to reconcile with physical realities. If we accept that time had a beginning, that space can be curved, that infinity can be bounded, then it is not far fetched at all to suppose that the universe can be finite.

Without being tied down by mathematical formulae, we are taken into a celebration of breakthroughs, from Newton through Einstein to Hawking and beyond. What is knowable depends on the observer and their perspective. The cosmology is peopled with real characters, human nature and the author's personal thoughts and spec-

ulations about them. Janna's hero worship of Einstein is confessed openly. "Einstein was gifted. Even his mistakes were gifted." And the concepts - gravity, Hubble expansion, cosmic background radiation and the very difficult topology are all presented in very accessible terms to make her thesis make infinite sense.

More than the science, what makes this book stand out from the rest is its frank portrayal of the author's living and working as a young scientist. The travel, the shifting from job to job ("Home is where the hat is."), the chaotic nature of friendships, the struggle to keep a relationship together in the face of all-consuming science. Janna weaves her life in with the development of her thought on the cosmos. She draws parallels with mathematicians and her obsessive-compulsive musician partner, links music and mathematics into the harmonics of string theory and the universe. She relates uncertainty in quantum theory to the uncertainty in her life, and we are caught.

So, what about those spots? Well, you will have to combine a little biological understanding with cosmic background radiation to get that one.

**Decidedly daring, definitely different.
Worth a read.**

BOOKENDS OF A GENERATION: TWO CSIRO RESEARCHERS

Joy Bear **Fiona Solomon and
Evie Katz**

When Jo O'Neil (see WISENET Journal 57, July 2001) asked me for an article for the WISENET Journal, I thought a profile of CSIRO social scientists Dr Fiona Solomon and Dr Evie Katz could be inspirational to other women. As Fiona is in her early thirties and Evie is in her late fifties, this overview brings into perspective two women's careers undertaken a generation apart.

Fiona is the group coordinator of the Social Values team at CSIRO Minerals. She has led a number of research projects on social and sustainability issues around the minerals industry in Australia, including stakeholder and community perspectives of mining, stakeholder and community consultation processes, and independent verification of companies' performance. Fiona undertook a Bachelor of Mechanical Engineering degree at The University of Queensland, graduating with first class honours in 1992. Her PhD thesis in 1997 was a philosophical and sociological analysis of engineering and technology.

For the thirteen years prior to joining the research group at CSIRO Minerals in October 2002, Evie worked as researcher, lecturer and tutor in the School of Social Sciences at La Trobe University where she is currently an Honorary Research Fellow. Her teaching and research areas have been varied - from anthropological theory, community studies, to the sociology and anthropology of science and technology. Her doctoral study focused on workplace change, in particular changes in technology, management, and systems of recruitment and promotion, and their relationship to theories of organisational culture.

JB: Evie could you contribute a few thoughts on how your career developed in the context of women working in science?

EK: I feel somewhat uneasy about this exercise, partly because of the term 'career'. I cannot recall ever thinking of having a career - paid work, yes, but the idea of

following a particular path, of perhaps planning one, was alien to me. This is probably fairly typical of a woman of my age, time and place. Post WW2 the assumption was that a girl would join the paid workforce, work for a few years, marry, have children, and then her 'career' would be that of wife and mother. And indeed, this was more or less my path.

After matriculation, I received a youth leadership scholarship for a year's study overseas. Upon my return I did a two-year primary teacher certificate at a teachers' college, and worked as a primary school teacher for three years. The next three years were spent travelling and working overseas, marrying, and then returning to Melbourne. Two children came, and when the younger one began school just at the time that university fees were abolished by the Whitlam Labor government I decided to apply for entry to Monash University. I did a BA, majoring in geography and anthropology, gaining first class honours that eventually, albeit with a number of 'interruptions', set me on the path to a doctorate in anthropology at La Trobe University.

JB: Why did you choose to do your PhD in anthropology?

EK: The discipline of social anthropology covers a variety of fields - economics, politics, philosophy, all social and cultural aspects of human life, including science and technology. It does this in a comparative way, and looks at how large-scale processes, for example, globalisation, interact with more local ones, such as family structures, individual decision-making, regional change, work and work relations. I liked this diversity, and found the opportunity to explore a phenomenon such as organisational culture via a number of possible avenues very appealing.

JB: Fiona, why did you decide to take an Engineering degree?

FS: At my girls' high school we had very small classes for physics and chemistry and had the same great teacher for both. He used to be a process chemist at Golden Circle so his teaching was always very

grounded in practical questions. We always did great experiments and had to explore complex questions via longish chains of reasoning and application. In my final years of high school I became quite interested in space, that is, astronauts, rockets, NASA, etc. I lined up work experience at the UQ Space Engineering group in Grade 12 and managed to get a scholarship from Comalco for women in non-traditional fields (1989-1992). The purpose of the scholarship was to support and increase the retention of women studying degrees such as engineering, and to this end it was successful. (JB: Fiona won the Kinhill Prize for the Best Mechanical Engineering Thesis in 1992.) However, I began to have doubts during the course as to whether it was living up to my expectations and whether it was the career for me.

JB: Were women commonly undertaking engineering as a career in your time at university?

FS: Not really, and it varies between engineering disciplines. For example, mechanical engineering (my discipline) had 5 women in a graduating class of 60. Environmental engineering had about 30% women I seem to recall. I became involved

in organising women in engineering activities, particularly when I became a postgraduate student.

JB: Why did you move to "Philosophy of Engineering" for your PhD thesis?

FS: I was being drawn to a broader set of questions about technology and society, so it seemed a good way to explore them!

JB: What made you seek your present position in CSIRO?

FS: I wasn't looking for a standard engineering career after my PhD as I was more interested in, and qualified to do, interdisciplinary research. CSIRO has provided lots of opportunities to travel and take up personal development activities. For instance, I was able to accept the Australian Minerals and Energy Environment Foundation Travelling Scholarship and the St James Ethics Centre Vincent Fairfax Fellowship, in 1999 and 2000.

JB: Evie, what brought you to CSIRO Minerals?

EK: I came to CSIRO by a circuitous route. Fiona was seeking someone for the Social Values Unit's Social and Economic Integration (SEI) projects, which involve



Fiona Solomon (l) and Evie Katz

the integration of social and economic sciences into traditional scientific and technological research and development processes. The SEI projects bring together a number of my research interests and skills – namely, the sociology of science and technology, and experience in education.

JB: It is significant that SEI is one of CSIRO's five emerging science areas and the Social Values group has led a pilot Organisational Learning Project, examined three case studies of SEI practice in natural resource management, technology road-mapping and mine technology development. The group is presently preparing a proposal for a new round of case studies.

JB: Fiona, what led you to seek part-time secondment to the World Wide Fund for Nature (WWF)? How does your work there differ from that at CSIRO - what is the connection?

FS: My secondment to WWF is to be the project officer for the Mining Certification Evaluation Project (see the website at www.minerals.csiro.au/certification). It is probably the most important policy R&D project in the minerals industry in Australia at the moment, so I was keen to make sure CSIRO and our research group was involved. The work is very similar to my work at CSIRO, in the sense that it is research that involves a wide range of stakeholders and tries to develop the research agenda via a participatory dialogue. It is different in the sense of it being a small office of 4-5 people who all answer the phones! I take calls from people who want to give money, who are doing school projects, or who want to get media comment on environmental issues, so it is

very interesting to also be at the 'front line' if you like.

JB: Would you both provide a few comments on your philosophy regarding inter-relationship of career, marriage and family?

FS: So far combining career and marriage has not been too much of a problem, apart from times when I have had to do large amounts of fieldwork interstate or overseas. I imagine that combining careers and children will be far more of a challenge! My partner and I are very committed to the idea of life balance and we look forward to what life ahead holds for us.

EK: I did not find it easy to combine the roles of mother and wife with paid employment. My guess is that women and men who wish to combine parenting and careers will continue to find reconciling the tensions these roles engender difficult to negotiate. My hope is that family responsibilities will be acknowledged as important – not just as empty rhetoric but supported materially in workplace policies and practices.

Joy Bear is an Honorary Fellow with CSIRO Minerals. Her career with CSIRO has spanned more than fifty years with her main researches being undertaken in the fields of mineral chemistry, solid state chemistry and pyro-metallurgy. Joy was the only woman appointed to the research ranks of the Division of Mineral Chemistry of CSIRO over the years of its existence (1959-1987). She was appointed a Member of the Order of Australia in 1986 for services to science. A biographical note about Joy appears in WISENET Journal 60, July 2002, p.9.

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DIFFERENT PATHWAYS IN SCIENCE; TWO INTERESTING LIVES AFTER BSc DEGREES

Jennifer Seabrook

An essay topic set by Dr Jo O'Neil in third year pharmacology set me on a career path that has been both stimulating and rewarding. Until I had completed a comparison of drug evaluation and marketing practices in Australia, the US and the UK, I didn't even know that there was a pharmaceutical industry in Australia. However, on completion of an honours degree in Pharmacology, and, having decided not to accept a PhD scholarship at the University of Sydney, the pharmaceutical industry offered itself as an obvious choice.

In Melbourne in the early 1980's there were four major pharmaceutical companies and most positions were in sales. Not my forte I thought, but a stepping stone to clinical research – my ultimate goal. In this regard, my third year research was not as in-depth as it should have been or I would have realised that there were precious few jobs in clinical research in Melbourne. However, in 1986 a new position of Clinical Research Associate at ER Squibb and Sons (now Bristol-Myers Squibb) was created and became mine. That began a stimulating 6 years - with active involvement in representative training, information services, marketing support, conference planning and, not forgetting, clinical research.

"I believe that a science degree is definitely a recipe for success, as long as you have the courage to follow where it leads"

From a clinical research perspective my most notable project was the LIPID study (Long-term Intervention with Pravastatin in Ischaemic Disease) – an internationally recognised study of 9,000 patients in 90 centres around Australia and New Zealand that demonstrated the dramatic effects of cholesterol reduction on survival in patients following a myocardial infarction. My roles in protocol and systems development, liaison

with participating centres, and management of drug supplies were important to the



smooth running and the success of the project. Two more years in clinical research at Glaxo (now GlaxoSmithKline) concentrated on developing links with local investigators and with head office.

One of my roles within LIPID was the organisation of the first scientific meeting for the medical and nursing staff at the participating centres. This proved a considerable success and led to requests for me to organise subsequent meetings, even after I had moved on to other positions. This definitely developed my appetite for conference organisation.

In 1994, I left GlaxoSmithKline to join my husband Ray Turner in the medical writing business, Arts and Technology, which we had established in 1992. While this provided plenty of challenges as it developed into a successful business servicing the pharmaceutical industry, academic and government clients, my approach to conference management continued to draw clients who wanted me to organise medical meetings. The temptation was too much and, in 1995, Meetings First was officially launched as a specialist medical/scientific conference organising business.

Since its launch, Meetings First has grown steadily. Conference attendees, impressed

with our organisation and, more importantly, our appreciation of what makes a successful medical/scientific conference, spread the word. Today Meetings First employs five people, provides secretariat support for several organisations, including the Australasian Society for Clinical and Experimental Pharmacologists and Toxicologists and the High Blood Pressure Research Council of Australia, and organises 10-12 Australian and internationally conferences per year. Software developed in-house allows staff to track every aspect of each project, providing instant status on registrations, accommodation, travel and other aspects of each meeting. Much of our conference organisation is now web-based, with delegates being able to register, arrange travel and accommodation and submit abstracts through the Meetings First website (www.meetingsfirst.com.au).

While conference organisation may seem a long way from a science degree, I believe that it is my background in medical science that has provided a competitive edge. Many people can plan the nuts and bolts of a conference, but few conference organisers can offer relevant input into programming, review abstracts and conduct (hopefully) intelligent technical communications with invited guest speakers. It's really the science factor that makes the business a unique one and attracts clients.

When I graduated in 1982, I saw my degree as something of a jumping off point for the rest of my life. So far, it has taken me from the university lab, to the corporate world (creating a taste for good food and wine and international travel in the process), and to starting up and running two successful businesses. I believe that a science degree is definitely a recipe for success, as long as you have the courage to follow where it leads.

Alena Glaister

I have been asked to reflect on my work as a freshwater biologist. Currently I am employed as a Research Assistant in the Cooperative Research Centre for Freshwater Ecology (CRCFE) based at Monash University, School of Biological Sciences.

My career in biology commenced back in 1976 in the Invertebrate Survey Department at the Museum of Victoria. I started work with a BSc in Zoology & Botany and a general interest in

molluscs and insects. In a short time I developed a love of freshwater invertebrates. In the Survey Department we monitored the aquatic macroinvertebrate fauna in rivers before and after the construction of dams, in particular the Thomson and Dartmouth dams. Changes in the invertebrate community were used to assess the impact of dam construction on rivers as part of the environmental assessment required by the Government. We spent many hours working in these beautiful rocky sections of rivers before they were *damned*. Our studies showed that the faunal composition downstream of these dams has been changed. The large amount of silt generated by the dam construction favours species that are tolerant of silt and reduces the number of animals grazing on algae. Large amounts of cool water being released in summer rather than in winter mean that species requiring warm summer temperatures and low water levels as a cue to pupate are not able to complete their life cycles and have disappeared from these localities.

“After taking four years of family leave part-time work made the initial transition back into research easier than going straight into full-time employment.”

The composition of macroinvertebrate species living in a river was used to measure the quality of the water. In the 70s and 80s there was a lack of adequate information about the Australian aquatic fauna. Many of the animals living in freshwater are larval (immature) forms and it is generally the adult (often terrestrial) life stages that have been studied. Various people, mostly based in Victoria, began to investigate and identify these animals. This involved rearing of immature insects like mayflies, caddis and stoneflies through to adults in laboratories, and led to the identification and description of many new species.

I became keenly interested in small freshwater beetles, Elmidae or riffle beetles and began collecting and rearing beetles from as many locations as possible. Riffle beetles usually live in fast, well-oxygenated water in rocky, shallow parts of streams called riffles. In the laboratory I successfully managed to raise Elmids which allowed me to associate the adult and larval life stages. Many people assisted me by collecting

and sending live specimens from different parts of Australia to supplement my own collections. Eventually, in 1999, I produced an identification guide to Australian riffle beetle larvae. Since leaving the Museum of Victoria most of my work relating to riffle beetles is being carried out in my own time, however, there has been some financial support in the form of small grants from the Mark Mitchell Trust in South Australia, and the CRCFE.

In 1981 I left the paid work force for 4 years to raise my 2 sons, though I maintained my interest in riffle beetles and raised those as well! In 1985 I joined the Aquatic Ecology laboratory at Monash University. I was hired for my “expertise” in aquatic invertebrates, but I soon learned that during the intervening few years there had been many changes and advances in the taxonomy of the Australian fauna, so initially I had plenty of “homework” to do. After taking four years of family leave part-time work made the initial transition back into research easier than going straight into full-time employment. The area of freshwater macroinvertebrate studies was increasing in importance and added to my employability, so a combination of luck and experience contributed to me returning into my field of biology.

In 1994 the Aquatic Ecology lab became part of the CRCFE and our current research contributes to the study of creeks that are adversely affected by sand slugs (a term used for

the bed of a stream that is filled in with sand from erosion in the headwaters). The number of fish and invertebrates living in sand slugs is reduced because the natural deep pools found in wood habitat become smothered in sand. In order to improve the quality of creeks Landcare and Friends groups have been active in planting trees, fencing, and stabilising the banks of streams. Working in collaboration with the CRC for Catchment Hydrology, landowners and Landcare we are assessing the effectiveness of stream restoration techniques by measuring changes in the invertebrate fauna, fish and hydrology after rehabilitation works are established.

Working for the CRCFE gave me the advantage of being able to work on research projects for the relatively long period of 3-5 years, and leading to many multi-authored publications in scientific journals. The link with a university provided the bonus of working in a quality research and teaching environment. In the CRCFE men hold most of the senior positions though the percentage of women has improved from 0% in 1994 to 25% in 2001. The project staff numbers have been maintained at approximately 25% women, while the CRCFE has supported about 50% women among the PhD and Masters students. In my experience, there have always been key women available as mentors and colleagues.



2003 – FORTY YEARS OF BEATLES; FIFTY YEARS OF DNA

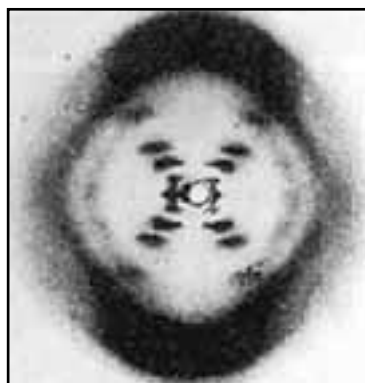
Andrea
McAdam

On 16th February 1963, The Beatles released their first hit, Please Please Me. On 25th April 1953, Nature published a brief paper by JD Watson & FHC Crick titled A Structure for Deoxyribose Nucleic Acid (1). In the 40 and 50 years since these events the Beatles and DNA have both become household words. From our perspective today, the second sentence of Watson and Crick's paper is an ironic understatement: "This structure has novel features which are of considerable biological interest".

The progress since 1953 is well beyond what any of the original protagonists may have envisaged. The 'considerable biological interest' they foreshadowed has given rise to diverse applications of the knowledge — from genome sequencing to nanotechnology; from medical diagnostics and gene therapy, to art and architecture.

A special feature in Nature to mark the anniversary offers a wide range of reflections on the events of 1953 and since; the people, the progress, the potential still unrealised. It is accessible free online at www.nature.com/nature/DNA50/ and includes archival reproductions such as the original journal paper, and articles from the 21st anniversary in 1974.

Not all the mysteries of this elegant, enigmatic and essential molecule have been solved, however. As Philip Ball comments in



Franklin's X-ray diagram of the B form of sodium thymonucleate (DNA) fibres, published in Nature on 25 April 1953, shows "in striking manner the features characteristic of helical structures"

his article Portrait of a molecule, "How many celebrations of the double helix will admit that 50 years on, we don't really know what DNA at large in the cell looks like?" (2).

James Watson, Francis Crick and Maurice Wilkins jointly received the Nobel Prize for Physiology and Medicine in 1962 for their work on DNA structure. One key researcher who co-published in that landmark issue of

*"great discoveries are
the sum of painstaking
individual observa-
tions, experiments and
conclusions"*

Nature was missing from the Nobel awards. Rosalind Franklin, the X-ray crystallographer whose photographs of the diffraction images of DNA crystals were so influential in confirming Watson and Crick's putative helical model, died of cancer on 16th April 1958, not quite five years after the momentous publication. She was 37.

Having read years ago the popular account written by Watson in 1968, The Double Helix (3), and been slightly troubled by the portrayal of Franklin more as a termagant than a colleague and expert scientist, I enjoyed reading last year a biography of her written in 1975 and reissued in 2000. This book, Rosalind Franklin and DNA by Anne Sayre (4), redressed the balance and provided a detailed portrait of a brilliant woman whose research career abruptly and prematurely ceased. Sayre has been criticised for weighing too heavily in the other direction and setting Franklin up as a "wronged heroine cast as a feminist icon by her premature death and misogynist treatment by the male scientific world" (5) by Brenda Maddox, who has written another biography, Rosalind Franklin: The Dark Lady of DNA (6). The book is to be released in paperback this month. I look forward to reading it because it is the insight into the life and humanity of such scientists that continues to remind me that a career is made up of ordinary days, and that great

discoveries are the sum of painstaking individual observations, experiments and conclusions just as the human body (and most other life forms) are quietly constructed from the basis of the tiny double helix that is DNA. Happy 50th Anniversary!

1. Watson JD, Crick FHC. A Structure for Deoxyribose Nucleic Acid. *Nature* 1953; 4356: 737
2. Ball P. Portrait of a molecule. *Nature* 2003; 421: 421-422
3. Watson JD. *The Double Helix*. New York: Atheneum; 1968
4. Sayre A. *Rosalind Franklin and DNA*. New York: Norton; 1987 (pb); reissued 2000.
5. Maddox B. The double helix and the 'wronged heroine'. *Nature* 2003; 421: 407-408
6. Maddox B. *Rosalind Franklin: The Dark Lady of DNA*. London: HarperCollins; 2002

Andrea McAdam is a Medical Scientist working full time in Diagnostic Haematology / Blood Bank at the Royal Melbourne Hospital. She teaches Immunology at RMIT TAFE (in her spare time!) and has wanderings to work somewhere with interesting tropical diseases, because she loves microscopy and parasites.

Women in X-ray crystallography

By Diana Temple

There has been a tradition of first-class women chemists achieving highly in the field



Dame Kathleen Lonsdale (1903-1971)

of X-ray crystallography, particularly in England. Perhaps the most notable is Dr Rosalind Franklin whose X-ray diffraction analysis was a critical component of the discovery of the structure of DNA.

Dame Kathleen Lonsdale, the century of whose birth is commemorated in Chemistry in Britain (Jan 2003) overcame hindrances (marriage and 3 children, plus social mores of the period) to carve out an early career at University College London, with the support of Sir William Bragg. She established that the benzene ring is planar, and applied Fourier methods to analyse X-ray patterns, doing the complex calculations at home by hand. She was one of the first two women to be elected a Fellow of the Royal Society.



Dorothy Crowfoot Hodgkin (1910-1994) honoured on a postage stamp issued in the United Kingdom.

Almost contemporary was Professor Dorothy Crowfoot Hodgkin of London and Oxford, famed for her X-ray crystallographic analysis of complex molecular structures, for example penicillin and Vitamin B12. She won the Nobel Prize for Chemistry in 1964, becoming one of few women Nobel Laureates. Britain then awarded her an Order of Merit - the first woman OM since Florence Nightingale.

WOMEN ACHIEVING RECOGNITION IN SCIENCE

*Compiled by
Diana Temple
and Jo O'Neil*

Fiona Stanley is Professor of Paediatrics, founding Director of the Institute of Child Health Research at the University of Western Australia and chief executive officer of the Australian Research Alliance for Children and Youth. Her work on child health and as a splendid communicator has been recognised in several ways - AC (Companion in the Order of Australia) 1996, the Tall Poppy Award from the Australian Institute of Political Science 2000, and most recently elected Australian of the Year for 2003.

Today's Life Science March/April 2003

Beryl Hesketh, who has been dean of the Science faculty at the University of Sydney since 1999, has been appointed Pro-Vice-Chancellor (Science and Technology). A psychologist, Beryl Hesketh's research area is applied decision making. She won the Australian Psychological Association Elton Mayo Award in 1997 for her work in organisational research.

University of Sydney News 28 Feb 2003

Anne Kolbe, paediatric surgeon has been elected as the first woman president of the Royal Australasian College of Surgeons. This makes Anne Kolbe the world's first female head of a surgical college.

Sydney Morning Herald, 6 March 2003

ARC Federation Fellowships

Four women are among recent recipients of these highly sought-after fellowships that were introduced by the federal Government to attract and keep scientists of international standing in Australia.

Marcela Bilek, Professor of Physics at University of Sydney, conducts research on polymer surfaces with many medical and physics applications. The fellowship, Professor Bilek says, will give her more time and resources for research, and provide new people and equipment.

Marilyn Renfree, Ian Potter Chair of Zoology, at the University of Melbourne, has received a number of other awards including the Gottschalk Medal (Australian Academy of Science) in 1980 and the Mueller Medal (ANZAAS) in 1997. Her research is on the control of reproduction and development in mammals with special interests in the Australian mammalian fauna, particularly

marsupials and monotremes and the evolution of reproduction.

Michelle Simmons, Professor at the University of New South Wales conducts research that represents a new initiative to build silicon devices containing only a few tens of atoms and is relevant to minaturisation of semiconductors, with potential relevance to processing and storing information.

Amanda Lynch, currently at the University of Colorado will return to Australia to take up a Chair at Monash University. Her research involves methodology to address extremes in climate impact assessment including coastal flooding and bush fires.

University of Sydney News, 28 March 2003;

www.arc.gov.au/

Suzanne Cory, Director of the Walter and Eliza Hall Institute for Medical Research, in 2002 won the Royal Medal for Science awarded by the Royal Society, London. She is the first Australian woman to have achieved this honour.

The Charles Perkins Memorial Prize, awarded annually to an indigenous student of outstanding academic merit, was won this year by **Llewellyn Williams**. An honours graduate in Health Science from Yooroang Garang School of Indigenous Health Studies, Llewellyn comes from Gladstone, Queensland, the daughter of a Wakka Wakka Willi Willi mother and a Torres Strait Islander father. Her thesis studied the media portrayal of indigenous people, showing how their health suffered from the usually negative portrayal in television media.

University of Sydney News, 3 Jan 2003

Sandra Capra has become the first Professor of Nutrition and Dietetics in N.S.W. with her appointment in the Faculty of Health at the University of Newcastle. She has a PhD in nutrition, and extensive academic experience. Another nutritionist, **Professor Jennie Brand-Miller** of Sydney University, has received a Clunies Ross Science and Technology Award for 2003. She has studied the conversion of different carbohydrate sources into blood glucose and classified them according to their glycaemic index. High blood sugar is common in adults who do not have diabetes, and can be

deleterious to the cardiovascular system, the eyes, kidneys and nerves.

Sydney Morning Herald, Mar 19 and 27 2003

Christine O'Keefe, a CSIRO mathematician of CMIS, has been invited to sign a square in the Pioneer Women's Hall of Fame Signature Quilt Project, the first stage of which was launched on International Women's Day this year. Known as the Patchwork of Empowerment, this project celebrates the achievements of Australian women over the last century, containing almost 350 signatures of women who were first comers in a variety of fields.

www.pioneerwomen.com.au/sigquilt.htm

Devi Stuart-Fox of the University of Queensland has won a UNESCO-L'Oréal Fellowship. These international awards were created in 1998 to recognise outstanding women research scientists, see www.forwomeninscience.com. She will investigate colour change in chameleons in different environments in South Africa, following on from her Queensland work on evolutionary lizard biology.

LabNews April/May 2003

Liz Kernohan, once a Sydney University agricultural science academic and a former director of the University Farms at Camden, has had a long stint as a member of the Legislative Council of NSW, from which she has recently retired.

Gail Risbridger, Professor and Head of the Monash University Institute of Reproduction and Development (IRD) Centre for Urological Research, has received a Senior Fullbright Fellowship. Earlier this year Gail and her institute were awarded \$800,000 to investigate the role of adult stem cells in prostate disease. Gail has been a key mover in the establishment of a program at IRD called WISE (Women in Scientific Excellence). This was established in September 2002 and consists of a group of women whose objective is to fund awards for high quality students, especially women, wishing to study through Monash IRD.

Monash Memo, 5 February & 16 April, 2003

Victoria Fellowships

The \$50,000 Victoria Prize and six \$15,000 Victoria Fellowships recognise the contribution of scientists, engineers and innovators to Victoria's future prosperity and quality of life. A woman is yet to receive the Victoria Prize, however four women were among the six

recipients of the 2002 Victoria Fellowships.

They were:

Tracey Bessell, a pharmacy graduate at Monash Institute of Health Services Research;

Danielle Forster, an electrical engineer working with the new start-up initiative, Dynamic Hearing, spun off from the Co-operative Research Centre for Cochlear Implant and Hearing Aid Innovation;

Rachael Prince, honours graduate and PhD student in Civil Engineering from Swinburne University of Technology, is currently investigating what causes discoloured drinking water in collaboration with industry partner South East Water Limited; and

Cindy Yap, postdoctoral fellow at the Australian Centre for Blood Disease, whose work on stroke prevention and treatment has been patented through a biotechnology company based in Victoria which is investigating the possibility of developing commercially new and safer antiplatelet drugs.

www.innovation.vic.gov.au

Lesley Rogers, professor and neurophysiologist at the University of New England, and publicist of women in science, was a recipient of a Centenary Medal.

Cathy Foley of CSIRO Applied Physics has received a Public Service Medal for her work in scientific research, the popular promotion of science and social responsibilities of scientists.

Joan Mason, founder of AWISE, WISENET's British counterpart, and a former member of WISENET, has been honoured with the award of an MBE. She has provided the following outline of her career:

"After postdoccing in California and London, then dropping out (husband-following, 3 children) our family returned to London (my husband moved to a chair at King's). This was just as the Open University was starting up, and I got a job on the Chemistry staff of the Open University... I'd known the Professor at Cambridge, so perhaps I plugged into the old boy network ... the OU needed some female faces on its TV in science. I then encountered the usual problems, seeing younger colleagues promoted over my head (since my husband could keep me). So I complained to the Vice-Chancellor; who noticed my publication record and told me to apply for a Cambridge D.Sc., then I'd be promoted. So I did and I was. They made me a Reader, and if I had had another year or two before the retiring age, they'd have made me a Professor".

GIVING WINGS

Reviewed by
Dr Beverley
Crocker

Famous Australian Birds.

By Gisela Kaplan, Allen and Unwin,
Melbourne, \$29.95

Increasingly, children's texts are being enriched by writers with a high level of expertise in their own field. Professor Kaplan is one such writer who is an internationally renowned, highly published academic of scientific texts. In response to her belief that she should share the results of her research on the behaviour of well known Australian

*"This is not just a book
about animal welfare but
about human welfare."*

birds, Famous Australian Birds became her first venture into writing a children's book. Such a task is difficult as it involves using appropriate language, carefully selecting material and presenting the text in a tone that does not condescend. Professor Kaplan has met these challenges. The book, already attracting a great deal of interest from reviewers and interviewers, is unique in that it is not simply another ornithological study but rather it challenges the readers' emotions by exploring a universe common to birds and humans.

Far from the remote authorial voice often found in factual texts, here the relationship between the reader and writer is very significant. Through anecdotes and photographs, the warmth and sincerity of the narrative voice speaks directly to the reader. The book allows the reader to respond emotionally to wonderful tales of rescue. The final section is called Living with Birds. How can we help? This could, in fact, be the subtitle or title of the book. It is a book that shows the relationship between human and bird and draws parallels between our ordinary days and those of birds and reminds us of the need for a positive attitude to life. This is not just a book about animal welfare but about human welfare.

While it is written with a sense of a young audience, Famous Australian Birds has the

power to fascinate the adult reader, too, as it offers knowledge and passion. It invites rereadings as new insights about the talents of birds are revealed and it also arouses passionate responses and challenges our sense of responsibility to develop an environment that offers protection and future expansion of birdlife.

One of the most influential liberal - humanists of the 20th century, Paul Hazard, believed that the essential focus of a children's text was 'to give wings to the imagination'. He also added that it should have 'the integrity to perpetuate the readers' faith in truth and justice'. This book both stimulates the imagination and gives integrity to the reader. Hazard would be delighted with this book.

Hazard Paul, 1944, Books, Children and Men. Boston: The Horn Book.



Tawny Frogmouth © Andrew Netherwood

DID YOU KNOW?

*Reviewed by
Caitlin O'Neil*

Famous Australian Birds.

*By Gisela Kaplan, Allen and Unwin,
Melbourne, \$29.95*

Did you know... that a tawny frogmouth can regrow his/her tongue?
That a cockatoo can live for up to one-hundred years?
That male emus incubate the female's eggs?
These are just some of the facts that continued to amaze me when I read this non-fiction book.
It includes information on cockatoos, magpies, tawny frogmouths, lyrebirds and more.
It would be a really great book for a school project or really anything else that you need information on birds for.
It includes about 10 pictures of each bird featured in the book and true stories about young (and old) birds that the author has rescued and met.
It has a fact file on each bird and large chart in the back including information like the weight, size and lifespan of each bird.

It also includes an index and glossary at the back.

Its weak point is that it could provide a little more information on rosellas, but I look over that. I rate it 9/10.

Caitlin O'Neil is a year 5 student at Clifton Hill (Gold St) Primary School in Melbourne. She has just had her 10th birthday.



The membership form can also be printed from the WISENET Web Site at: www.wisenet-australia.org

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