

RESEARCH in the national interest - enabling the future



Australian Government  
Australian Research Council

**Women in Chemistry: personal,  
historical and future perspectives**  
**21 June 2011**

**Professor Margaret Sheil**  
**Australian Research Council**

**Halpern Lecture 2011**

*Research*

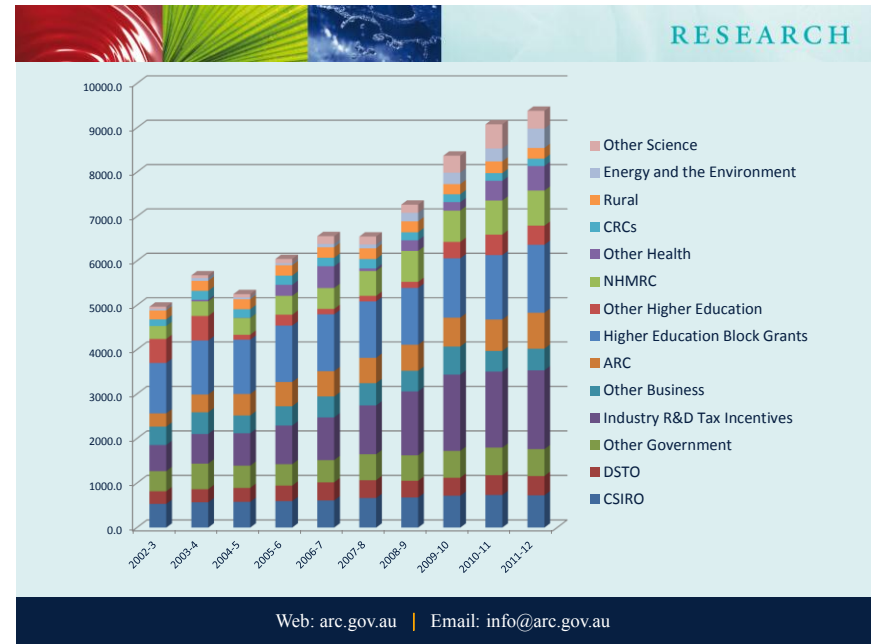
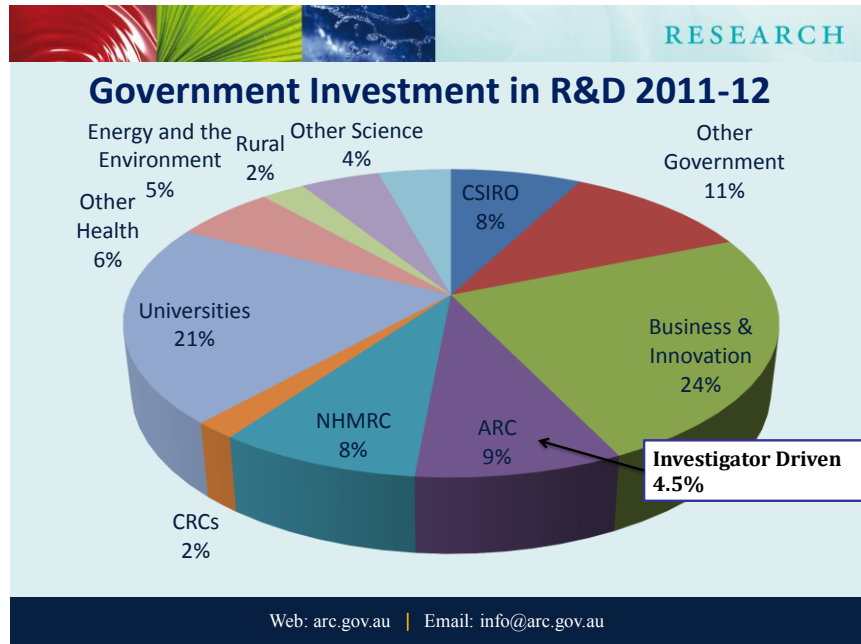
RESEARCH



Minister for Innovation, Industry,  
Science & Research

Department of Innovation, Industry, Science & Research	Australian Research Council Act 2001	CSIRO AIMS ANSTO AAO Chief Scientist
--	--	--

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



## RESEARCH

## Whole of Government

- Commitment to Budget Surplus in 2013
- Natural Disasters and Australian dollar impacting on revenue
- Tight political situation raising expectations and requirements
  - Stakeholders
  - Reporting
- Big ticket items-health, mining tax, carbon tax etc.

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Strategic Objectives

- To *support* excellence in *research*
- To *build* Australia's research *capacity*
- To *provide* informed high quality *policy advice* to government
- To *enhance* research outcomes through effective *evaluation*
- To *raise the profile* of Australia's research effort and *be an effective advocate* for its benefits

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



## The ARC

**National Competitive Grants Program**  
\$810M in 11-12

**Evaluation and Policy**

**Discovery & Fellowships**  
\$502 M

**Linkage & Centres**  
\$308 M

**Excellence in Research for Australia**

- Statutory Agency established 2001
- Mission: *to deliver policy and programs that advance Australian research and innovation globally and benefit the community*
- Fund direct costs to Universities and partners
- All disciplines except clinical medicine & dentistry

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

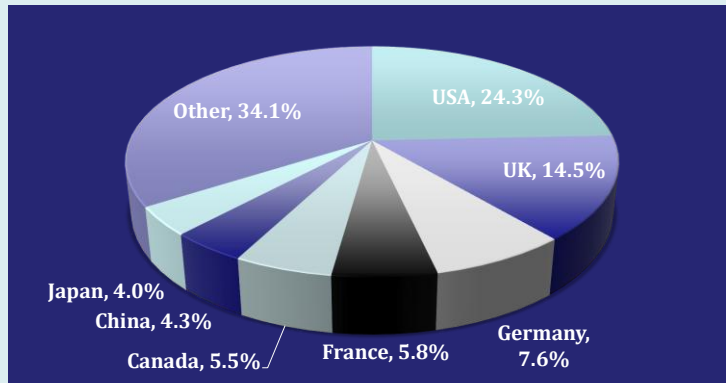


## Peer Review underpins.....

- Research Publications
- Grant selection committees

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## International Collaboration 2010



Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Ethical and Regulatory Framework

- Universities
- NHMRC
- ARC
- Government
- Human and Animal Ethics
- Research Misconduct
- Licensing guidelines
- Gene Technology Regulation .....

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Encouraging Opportunity

**Australian Laureate Fellowships**

- 2x PhD  
2x Post-Doc
- 17 5-year awards

**Discovery Early Career Researcher Award (DECRA)**

- \$125,000
- 200 p.a. 3-year awards

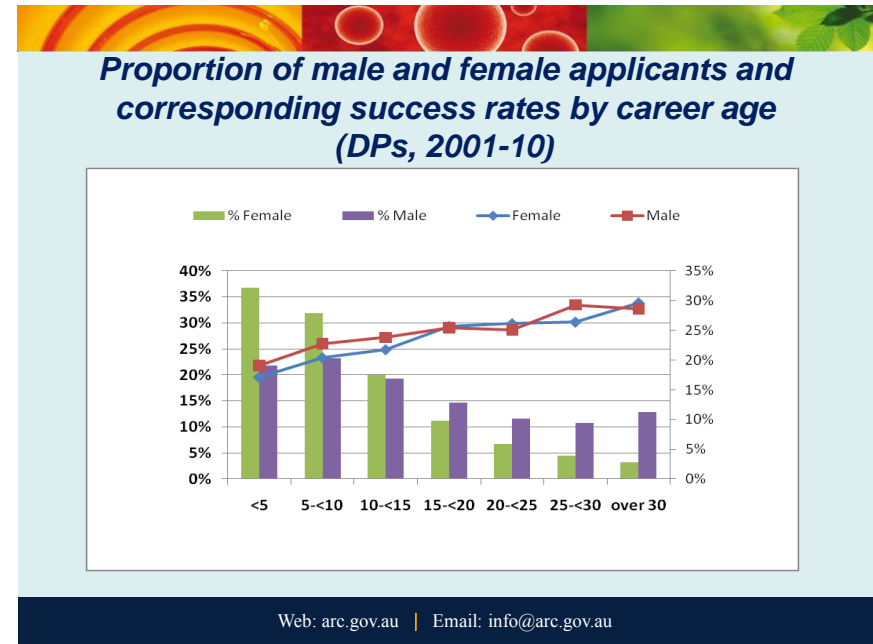
**Researchers in Industry Training Awards**

- \$30,000
- 100 3-year awards (bi-annual)

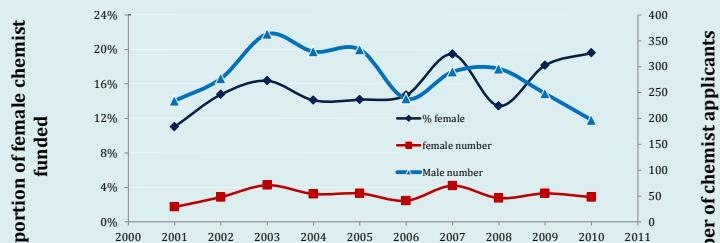
**Future Fellowships**

- Up to \$143,000
- 200 p.a. 4-year fellowships

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



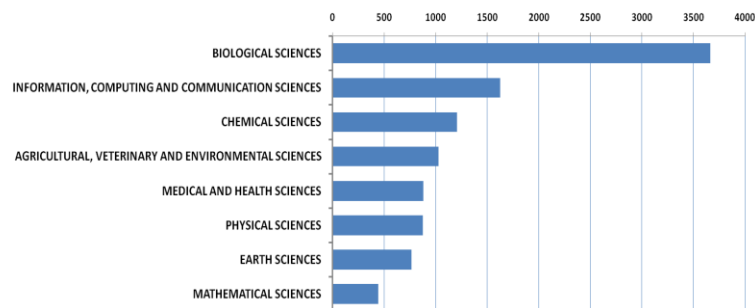
### Proportion of Female Applicants, Chemistry



Data for Year 2010 does not include LP11 Round 2.  
Each chemist is counted once per year.

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

### Funding instances for female scientists by 2-digit discipline (2001-09)



Note - Data is the total instances of funding for female scientists.

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Australia's Female Chemists

**Doreen Clark AM**  
**President of RACI**  
**1994**

**Dr Jean Youatt**  
**Monash**

**Joy Bear AM**  
**Leighton Medal 1998**

*"I did twice go and see professors about promotion, but I got no encouragement at all and I didn't know then what to do. To this day I don't know what the process is. I didn't know you could go ahead and apply anyway, so I just gave up. But that was part of my upbringing too: I had the reverse of assertiveness training."*

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Re-enforcing Leadership

### ARC Federation and Laureate Fellows

2008

Bernadette  
McSherry

Cheryl  
Praeger

2009

Frances Baum

Tanya Monro

Michelle  
Simmons

2010

Lesley Head

Jennifer  
Martin

2011

Hilary  
Charlesworth

Margaret Jolly

Hanna Kokko

Lorraine  
Mazerolle

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Encouraging Opportunity

- Women have the ability to succeed in science & engineering
- Women lost out at every career transition
- Problem is not simply the pipeline
- Women are likely to face discrimination in all fields
- Evidence that most people have implicit biases
- Measures of success in performance-evaluation systems are often arbitrary and frequently place disadvantage women. "Assertiveness," for example, may be viewed as a socially unacceptable trait for women but suitable for men

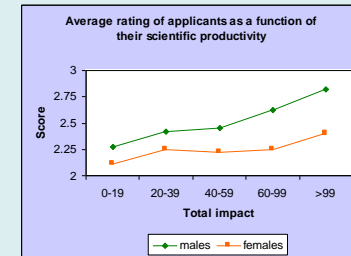
### BEYOND BIAS AND BARRIERS:

*Fulfilling the Potential of Women in Academic Science and Engineering*

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## Evaluation of Fellowship Applications: Gender

“...the success rate of female scientists applying for postdoctoral fellowships at the [Swedish Medical Research Council] during the 1990s has been less than half that of male applicants.”



Women applying for a post-doctoral fellowship had to be 2.5 times more productive to receive the same reviewer rating as the average male applicant.

Similar findings:

- USA/GAO report on *Peer Review in Federal Agency Grant Selection* (1994)
- *European Molecular Biology Organization Reports* (2001)
- NIH Pioneer Awards: *Journal of Women's Health* (2005) & *Nature* (August 2006)

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



## Encouraging Opportunity

### What is the ARC doing?

- More women (re workload) and “well trained” men on committees
- Ease restrictions on fellowships (PT, longer entry periods)
- Track record replaced with ROPE

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



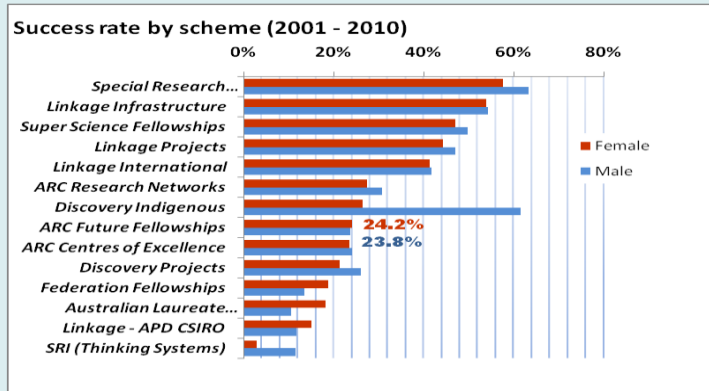
## Changing Language

### Research Opportunity and Performance Evidence (ROPE)

- Changing how we measure excellence  
Track record v. Performance evidence
- Assessors take into account any career interruptions, such as:
  - Childbirth
  - Carer’s responsibility
  - Misadventure
  - Debilitating illness

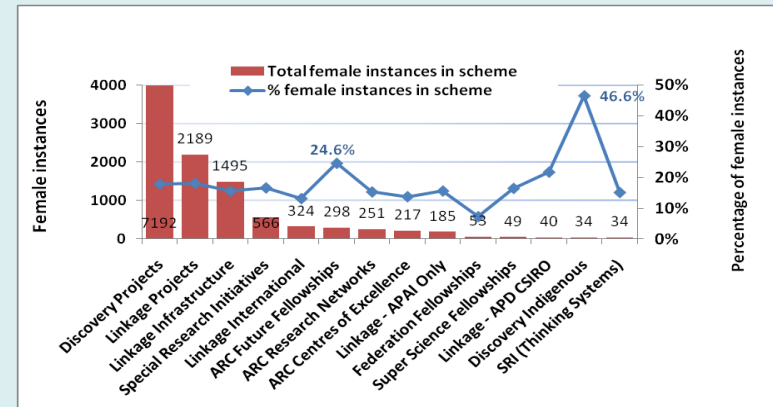
Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

### Success rate of female scientists by funding scheme (2001-10)



Web: arc.gov.au | Email: info@arc.gov.au

### Participation of female scientists by funding scheme (2001-10)



Web: arc.gov.au | Email: info@arc.gov.au

## Australian Laureate Fellowships

### FOCUS

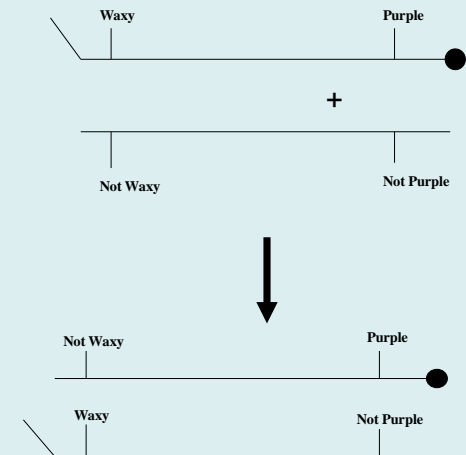
- International repute
- Sustained leadership & mentoring

### OBJECTIVES

- Attract and retain outstanding research leaders
- Build and strengthen world-class research capability
- Provide excellent research –training environment
- Expand knowledge base
- Forge strong links
- Support research

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

McClintock  
Cornell ~ 1931



Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

Barbara McClintock  
Nobel Prize  
Physiology and Medicine 1983

- >30 years after initial research on controlling elements of genes
- Work done in plants (not animals or humans)
- Woman without tenure
- #7 in sciences
- Science took a long time to catch up (communication?)
- Sole winner
- Published relatively few papers

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

- *“The Dept of Botany does not wish to reappoint her, chiefly because they realise her interest is entirely in research .....; partly as she was not entirely successful as a teacher of undergraduate work. The Dept. Obviously prefers a less gifted person who will accept a large amount of routine duty.”*
- **Weaver on McClintock 1933**

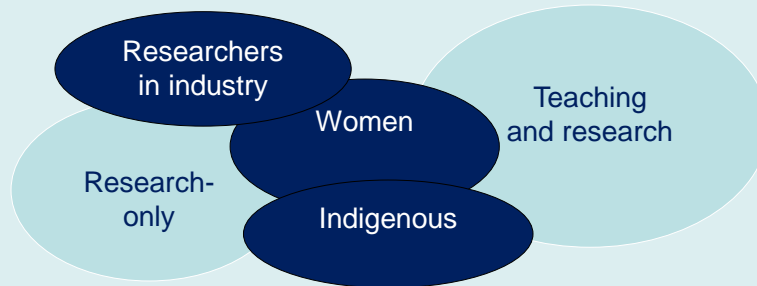
Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



## Strategic Objectives

### The ARC aims to:

- Provide opportunities for researchers at every career stage
- Foster a range of different cohorts



Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



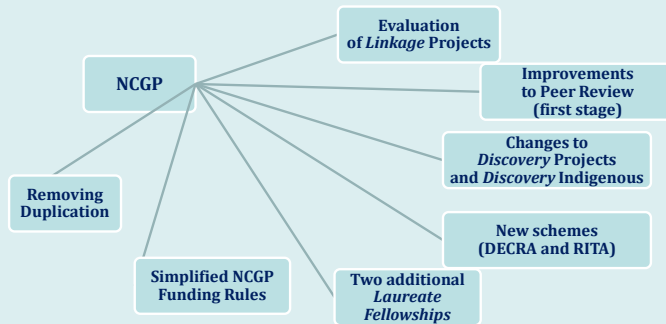
## Strategic Objectives

### The ARC does not:

- Employ researchers directly
- Aim to provide a complete externally funded career structure
- Funds all the excellent research proposals it receives

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

## ARC – the latest developments

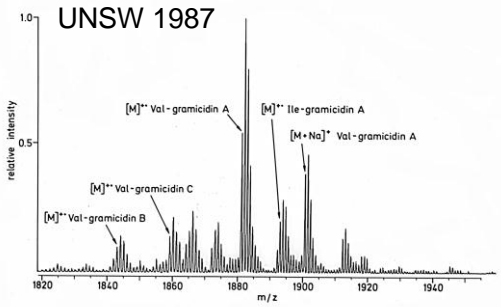


Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)

*I have frequently been questioned, especially by women, of how I could reconcile family life with a scientific career. Well, it has not been easy.*

**Marie Curie**

Web: [arc.gov.au](http://arc.gov.au) | Email: [info@arc.gov.au](mailto:info@arc.gov.au)



**UNSW 1987**

relative intensity

m/z

[M]<sup>+</sup> Val-gramicidin A

[M]<sup>+</sup> Ile-gramicidin A

[M+Na]<sup>+</sup> Val-gramicidin A

[M]<sup>+</sup> Val-gramicidin C

[M]<sup>+</sup> Val-gramicidin B

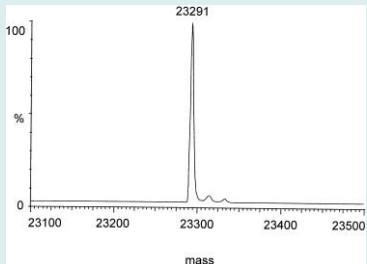
Utah 1988-9  
ANU 1990  
3-5,000 Da

Ala.Lys.Pro.Thr.Tyr.Phe.Phe.Gly  
Arg  
Glu  
NH<sub>2</sub>NH<sub>2</sub>  
Phe.Val.Asp.Glu.His.Leu.Cys.Gly.Ser.His.Leu.Val.Glu.Ala.Leu.Tyr.Leu.Val.Cys.Gly  
S  
S  
NH<sub>2</sub> NH<sub>2</sub> NH<sub>2</sub> NH<sub>2</sub>  
Gly.Ile.Val.Glu.Gln.Cys.Cys.Ala.Ser.Val.Cys.Ser.Leu.Tyr.Glu.Leu.Glu.Asp.Tyr.Cys.Asp  
S S

Web: arc.gov.au | Email: info@arc.gov.au

**Great Advice**

*"Its ridiculous to suggest this technique will have any value in understanding the changes in proteins due to cataract ..... HE demonstrates a fundamental lack of understanding or experience protein chemistry and would have to rely on the postdoc to do the experiments"*



UoW1992-9  
20-150,000 Da

mass

Web: arc.gov.au | Email: info@arc.gov.au

