

‘What’s a Nice Girl like you Doing with a Nobel Prize?’ Elizabeth Blackburn, ‘Australia’s’ First Woman Nobel Laureate and Women’s Scientific Leadership

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Abstract: In 2009 Elizabeth Blackburn (along with two of her American colleagues) won the Nobel Prize for Physiology or Medicine, confirming her position as a global scientific leader. She was immediately celebrated as Australia’s first woman Nobel laureate. However, although 2009 was a ‘bumper’ year for women Nobel laureates, with five winners in total, the media coverage soon became highly negative and discouraging. Much discussion focused not on Blackburn’s scientific work but on her gender – the difficulties it was assumed she must have faced individually as a woman scientist, and her wider leadership role in encouraging and supporting other women to overcome these obstacles. In this chapter I suggest the continuing highly negative ways the possibilities for women’s participation and leadership in science are discussed are counterproductive. Journalistic, policy and scholarly discussions of the ‘problem’ of women in science misconstrue the extent of women’s participation in the field and the nature of their experiences. In all these spheres, science continues to be understood and represented as an unhappy place for women to be. This misrepresentation, I argue, undercuts the leadership roles women scientists are seeking.

Keywords: Elizabeth Blackburn, women scientists, Australian science, gender and science, Nobel Prize

On 5 October 2009 molecular biologist Elizabeth Blackburn received a phone call from Geneva with the news that she, along with her American colleagues Carol Greider and Jack W. Szostak, had been awarded the Nobel Prize for Physiology or Medicine.¹ As the news became official, the Australian media swiftly celebrated the Tasmanian-born scientist as the nation’s eleventh Nobel laureate. Of particular interest was that Blackburn was the first Australian woman to win a Nobel Prize, the highest scientific accolade in her field.²

Blackburn’s success confirmed her position as a global scientific leader. It recognised the groundbreaking research she has conducted in the United States since the late 1970s, which led to, as the Nobel citation described it, ‘the discovery of how chromosomes are protected by telomeres and the enzyme telomerase’.³ This muted description does little justice to the significance of these discoveries. The telomere is a cap-like structure at the

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end of chromosomes that stops them from disintegrating during cell division. Telomerase is the enzyme that builds them. We literally could not live without them. Blackburn's research uncovered a fundamental biological process and she founded an entirely new scientific field.

Her Nobel Prize followed on from a string of other prestigious scientific awards. But before 2009 she was best known for her controversial appointment to and then dismissal from President George W. Bush's high profile Bioethics Council. She became something of *cause celebre* when she was dismissed from the council in 2004 for her outspoken support for embryonic stem cell research, her criticism of the council's reports as scientifically inaccurate, and her defence of scientific freedom from political influence.⁴ Indeed, in 2007 Blackburn was included in *Time Magazine's* annual list of the one hundred most influential people in the world.⁵

There was significant media fanfare around Blackburn's exceptional achievement in winning the Nobel Prize. Unsurprisingly, perhaps, much of this attention focused not on her scientific work but on her gender – the difficulties it was assumed she must have faced individually as a woman scientist, and her wider leadership role in encouraging and supporting other women to overcome these obstacles. The coverage very much represented Blackburn as a 'crusader for women in science', as Melbourne's *Age* put it, claiming 'she pushed the cause of women in science as strongly as she did her own endeavours'. At the time of her award, Blackburn certainly expressed the hope that her success would send 'a signal that says women can participate [in science] as much as men'.⁶ And she used the media attention she received as a platform to raise issues of gender equity. But contrary to Blackburn's hope that her success would send a positive message, and be seen as proof that women could not only do science but also achieve success in the field, the media message was highly negative and discouraging.

The year 2009 was a 'bumper' one for women Nobel laureates. There were five winners in total, the first time more than two women had been chosen in a single year and the first time more than one woman scientist had been honoured. Along with Blackburn and Greider, Romanian-born German writer Herta Mueller won the Literature Prize, Israel's Ada Yonath shared the Chemistry Prize, and, in a major breakthrough, Elinor Ostrom of the United States shared the Economics Prize – the first time a woman had won in that field.⁷

Nevertheless, the exceedingly small total number of women Nobel Prize winners was invariably cited as evidence of the great obstacles women still faced.⁸ And the journalistic assumption was that Blackburn must have faced extreme barriers to her scientific interests. As the *Sydney Morning Herald* erroneously reported, 'Dr Blackburn's career path wasn't easy. Early in her tertiary education, she returned to her birthplace, Hobart, where according to

her biography a family friend said: “What’s a nice girl like you doing studying science?”⁹ Indeed, even in a year when three women scientists had won Nobel Prizes, this seemed to be the only prism through which women’s participation in science could be discussed. As I will outline further below, to a large extent the same assumptions have predominated in policy discussions and in scholarly studies of women in science. In all these spheres, science continues to be understood and represented as an unhappy place for women to be.

In this chapter I suggest that the continuing highly negative ways in which the possibilities for women’s participation and leadership in science are discussed are counterproductive. I explore this firstly through an examination of Blackburn’s scientific career and how this has been (mis)represented in the media. Secondly, I consider her leadership styles both in the laboratory and in wider public debates. Finally I look more broadly at journalistic, policy and scholarly discussions of the ‘problem’ of women in science, and how these misconstrue the extent of women’s participation and the nature of their experiences. These misconstructions, I argue, undercut the leadership which women scientists are seeking to take in this area.

A brilliant career

Contrary to most media portrayals, on paper Elizabeth Blackburn has had a dream scientific career – working in a succession of highly prestigious institutions firstly in the United Kingdom and then in the United States.¹⁰ Her family background provided strong foundations for her future work. Blackburn was born in Hobart in 1948, the second of seven children. Both her parents were medical doctors who in turn came from families with strong scientific inclinations. Her maternal grandfather and great-grandfather were both geologists, and her paternal great-grandfather had been a keen insect collector in Hawaii and Tasmania. Her American colleagues viewed her ‘exotic’ Tasmania birthplace with some incredulity. ‘Certainly half way around the globe, if not at the end of the earth,’ as one put it.¹¹ She received a solid education at Broadland House Church of England Girls’ Grammar School in Launceston. When the school built new laboratories she had access to excellent facilities and the encouragement of a young and enthusiastic chemistry teacher Nancy Hughes.¹² Her mother instilled all of her children with a strong sense of their intellectual potential and expected them all to pursue a profession. As Blackburn recalled in an interview in 2005, ‘books and science and ... some sort of love of knowledge’ were always a part of her family and her growing up.¹³ She particularly remembered reading a biography of Marie Curie written by Curie’s daughter Eve, who was also a Nobel Prize winner.

When Blackburn was sixteen her parents separated and her mother moved the family to Melbourne. She completed her final school year at the coeducational University High School, one of the top academic schools in the city, which had an excellent science curriculum. She topped the state in three subjects in her final examinations. The following year she enrolled in a science degree at the University of Melbourne, having already decided to major in biochemistry. As Melbourne's *Age* later reported 'it didn't strike her as unusual to be a woman doing science. "I was in an undergraduate department, biochemistry, where there were a number of very distinguished women professors."'14

Throughout her school and university studies, and well into her working life, Blackburn rarely if ever thought about whether science was an unusual pursuit for a woman.¹⁵ As she later reflected, 'For many years I just blundered ahead as though I was sort of gender free.'¹⁶ She did recall a sense of 'hostility ... in Australia as a woman who was intelligent and accomplished'.¹⁷ But when pushed Blackburn could only recall one explicit instance of discouragement in this period – from a male school teacher she met briefly while visiting Hobart during her undergraduate degree who apparently commented, 'What's a nice girl like you doing in science?'¹⁸ It was this one isolated incident, incorrectly attributed by journalists to a family friend, that was later widely reported as evidence of the great barriers Blackburn had overcome to pursue her scientific career.

Her first scientific paper emerged from the research she conducted in her honours year, precocious by any standards.¹⁹ Blackburn was by this stage already set on pursuing postgraduate studies overseas, a common progression for Australian science graduates with academic ambitions in this period. In 1971 she continued on to a masters degree at Melbourne in order to qualify for entry into Cambridge. During this year her supervisor, Frank Hird, introduced Blackburn to the British biochemist and Nobel laureate Fred Sanger, who was visiting Australia at the time. It was arranged that Blackburn would do her PhD with Sanger at the Laboratory of Molecular Biology in Cambridge. This laboratory was an internationally renowned epicenter for research: it was closely associated with the discovery of the structure of DNA. Blackburn later described this as her 'biggest break ... Having a mentor at Melbourne University who said "you must go to Cambridge and work with Fred". That set in train a whole set of things.'²⁰

Blackburn was in fact the second woman to go on from the University of Melbourne to work in this highly prestigious laboratory. She followed in the footsteps of Suzanne Cory who had commenced her PhD there in 1966, the start of her own stellar career.²¹ Blackburn's PhD project involved sequencing parts of the genome of a small bacteriophage – meaning she was among the first handful of scientists in the world to sequence DNA.²²

Blackburn found the Laboratory of Molecular Biology (LMB) to be remarkably egalitarian and collaborative, but she had a broader sense that the United Kingdom was less congenial for women scientists than the United States.²³ So she decided she would pursue her postdoctoral studies in the US, and applied for a position at the University of California.²⁴ These plans changed after she became engaged to John Sedat, a postdoctoral fellow in the LMB, during the final year of her PhD. Sedat was returning to the United States, but to a position at Yale. So Blackburn transferred her postdoctoral fellowship to Yale. Although in some ways she was following her husband's career, Yale was obviously a prestigious institution which offered her many excellent opportunities. She worked in the laboratory of Joseph Gall, who became another strong mentor. There were also many other women in his laboratory. It was here that she first identified the sequence of *Tetrahymena* telomeres, although it was not until the early 1990s that the full significance of this work would be recognised. At the time her findings were viewed as limited to this obscure species of 'pond scum'.

On finishing their fellowships at Yale in 1977, both Blackburn and her husband needed to find academic positions. Sedat was first to gain a tenure-track post, at the University of California at San Francisco (UCSF). So Blackburn again followed her husband, hoping that she would soon find a position nearby. Early the following year she was offered a job at Berkeley, another prestigious appointment. She was now a fully-fledged scientist at the head of her own laboratory, and directing the work of a growing team of graduate students and postdoctoral researchers.²⁵ Among them was Carol Greider. Over the course of the 1980s she consolidated her initial work on the structure and function of telomeres, and also, with Greider, the discovery of telomerase.

In 1990, taking advantage of her growing prominence, she negotiated a position more conducive to her research and moved from Berkeley to the Department of Microbiology and Immunology in the medical school at UCSF. Her scientific influence was further confirmed by her election as a fellow of the Royal Society of London in 1992, and the American National Academy of Sciences in 1993. In 1993 she became head of her department. Finding that she did not enjoy the institutional politics this position entailed, in 1998 she negotiated to step down so she could concentrate fully on her research.

Leadership

In assessing Blackburn's leadership styles it is necessary to consider different areas of her work, and different periods of her career, separately. Exercising 'leadership' in science is based firstly on gaining a position as the head of your own laboratory and funding for your research. It also consists in gaining

recognition for your work from colleagues, to the extent that you will be able to steer the broader research directions being taken in your field. Finally it entails institutional and political influence to ensure support for your research area.

It is clear that Blackburn has always demonstrated fierce independence in her research, following her own instincts and curiosity, and having a strong confidence in the strength and significance of her findings when she felt this was warranted by the evidence. As she outlined in her Nobel Prize acceptance speech, she doggedly pursued what many would have seen as an ‘arcane and bizarre’ field, and worked with an obscure ‘oddball’ organism (pond scum).²⁶ At the same time, the words ‘collaborative’ and ‘collegial’ come up again and again in descriptions of Blackburn’s research leadership. Indeed, Blackburn has frequently stated that ‘All science happens through collaboration’²⁷ and ‘I’ve always told people in my lab they would get much further ahead by cooperating and collaborating than by competing.’ Her biographer, Carol Brady, insists that Blackburn has always eschewed the ‘alpha male’ leadership style.²⁸

While this approach has certainly served her well in achieving excellence in research and recognition in her field, as Brady outlines, it has not always translated into power or authority within her institutional setting. This became evident during her tenure as Head of Department. For much of her career Blackburn avoided entering into the power politics which characterise universities, as departments vie with each other for funding, space and resources. She focused on her research. As Blackburn put it, ‘My empire-building genes are not very good.’²⁹ She thus had difficulty navigating institutional politics. She had trouble seeing herself as institutionally powerful even by the late 1990s when she was already being discussed as a potential Nobel Prize winner.

In the early 2000s, however, she rose to international prominence as an advocate for scientific freedom. As noted above, prior to her Nobel Prize, Blackburn was best known for her controversial membership of the President’s Council on Bioethics. The council was established in 2001 with Leon Kass as chairman. Human cloning and stem cell research were understood to be key issues prompting its formation.³⁰ Kass was known for his opposition to these areas of research.³¹ Blackburn’s appointment to the council was thus surprising. She has described on several occasions that her initial instinct was to refuse the appointment as she was already frantically busy. However, in the wake of the events of 11 September 2001, Blackburn ‘felt that I wanted to contribute something.’ She also received personal assurances from the President and from Kass that ‘the wisdom of a full range of experts was needed. I believed that, especially at this juncture in history, it was important to serve in this potentially critical way.’³²

Along with some of her fellow council members, she raised concerns from very early in her tenure. In September 2002, soon after a four-year ban on embryonic stem cell research was announced, she, along with Janet Rowley, Michael Cazzaniga and Daniel Foster, wrote a short editorial for *Science* entitled 'Harmful Moratorium on Stem Cell Research'. They argued that 'The need to fund research on the actual potential of human embryonic stem cells to treat human disease is urgent' and urged Congress to lift the ban immediately.³³ Blackburn was very much identified as the leading figure among these dissenting voices. The council issued its major report on 'Monitoring Stem Cell Research' on 15 January 2004.³⁴ Blackburn was even more vocal in her opposition to the recommendations in this report, and the way it (mis)represented existing scientific research, both internally within the council and then publicly after the report was released. In September 2004 she was informed that her position on the council would not be renewed. It was generally believed that she had been fired as a result of her opposition. As she wrote soon afterward in the *New England Journal of Medicine*, 'There is a growing sense that scientific research ... is being manipulated for political ends.'³⁵ Blackburn and Janet Rowley, a continuing member of the council, also published their concerns about political manipulation, and the need for scientific freedom, in the journal *PLoS Biology*, in an essay titled 'Reason as our Guide'.³⁶

As the *USA Today* put it, at this time Blackburn became 'a cause celebre for many researchers who complain that the White House's science policy is distorted by politics'.³⁷ One hundred and seventy scientists signed an open letter to President Bush protesting Blackburn's treatment.³⁸ The American Society for Cell Biology, representing eleven thousand scientists worldwide, also protested, as did the Union of Concerned Scientists. They argued that the White House was distorting scientific facts to support its policies in numerous areas. The extent of feeling was such that it prompted journalist Chris Mooney to publish a book titled *The Republican War on Science*, which became a *New York Times* bestseller in 2005. This somewhat clunky and polemic work, devoted considerable attention to what he termed 'the Blackburn affair'.³⁹

In this episode, Blackburn undoubtedly exercised a form of global scientific leadership, and was widely praised for her courageous stance on stem cell research in particular and scientific independence in general. As she saw it, 'Scientists need to function in the larger world. We had to speak up for scientific research if we wanted continued support for it.'⁴⁰ It wasn't just funding that was at stake here, but the independence to pursue pure research without political interference, or being tied to commercial objectives. Blackburn's gender, however, was never raised in this extensive controversy.

By contrast, the Nobel Prize provoked widespread commentary on Blackburn's experience and the broader status of women in science.

The Nobel Prize and 'crusading' for women in science

The initial coverage in the local press focused very much on Blackburn's (debatable) Australianness. The *Australian*, for example, under the headline 'Our World-beater', reported that 'Elizabeth Blackburn is an outstanding advocate for a profession at which Australians excel'. This article did go on to situate Blackburn's success within a tradition of 'outstanding Australian scientists' who have pursued careers overseas.⁴¹ The US coverage of Blackburn's success only rarely mentioned her Australian origins.⁴² Most reports, including ABC radio's first report, also emphasised that she was 'the first Australian woman to win a Nobel Prize'.⁴³ Unsurprisingly, Tasmanian newspapers were among the most eager to claim Blackburn. The *Hobart Mercury* ran with headline 'Nobel coup for Tassie Researcher', and opened with the claim that 'Tasmanian scientist Elizabeth Blackburn has become Australia's first female Nobel laureate'.⁴⁴

Australian media coverage, after the initial outburst, grudgingly acknowledged that Blackburn had been living and working in the United States for over thirty years. One indeed made the 'brain drain' of which she was clearly a part a focus for an article. More common were cricket metaphors – since Blackburn was the eleventh Australian Nobel laureate, some commentators reflected on our 'first XI'.⁴⁵ The *Daily Telegraph's* first report, under the headline, 'Aussie wins Nobel', opened with the observation that 'Australia's first female Nobel laureate knew she was on to something big when her research team discovered an enzyme – and with it hope for future cancer treatments.' This article also exemplified the media tendency to wildly exaggerate the existing results of Blackburn's research. As the report continued: 'telomerase ... assists chromosomes in cells to stay eternally young'.⁴⁶ Over-enthusiastic journalists saw both a fountain of youth and a cure for cancer emerging from Blackburn's work.

This parochial, celebratory pride also quickly turned to highlighting the difficulties Blackburn, and all women, faced in entering into science. The first report in Melbourne's *Age* carried the headline 'What's a nice girl like you doing with a Nobel prize?', and opened with the largely inaccurate representation of the early discouragement Blackburn had supposedly endured that I discussed above.⁴⁷

The issue of women in science was brought up in her very first interview after the prize announcement, given for the Nobel foundation website. The interviewer observed that there were large numbers of women in Blackburn's field, which was unusual. While Blackburn was careful to stress that she

didn't favour women over men in her own laboratory, and that 'there's nothing particularly about the science [of telomeres] per se which has any, sort of gender-like quality to it', she did state 'you want women to have access to science because it's such a wonderful thing to do. Anything that makes it more feasible for women to be in science and do the science they like, that's good.'⁴⁸

As I have already noted, the media also insisted on portraying Blackburn as a fierce 'crusader' for women in science, in ways that distorted both the realities of women's strong presence in many areas of science, and the extent and nature of Blackburn's activism on this issue. Many journalists emphasised the continuing obstacles women faced and Blackburn's views on this issue. The *Australian*, for example, noted that Blackburn was 'concerned about the rate at which women are leaving the profession at relatively senior levels, even after completing doctorates, graduate training and postdoctoral research'. This report also noted that she was 'married with an adult son' and thus understood 'the challenges'. It summarised Blackburn's views thus: 'While academia and research can be flexible, the hours are long. Improving conditions, including childcare to accommodate parents working outside standard business hours, must remain a priority.'⁴⁹ She identified childcare, not science, as the major problem.

Throughout the extensive media attention she received in the wake of her Nobel Prize success, she was quite specific about where the problems remained, affirming that she wanted 'a better deal for women scientists who also choose motherhood'.⁵⁰ In another interview she spelled out her view of the situation in more detail:

the life sciences were much improved since her time – 'but only up until the end of the ... postdoctoral research period. Then the number of women in science careers drops off, indicating that the career options for women are not as well matched for women as they are for men.' She said one practical remedy would be to provide 'childcare and part-time career options for those years in which a woman's family involvements are particularly demanding, so women did not have to feel that the choice is between having a career in science, or a family'.

The article went on: Blackburn's 'lab at UCSF is seen as female-friendly, partly because of her role as a mentor but also because of its inter-disciplinary approach, which embraces fields well beyond basic biology'.⁵¹ Precisely why interdisciplinarity is 'female-friendly' was not explained. But despite Blackburn's attempts to narrow the focus to specific issues, media coverage continued to present a highly negative view of women's participation in science as a whole.

A few days after Blackburn's Nobel win was announced, undoubtedly by design, a lengthy report into the status of women in Australian science was released. Produced by Federation of Australian Scientific and Technical

Societies, and written by Professor Sharon Bell, it opened with the observation that:

It is timely that as this report goes to press, molecular biologist Professor Elizabeth Blackburn has been confirmed as the first Australian woman Nobel laureate ... That such individual achievement is possible when the progress of the majority of Australian women hoping to make careers in science, engineering or technology related fields has stalled is cause for cautious optimism. This report, looking at the place and progress of women in science in Australia, presents a sobering account.⁵²

The report concluded that there had been little change in women's status since the last major report on this issue published in 1995. It particularly pointed to the 'persistent horizontal and vertical segregation of women academics and researchers'.⁵³ Women remained clustered in the lower levels and in particular fields.

The deliberate timing of the release of this report produced the desired results. It attracted considerable media reporting, far more than would normally have been the case. It also reinforced the already dominant negativity of this coverage. As the *Australian* reported, under the discouraging headline 'Despite Nobel win, women face battles':

Australia's Nobel prize-winning molecular biologist Elizabeth Blackburn lamented recently the professional difficulties facing female scientists – and a new study proves her right ... Women still cluster at the bottom of the scientific heap, even in fields such as biology where they are well represented ... Professor Bell concludes that not only do women scientists get fewer senior jobs than men, they also earn less ... [and] receive less recognition ... Despite the impressive improvement in the participation of women in science at undergraduate and postgraduate levels ... 'Sadly, we haven't come very far at all.'

They highlighted the situation at the CSIRO in particular:

While Australia's premier research body ... is now led by Megan Clark, only 21 per cent of the organisation's 1727 research scientists are women, just 10 per cent of top salary earners are women, 8 per cent of 194 research managers are women and only three of the 12 members of the executive team are women.⁵⁴

Other reports confirmed this negative view. The *Daily Telegraph* observed 'Women have failed to make headway in the male-dominated field of science during the past 15 years, a report reveals.'⁵⁵ Similarly the *Geelong Advertiser*, under the headline 'Glass Ceiling remains in lab', concluded that the report 'raised questions about how women viewed themselves and their own innate abilities'.⁵⁶

What was perhaps most disconcerting about these gloomy portraits is the way they totally obliterated the extraordinary increases in women's presence in science since the 1970s. In Australia in 2009 women in fact comprised the majority of university science graduates, in the 'pure' (natural and physical)

sciences. It is only in physics and mathematics that they remain somewhat underrepresented, and these are the smallest areas in terms of total undergraduate science enrolments. In the biological sciences, the largest enrolment area, women are in the substantial majority, and have been for some time.⁵⁷ The major gender disparities in university studies are in engineering and IT. And it is only by grouping science and engineering together that reports can continue to talk of a broad 'problem' in terms of women's participation in science education.

Contrary to Blackburn's hope that her success would be seen as proof that women could not only do science, but also achieve success in the field, these discussions were highly discouraging. All emphasised the bad news and almost totally elided the good. The good news is of course the extraordinary turn around in women's participation in science since the 1970s. This has far exceeded expectations, and it seems that it has been difficult for dominant academic feminist and policy frameworks to come to terms with this dramatic change.

The *Adelaide Advertiser* was one of the few to report more optimistically that although it was still 'lonely at the top' for female scientists, this 'was not for long ... Women are 50/50 in the sciences, and it is just a matter of waiting for them to progress up the ladder.' Moreover, it cited Professor Chilla Bulbeck's observation that 'in Adelaide Uni in particular they have pro rata more female professors in the sciences than in the humanities and social sciences'.⁵⁸ This was probably an overly optimistic account. In 2008, while women comprised the majority of academic staff employed at tutor level or below in the natural and physical sciences in Australian universities, they represented less than 10 per cent of staff above senior lecturer (that is, associate professors, professors and senior administrators). In 2009, women made up only 9 per cent of fellows of the Australian Academy of Science.⁵⁹ Moreover, US and European research strongly suggests women's representation at the higher levels will not just naturally or automatically increase to a level commensurate with their presence as university students. The rate at which women are leaving academic science is simply too high for this to occur.⁶⁰

As I have argued elsewhere, focusing on women's absence from prestigious awards such as the Nobel Prize is not the best barometer of women's engagement with science, or their professional presence within the field.⁶¹ This is not to suggest that there are no problems. But the continuing representation of science as hostile to women simply supplies oxygen to ideas that have largely been dispelled among the younger generations of women today, and distracts attention from the structural issues that are now clearly the core problem. And science is by no means the only profession where this is the case.

Epilogue

In June 2012 Blackburn returned to Australia for an extended visit, which included a 'Hooked on Science' national tour – a series of talks aimed at encouraging young people into science.⁶² The tour was sponsored by the governments of New South Wales, Queensland, Australian Capital Territory, Victoria and Tasmania, and the Australian National University, the University of Tasmania and Atlantic Philanthropies.⁶³ As the *Australian* reported on one of her lectures in Sydney, Blackburn was enthusiastically received. It described her tour as 'part of a charm offensive underway in Australia to overcome the lack of interest in science among school children'.⁶⁴

While Blackburn's tour was not gender specific, the issue of women in science naturally arose in a variety of ways during her visit. For example, she launched the Parliamentary Friends of Women in Science, Maths and Engineering.⁶⁵ At one talk to primary and secondary school students at the University of Tasmania, according to the University's publicity department, she put up a picture of her son, Ben, and described him as 'her greatest achievement'.⁶⁶ Similarly, the University of Queensland's publicity around her lecture for high school students given at the Institute for Molecular Bioscience described Blackburn as a 'Nobel-winning mother'.⁶⁷ While one of Blackburn's aims in her talks was certainly to present a positive picture of the possibilities for combining a science career with having children, even for a Nobel Prize-winning scientist, the headline choices here were somewhat disturbing.

In one interview, the interviewer, noting the 'countless' campaigns that had already taken place in this area, asked 'Are sexy campaigns enough?' Blackburn discussed the specific example of a physics department that always advertised its jobs as being either full time or part time, and as a result received large numbers of applications from women. Rather than expounding 'doom and gloom' on the possibilities for women in science, Blackburn pointed to this practice as 'a very simple step', and one of a number of 'very good solutions to that' which could have an enormous impact. Again using the specific example of an award winning US cancer geneticist, who did her best work while working part time, she stated that 'doing world-class research is not incompatible with part-timeness when things are set up right'. Women working part time could also 'job share' heading a laboratory, particularly since 'people don't work as solo scientists anymore.' It wasn't insurmountable; rather there was just a need for institutional 'leadership at the top' and the introduction of 'very simple things'.⁶⁸

That same month the European Union launched a major new campaign to encourage 'girls' to take up scientific studies. The largely web-based campaign carried the slogan 'Science: It's a Girl Thing'.⁶⁹ The 'trailer' produced for the campaign went 'viral' on the internet, as it was designed to

do, but not for reasons the EU administrators had hoped for. This short video depicted a group of teenage girls dressed in miniskirts and high heels invading a science lab to the beat of dance music, while a young male scientist looks on in stunned silence. Lipsticks are transformed into test tubes, the laboratory turns pink, the girls laugh and throw chemicals around. As the *Wall Street Journal's* blog reported, 'It seems like the beginning of a porn movie.'⁷⁰ *Time's* website described it as 'Breathtakingly Sexist'.⁷¹ While the *SciencePunk* blog by Frank Swain ran its commentary under the heading 'Science: It's a girl thing. Excuse me while I die inside.'⁷² Indeed, the negative response was so swift and widespread that the EU removed the video from the website just thirty hours after the campaign was launched. It had, however, already been uploaded to YouTube, where it received nearly one million views over the next six weeks.

The reaction to the trailer from young women (and some men) was overwhelmingly one of ridicule. Among the most popular of the some two thousand five hundred comments posted on video on the YouTube site described its contents astutely: 'So let me get this straight. The male scientist is doing some testing in his laboratory, when a group of female models barge in and start messing around with all of his scientific equipment in a stereotypical and cliché fashion.' Another observed 'Wheee.. *giggle* I love science! *giggle* I can use science to make lipstick and eyeshadow *hehe*_ Oh, my goodness, look at me! I'm a super model science VIXEN! /strikes a sexy science pose.' One commentator wondered 'what demographic created this video? Somehow I highly doubt it was women in science...' Another asked, 'I'm a girl ... and I want to be a scientist ... so does this mean I have to plaster my face with make up, buy high heels and lose 10 kg?' Others simply expressed total disbelief: 'What. The. F@#k', and 'Humans as a race went to the moon, and now this... I'm so sad.'⁷³ Comments on the campaign's Facebook page described it as 'sexist and demeaning', 'Sexist and degrading', and 'The 53 seconds of your video were the 53 most patronising seconds of our lives.' One woman scientist wrote: 'If this is the level of insight among the people trying to promote women in science at EU level I am almost ready to quit.'⁷⁴

¹ 'The 2009 Nobel Prize in Physiology or Medicine – Prize Announcement', http://www.nobelprize.org/nobel_prizes/medicine/laureates/2009/announcement.html (accessed 15 August 2012); 'Elizabeth H. Blackburn – Interview', http://www.nobelprize.org/nobel_prizes/medicine/laureates/2009/blackburn-interview.html (accessed 15 August 2012).

² Established in 1901, Nobel Prizes are awarded annually in the scientific fields of Physiology or Medicine, Physics and Chemistry. Many other scientific fields have

established awards which are regarded as equivalent to a Nobel Prize. The other three Nobel Prizes are awarded for Peace, Literature and (since 1968) Economics.

³ 'The Nobel Prize in Physiology or Medicine', http://www.nobelprize.org/nobel_prizes/medicine/laureates/2009 (accessed 15 August 2012). Although this was a joint award, Blackburn was the leading figure, as she was closely involved in both of these discoveries. Blackburn collaborated with Stoszak in experiments which confirmed the structure of telomeres, and Greider was Blackburn's PhD student when they discovered telomerase. For some of the key papers where these discoveries were described see: E.H. Blackburn and J. Gall, 'A Tandemly Repeated Sequence at the Termini of the Extrachromosomal Ribosomal RNA Genes in *Tetrahymena*', *Journal of Molecular Biology* 120, no. 1 (1978): 33–53; J.W. Szostak and E.H. Blackburn, 'Cloning Yeast Telomeres on Linear Plasmid Vectors', *Cell* 29 (1982): 245–55; C.W. Greider and E.H. Blackburn, 'Identification of a Specific Telomere Terminal Transferase Activity in *Tetrahymena* Extracts', *Cell* 43 (1985): 405–13; C.W. Greider and E.H. Blackburn, 'A Telomeric Sequence in the RNA of *Tetrahymena* Telomerase Required for Telomere Repeat Synthesis', *Nature* 337 (1989): 331–7.

⁴ Scott Smallwood, "Bush Drops 2 Supporters of Embryo Research From Bioethics Panel," *Chronicle of Higher Education*, 1 March 2004, <http://chronicle.com/article/Bush-Drops-2-Supporters-of/101713/> (accessed 15 August 2012).

⁵ Alice Park, 'The Time 100: Elizabeth Blackburn', http://www.time.com/time/specials/2007/time100/article/0,28804,1595326_1595329_1616029,00.html (accessed 15 August 2012). They incorrectly gave Blackburn's age as forty-four.

⁶ Andrew Darby, 'Nobel Crusader for Women in Science', *Age*, 7 October 2009, 9. See also Andrew Darby, 'Chance Favoured this Prepared Mind: Our 11th Nobel Winner', *Sydney Morning Herald*, 7 October 2009, <http://www.smh.com.au/national/chance-qlfavoured-this-prepared-mind-our-11th-nobel-winner-20091006-glfr.html> (accessed 15 August 2012).

⁷ By including economics as a scientific discipline, the journal *Science* was thus able to proclaim in a feature article that four women scientists had been honoured in the awards for 2009: '2009 Nobels: Break or Breakthrough for Women', *Science* 326, no. 5953 (2009): 656–68. See also Daniel Cole, 'Obituary: Elinor Ostrom: The First and Only Woman to Win the Nobel Prize for Economics', *Guardian*, 15 June 2012, <http://www.guardian.co.uk/science/2012/jun/13/elinor-ostrom> (accessed 15 August 2012).

⁸ For a full list of women Nobel laureates see 'Nobel Prize Awarded Women', http://www.nobelprize.org/nobel_prizes/lists/women.html (accessed 15 August 2012). As of 2011 the Nobel Prize had been awarded 807 times to men and 44 times to women, making women's representation just 5.2 per cent. Most of these awards (27) have been for peace or literature. Just two of the 105 prizes for physics have gone to women, along with four of the 103 prizes in chemistry and ten of the 102 prizes for physiology or medicine. For a study of the first fourteen women Nobel laureates in science see Sharon Bertsch McGrayne, *Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries* (New York: Carol Publishing Group, 1993).

⁹ Andrew Darby, 'Outspoken Australian Scientist Dropped by Bush Wins Nobel', *Sydney Morning Herald*, 6 October 2009, 1. See also Andrew Darby, 'What's a Nice Girl like you Doing with a Nobel Prize?', *Age*, 6 October 2009, 1.

¹⁰ Unless otherwise noted, biographical details in this section are taken from Carol Brady, *Elizabeth Blackburn and the Story of Telomeres* (Cambridge, Mass: MIT Press, 2007), and *Conversations in Genetics: Talking with Elizabeth Blackburn*, DVD, Interview conducted 9 December 2005 in San Francisco California by Joseph G. Gall, of the Carnegie Institution, Washington, DC (Bethesda: Genetics Society of America, 2005).

¹¹ *Conversations in Genetics*.

¹² In her early high school years, Broadland did not have its own science laboratories, so students attended classes at another girls' schools nearby. By all accounts Blackburn was a model student. But she also used the school's new chemistry lab to make 'touch powder', a mildly explosive substance that she and her friends placed in the path of their unsuspecting headmistress, causing quite a reaction: Brady, 10.

¹³ *Conversations in Genetics*.

¹⁴ Darby, "Nobel Crusader," 9.

¹⁵ Brady, 12–13, 16–17.

¹⁶ *Conversations in Genetics*. This attitude is highlighted in Brady's biography of Blackburn. My wider research on Australian women scientists shows this is a common attitude: Jane Carey, 'Engendering Scientific Pursuits: Australian Women and Science, 1880–1960', *Limina* 7 (2001): 10–25, and 'No Place for a Woman? Class, Modernity and Colonialism in the Gendering of Australian Science, 1885–1940', *Lilith: A Feminist History Journal* 10 (2001): 153–72.

¹⁷ Brady, 27, 32 (quote).

¹⁸ *Ibid.*, 13.

¹⁹ She was second author with her two honours advisers: Barrie Davidson, Elizabeth H. Blackburn and Theo Dopheide, 'Chorismate Mutase-Prephenate Dehydrase from *Escherichia Coli* K-12', *Journal of Biological Chemistry* 247, no. 14 (1972): 4441–6.

²⁰ Lissa Christopher, 'Profile: Elizabeth Blackburn', *Australian*, 24 September 2008, <http://www.smh.com.au/news/business/money/investment/profile-elizabeth-blackburn/2008/09/22/1221935544708.html> (accessed 15 August 2012).

²¹ Unlike Blackburn, Cory returned to Australia. After completing postdoctoral research in Geneva, she took a position at the Walter and Eliza Hall Institute of Medical Research in Melbourne, where she helped introduce gene cloning techniques to Australia. From 1996 to 2009 she was director of WEHI (the first woman to hold this post), and in 2010 became the first woman to be elected president of the Australian Academy of Science.

²² The method Blackburn used was extremely laborious, involving RNA copies, and was superseded by a new method Sanger developed in 1977.

²³ Nevertheless, Blackburn was the only woman in Sanger's lab, and there were only a few other women among the staff and students in the whole institution.

²⁴ *Conversations in Genetics*.

²⁵ Blackburn describes this period before she gained her post at Berkeley as a very difficult one, full of rejection letters from other job applications.

²⁶ 'Elizabeth H. Blackburn – Banquet Speech',

http://www.nobelprize.org/nobel_prizes/medicine/laureates/2009/blackburn-speech_en.html (accessed 15 August 2012).

²⁷ Darby, 'Nobel Crusader', 9. See also Darby, 'Chance Favoured this Prepared Mind'. Blackburn's collaborative approach to research is a major theme throughout Brady's biography.

²⁸ Brady, 40–1; 170.

²⁹ *Ibid.*, 170. Blackburn discusses these difficulties extensively in *Conversations in Genetics*.

³⁰ Ron Southwick, 'President Bush Names Members of New Bioethics Panel', *Chronicle of Higher Education*, 17 January 2002.

³¹ Kass opposed any tendency in science he believed would lead to 'dehumanisation' along the lines of Huxley's *Brave New World*. This was in part informed by his Jewish heritage and opposition to neo-eugenics: Leon R. Kass, 'Foreword', *Beyond Therapy: Biotechnology and the Pursuit of Happiness* (Washington: President's Council on Bioethics, 2003) and *Life, Liberty, and the Defense of Dignity: The Challenge for Bioethics* (San Francisco: Encounter Books, 2002).

³² Elizabeth Blackburn, 'Bioethics and the Political Distortion of Biomedical Science', *New England Journal of Medicine* 350, no. 14 (2004): 1379. Blackburn also discusses her time on the council extensively in *Conversations in Genetics*.

³³ Janet D. Rowley, Elizabeth Blackburn, Michael S. Gazzaniga and Daniel W. Foster, 'Harmful Moratorium on Stem Cell Research', *Science* 297, no. 5589 (2002): 1957. See also Blackburn's more expansive discussion in 'The Thoughts of a Former Council Member', *Perspectives in Biology and Medicine* 48, no. 2 (2005): 172–80. This also discussed the council's 2004 report on 'Reproduction and Responsibility: The Regulation of New Biotechnologies', available at *The President's Council on Bioethics: Reproduction and Responsibility*: table of contents, <http://bioethics.georgetown.edu/pcbe/reports/reproductionandresponsibility/> (accessed 15 August 2012).

³⁴ See the transcript of the council's meeting on this day: 'PCBE: Transcripts (January 15, 2004): Session 1: Stem Cells: Council's Report to the President', <http://bioethics.georgetown.edu/pcbe/transcripts/jan04/session1.html> (accessed 15 August 2012).

³⁵ Blackburn, 'Bioethics and the Political Distortion', 1380. The administration claimed the reason Blackburn was not reappointed was the council's focus was shifting to neurology and behaviour, and thus her expertise was no longer relevant.

³⁶ Rowley and Blackburn felt the potential utility of *adult* stem cells had been vastly overstated to provide support for the idea that *embryonic* stem cell research could be prohibited without necessarily impeding scientific or therapeutic outcomes, Elizabeth Blackburn and Janet Rowley, 'Reason as our Guide', *PLoS Biology* 2, no. 4 (2004): 421.

³⁷ 'Scientists Rally Around Stem Cell Advocate Fired by Bush, *USA Today*, 19 March 2004, http://www.usatoday.com/news/science/2004-03-19-fired-bioethicist_x.htm (accessed 15 August 2012). See also Smallwood.

³⁸ See C. Holden, 'Researchers Blast US Bioethics Panel Shuffle', *Science* 303, no. 5663 (2004): 1447.

³⁹ Chris Mooney, *The Republican War on Science* (New York: Basic Books, 2005), 197–204, 229–40. William May was dismissed from the council at the same time, but Blackburn was more vocal and seen as the key target.

⁴⁰ Brady, 178.

⁴¹ Editorial, 'Our World-beater', *Australian*, 7 October 2009, <http://www.theaustralian.com.au/news/opinion/our-world-beater/story-e6frg71x-1225783528145> (accessed 15 August 2012).

⁴² For example, an article reprinted in the *Canberra Times* from the *San Francisco Chronicle* titled 'Nobel a Men's Club No More', reported that 'Three American scientists, including one from the University of California at San Francisco, have won the Nobel Prize in Medicine'. It went on to note that two of them were women, *Canberra Times*, 9 October 2009, 10.

⁴³ Lexi Metherell, 'Australian Scientist Wins Nobel Prize', *AM Program*, ABC radio, Posted Monday 5 October 2009 9:15pm AEDT, updated Tuesday 6 October 2009 11:05am AEDT, <http://www.abc.net.au/news/2009-10-05/australian-scientist-wins-nobel-prize/1092342>.

⁴⁴ 'Tassie Researcher's Nobel Coup', *Hobart Mercury*, 6 October 2009, 2. Some coverage did question whether Blackburn could really be claimed for Tasmania, observing, 'Some will scoff at Tasmania or even Australia taking pride in Dr Blackburn's award. After all, she has done most of her research in the US and has not lived here since the 1970s.' Editorial, 'Nobel Inspiration', *Hobart Mercury*, 7 October 2009, 20. See also Editorial, 'Our World-beater'.

⁴⁵ Deborah Smith with Andrew Darby, 'A First XI Doing their Country Proud,' *Sydney Morning Herald*, 10 October 2009, 3. See also the virtually identical article Deborah Smith, 'Resting on Our Laureates – NOBELS', *Age*, Insight, 10 October 2009, 7.

⁴⁶ 'Aussie wins Nobel', *Daily Telegraph*, 6 October 2009, 7. Melbourne's *Herald Sun* described Blackburn's research in exactly the same terms: 'Nobel for Aussie Biologist', *Herald Sun*, 6 October 2009, 13.

⁴⁷ Darby, 'What's a Nice Girl Like You?', 1.

⁴⁸ "Elizabeth H. Blackburn – Interview."

⁴⁹ Editorial, 'Our World-beater'.

⁵⁰ Darby, 'Nobel Crusader', 9.

⁵¹ "Nobel First for Aussie Woman," *Australian*, 6 October 2009, 2.

⁵² Sharon Bell, *Women in Science in Australia: Maximising Productivity, Diversity and Innovation*, a Report prepared for the Federation of Australian Scientific and Technical Societies (2009), 8, my emphasis. See also Women in Science, Engineering and Technology Advisory Group, *Women in Science, Engineering and Technology* (Canberra: Commonwealth Office of the Chief Scientist, 1995).

⁵³ Bell, 8.

⁵⁴ Leigh Dayton, 'Despite Nobel Win, Women Face Battles', *Australian*, 20 October 2009, 7. See also AAP, 'No Progress for Women in Science: Report', *Age*, 19 October 2009.

⁵⁵ 'Women on the Outer', *Daily Telegraph*, 20 October 2009, 13.

⁵⁶ 'Glass Ceiling Remains in Lab', *Geelong Advertiser*, 20 October 2009, 13.

⁵⁷ Bell, 88. Table showing university enrolments for 2001–2007.

⁵⁸ 'Our Nobel Women', *Adelaide Advertiser*, 7 October 2009, 19.

⁵⁹ Bell, 90, 96.

⁶⁰ Deborah Kaminski and Cheryl Geisler, 'Survival Analysis of Faculty Retention in Science and Engineering by Gender', *Science* 335, no. 6070 (2002): 864–6; American Association of University Women, *Why so Few? Women in Science, Technology, Engineering and Mathematics*, 2010, <http://www.aauw.org/learn/research/whysofew.cfm> (accessed 15 August 2012); European Commission, *She Figures 2009: Statistics and Indicators on Gender Equality in Science* (Brussels: Director-General for Research, European Commission, 2009); *Tapping all our Talents: Women in Science, Technology, Engineering and Mathematics: A Strategy for Scotland* (Edinburgh: Royal Society of Edinburgh, 2012).

⁶¹ Jane Carey, 'Departing from Their Sphere? Australian Women in Science, 1880–1960', in *Departures: How Australia Reinvents Itself*, ed. Xavier Pons (Melbourne: Melbourne University Press, 2002), 175–83.

⁶² *Age*, 18 June 2012, 14; *Newcastle Herald*, 15 June 2012, 27.

⁶³ 'Elizabeth Blackburn's Hooked On Science Tour of Australia', 13 June 2012.

Available at *Australian Academy of Science – Media Releases*, <http://www.science.org.au/news/media/13june12-1.html> (accessed 15 August 2012).

⁶⁴ Jill Rowbotham, 'Blackburn's Pitch to Future Scientists', *Australian*, Higher Education section, 15 June 2012, <http://www.theaustralian.com.au/higher-education/blackburns-pitch-to-future-scientists/story-e6frgcjx-1226395852693>. Given the current glut of 'pure' science graduates in many areas, the rationale behind this initiative is difficult to understand. Blackburn herself argued that there was not enough investment in research to provide 'viable career options' for science graduates in Australia. She pointed particularly to the problem of short-term contracts.

⁶⁵ This is one of numerous 'official' Friends of Parliament groups: *Parliamentary Friendship Groups*, http://www.aph.gov.au/About_Parliament/Parliamentary_Friendship (accessed 15 August 2012).

⁶⁶ 'Hooked on Science but Her Son is Her Greatest Achievement', <http://www.utas.edu.au/tools/recent-news/news/hooked-on-science-but-son-is-her-biggest-achievement> (accessed 15 August 2012).

⁶⁷ 'Nobel-winning Mother: Students Hear How to Balance Science with Life', <http://www.uq.edu.au/news/index.html?article=24888> (accessed 15 August 2012).

⁶⁸ 'Hooked on Science' *Life Matters*, ABC Radio National, <http://www.abc.net.au/radionational/programs/lifematters/hooked-on-science/4094080> (accessed 15 August 2012).

⁶⁹ The campaign was launched on 21 June 2012 in Brussels, as part of its broader 'Women in Research and Innovation' initiative: *Science: It's a Girl Thing!*, <http://science-girl-thing.eu> (accessed 15 August 2012).

⁷⁰ Liz Moyer, “‘Science: It’s a Girl Thing’ Campaign Backfires”, *The Juggle: Wall Street Journal Blog*, 23 June 2012, <http://blogs.wsj.com/juggle/2012/06/23/science-its-a-girl-thing-campaign-backfires> (accessed 15 August 2012).

⁷¹ Jeffrey Kluger, ‘WATCH: The EU’s Breathtakingly Sexist Science Video’, *Time Newsfeed*, 25 June 2012, <http://newsfeed.time.com/2012/06/25/the-e-u-s-breathtakingly-awful-science-video> (accessed 15 August 2012).

⁷² Frank Swain, ‘Science: It’s a girl thing. Excuse me while I die inside’, *SciencePunk: Science Blogs*, 22 June 2012, <http://scienceblogs.com/sciencepunk/2012/06/22/science-its-a-girl-thing-excuse-me-while-i-die-inside> (accessed 15 August 2012).

⁷³ ‘Science: It’s a Girl Thing!’, <http://www.youtube.com/watch?v=g032MPrSjFA> (accessed 2 August 2012). Mainstream media coverage was also swift and astute. See for example Martha Gill, “‘Science, it’s a Girl Thing!’ says EU Commission, Holding Lipstick and Bunsen Burner”, *New Statesman*, 22 June 2012, <http://www.newstatesman.com/blogs/staggers/2012/06/science-its-girl-thing-says-eu-commission-holding-lipstick-and-bunsen-burne-0> (accessed 15 August 2012).

⁷⁴ European Commission, ‘Science: It’s a Girl Thing’, <https://www.facebook.com/sciencegirlthing> (accessed 15 August 2012).