1-1-2001

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Abstract

Science is generally perceived as one of the most strongly gendered spheres within modern society. The perceived 'masculine' construction of scientific practice has been the focus of numerous overseas studies of women's historic absence from science. However, the experiences of Australian women scientists, in many ways, stand in stark contrast to this construction. Existing historical accounts of Australian science reveal little about women's participation in the field. It is perhaps surprising to find that, during the first half of this century, women were in fact studying science in quite high numbers. Indeed, few seem to have felt they were doing anything particularly unusual for a woman of their times and few would accept that their sex had any significant impact on their opportunities. This paper seeks to explore the specificities of Australian women's experiences in science, and to examine the influences which allowed then to feel such a sense of freedom within a supposedly highly gendered sphere.

Keywords

science, australian, pursuits, 1880, scientific, 1960, engendering, women

Disciplines

Arts and Humanities | Law

Publication Details

Carey, J. L. (2001). Engendering scientific pursuits: Australian women and science, 1880-1960. Limina: a journal of historical and cultural studies, 7 10-25.

L I M I N A
Iain Brash Prize

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Jane Carey

Science is generally perceived as one of the most strongly gendered spheres within modern society. The perceived 'masculine' construction of scientific practice has been the focus of numerous overseas studies of women's historic absence from science. However, the experiences of Australian women scientists, in many ways, stand in stark contrast to this construction. Existing historical accounts of Australian science reveal little about women's participation in the field. It is perhaps surprising to find that, during the first half of this century, women were in fact studying science in quite high numbers. Indeed, few seem to have felt they were doing anything particularly unusual for a woman of their times and few would accept that their sex had any significant impact on their opportunities. This paper seeks to explore the specificities of Australian women's experiences in science, and to examine the influences which allowed then to feel such a sense of freedom within a supposedly highly gendered sphere.

When Edith Dornwell became Australia's first female science graduate, and the first woman to graduate from the University of Adelaide, there was relatively little fanfare in the press. The editorial in the *Advertiser* for that day in December 1885 devoted several paragraphs to the occasion of the annual graduation day, and to reflecting with satisfaction on the general state of the University. Only then did it come to state:

> one noteworthy feature of the celebration today will be the conferring of the first BSc degree on one of the students of this University, and this is rendered all the more remarkable because the candidate who has won this unique position is a young lady … It is to be hoped that Miss Dornwell may be the precursor of a long line of graduate girl bachelors.[1]

This novel event was not singled out for any further comment. The following day, however, transcripts of the speeches given at the ceremony

were printed. Thus we learn that the Chancellor of the University did make something of the occasion, directing much of his speech to Miss Dornwell personally:

> Will you allow me to say that we are all proud of you? You are the first bachelor of science; you are the first woman graduate in the University of Adelaide. No graduate of this University has ever taken a more distinguished degree … In your distinguished undergraduate career, and the manner in which you have taken this degree, you have not only done honour to this University but have vindicated the right of your sex to compete on equal terms with other graduates for the honors and distinctions of the University.[2]

There was no suggestion that Miss Dornwell's foray into the realm of science was inappropriate, or in any way undesirable, for a member of her sex. Indeed, her graduation was clearly a matter of pride for the University, proof of its modern, progressive status.

The reaction to this event is, perhaps, surprising given that science is generally viewed as one of the most highly gendered spheres within modern society, and one which has, historically, been particularly inhospitable to women. The low participation of women in the study and practice of science was an issue of great concern in the 1960s and 1970s, given the perceived importance and power of science, its impact on daily life and the increasing fields of employment requiring scientific knowledge. This concern gave rise to increasing numbers of studies which sought to uncover women scientists of earlier times, initially aimed at providing role models for aspiring women scientists. These studies generally assumed that, if women were excluded from science to such a severe degree in the present, the barriers which they had faced in the past must have been even greater. This subject has, over the last 25 years, been the subject of a considerable amount of research overseas, particularly in the American context.[3] Most of these studies of women and/or gender and science have focussed on the significance of the masculine construction of scientific practice. As Evelyn Fox Keller, a leading proponent of this approach, put it, '[t]o a remarkable extent, to learn to be a scientist is to learn the attributes of what our culture calls masculinity'.[4] This construction is seen as always having been a powerful determinant of women's experiences in science – both in terms of severely limiting women's participation and achievement, and in terms of the gendered identity of women scientists themselves. It is presumed that women must always have been conscious of the strongly masculine nature of science, and that daring to enter into this realm must inevitably have been seen as stepping beyond the bounds of respectable femininity, both by women scientists

themselves and by society at large. However, what I would like to suggest here is that some of the experiences of Australian women in science stand in stark contrast to such assumptions.

Relatively little research has been conducted in this area in the Australian context. The few existing studies are largely biographical in nature, containing little comparative or quantitative analysis, or attempts to link these women's stories to wider patterns of women's education or entry into professional occupations.[5] Reviewing the position of women in Australian science during the first half of the century, Nessy Allen concluded that Australia was no different from other Western countries:

> There were educational, cultural and institutional obstacles in the path of women who wished to become scientists … There were certainly no women … in positions of power … who could act as role models or mentors to aspiring women scientists.[6]

While this may, on the whole, be true, closer examination suggests the picture is more complex.

Few general histories of Australian science reveal much about women's participation in the field. Indeed, reading them, it would be easy to conclude that until relatively recently women were not involved in the study or practice of science to any significant degree.[7] However, despite their absence from the historical record, and again perhaps surprisingly, during the first half of this century women were in fact participating in science in comparatively high numbers and at far higher levels than is commonly realised. If we look back to the nineteenth century, we find that women were actively involved in a wide range of 'amateur' scientific activities, such as botanical illustrating and collecting, and in writing popular scientific books and school texts.[8] Furthermore, some studies have suggested that the construction of botany as an appropriate female accomplishment actually meant that more science was taught in girls' schools than in those for boys – although of course far fewer girls had access to this education.[9]

By the time university science courses were introduced in the 1880s, women had already gained entry into the three existing Australian universities. They were thus present in science courses right from the start. In the years up to 1900 women took out just over 20 per cent of science degrees awarded by the University of Adelaide.[10] At the University of Melbourne, Farley Kelly has found that, while numerically most women studied Arts, women made up just under 30 per cent of science graduates up to 1920 - the highest proportion of women in any course of study.[11] At the University of Sydney women represented around 20 per cent of science students at the turn of the century and 43 per cent by 1920.[12] In Melbourne and Sydney this high level of participation continued into the 1930s, and,

naturally enough, reached a peak during the Second World War.[13] Since women were concentrated in the biological sciences, they were often in the majority in these subjects.

Not only were women well represented as science students, they were also remarkably well represented on the science staff of many universities.[14] Women were appointed to the science faculties of most Australian universities significantly before they were appointed in arts.[15] The precedent was in 1898 when Ada Lambert was appointed as a demonstrator in biology at the University of Melbourne. Indeed, seven of Melbourne's 62 early women graduates in the biological sciences went on to reach lecturer status or higher, including two associate professors.[16] Many more worked as university demonstrators and tutors. Women in fact made up the majority of demonstrators in all disciplines, including physics, until the end of the Second World War. These numbers become even more significant when one considers the extremely small size of the academic staff at the time. For example, at the University of Melbourne during the 1930s, three of the seven senior academics in the biological sciences were women. At the University of Sydney, until 1945, women employed in science and medicine represented the overwhelming majority of women on the academic staff.[17] While Adelaide women did not flock to university science courses in the same high numbers as their sisters in Melbourne and Sydney, they too were reasonably represented on the science staff. Ellen Benham was the first woman appointed to the University of Adelaide, giving lectures in botany from 1901 to 1912. Throughout the 1930s and 1940s women made up the majority of staff in the biological sciences, although most were in low status positions.[18] There is some evidence to suggest that since the Universities were constantly under funded in this period, women who were willing to accept low paid positions were actually an attractive proposition.[19]

Both Alison Mackinnon and Farley Kelly have also noted that by the 1920s, university education for women was no longer seen as radical.[20] Furthermore, women entering science in the 1920s and 1930s increasingly felt accepted within the university community. Indeed, many have commented on the egalitarian atmosphere they encountered in their undergraduate years. As Diana Dyason, a Melbourne science graduate of the 1930s who later worked in the Physiology Department, described it:

> there was little of the overt discrimination against women that had been so obvious in earlier times. After all, most women, particularly in science, had strong family support and assumed the rightness of their ambitions and their equality with men.[21]

Furthermore, existing biographical studies of Australian women scientists indicate that after the first true 'pioneers', few women studying or working

in science had any sense that they were doing anything particularly unusual for a woman of their times and few would accept that their sex may have had an impact on their opportunities.[22]

In seeking to explore these observations, I conducted a mass survey of women who graduated in science between 1930 and 1955.[23] Most interestingly, the survey confirmed that few were aware of any barriers to their participation in science. Only a tiny proportion of respondents reported any sense of differential treatment in their undergraduate years. In terms of their working lives, over half claimed that they were never aware of any sort of differential treatment. Of the remainder, most reported only isolated examples, with the implication that such treatment was rare. Some mentioned issues such as lower rates of pay and the existence of marriage bars, but almost invariably stated that everything was equal apart from this. That is, such women seemed to make a distinction between discriminatory institutional regulations and the treatment they received from their colleagues and superiors. For example, one woman explained that, 'I was required to retire from CIG on marriage in 1947. No other differential treatment – [this is] usually in the mind of [the] "oppressed"'.[24] Indeed, many seemed to become annoyed at questions which implied that all might not have been equal in the world of science. Some felt the need to write NO in large capital letters, thickly underlined. Others were moved to comment further. As one graduate of the 1940s wrote, '[t]he questionnaire seems to presuppose that women in science had difficulties. Sorry but I didn't'.[25] Another simply asked with clear frustration, '[w]ho has drummed up this idea of discrimination in the past 20 years or so'.[26]

My own interviews with women of this period have also revealed a strong commitment to what I have termed a 'narrative of equality' when it comes to describing their experiences in science.[27] As one geology graduate of the 1950s, who later worked for many years in the strongly male dominated area of commercial geological surveying, described it:

> I freely grant that women have had a rough trot over the years, and the less educated ones particularly so … But it hasn't really been a bother to me personally, I'm selfish I have to admit, because I've been in professional circles and apart from minor things … like not getting paid as much as men, which I used to resent a bit … I was alright Jaqueline … But if I had been in a different situation and not a professional woman in a job that looked after me well, I probably would have been out there leaping up and down and screaming … [but] I was cushioned.[28]

This lack of perception of discrimination was particularly true of women who worked within the universities, where they enjoyed the same pay and

conditions as men.[29] Few of the women employed there expressed any sense of differential treatment either as students or as staff. As Patricia Thomas, who worked in the Department of Zoology, University of Adelaide from the late 1930s, stated, 'I just don't see that we were badly treated … I don't think we were squashed at all because we were women'.[30] Furthermore, few felt that they were doing anything particularly unusual for a woman of their times. When Madeline Angel, also in Zoology in this period, was asked if women felt that they were 'blazing a trail' by studying and working in science, she replied, 'no I don't think we did … because … it must have been back to 1920 I imagine that there had been women doing science.' When further questioned if people ever saw her as 'odd', she answered, 'no I don't think so … as far as my friends were concerned, they tended to be mostly academic … I didn't ever feel different from them.'[31] The absence of explicit barriers to women's progress makes the universities a particularly interesting site for the examination of women's participation in science and has been the main focus of my research.[32]

However, while I am interested in exploring why women felt such a sense of freedom in science, I am not suggesting that this does in fact reflect the reality of their position. Indeed, one does not have look far to find evidence that sex did in fact count for women scientists of this period. The fact remains that only a tiny number of women reached the top of their profession. Furthermore, while they were well represented numerically, women's choices and prospects were limited in myriad and highly significant ways, even if their participation in science was never wholly precluded. The specific ways in which sex and gender functioned to circumscribe women's careers were highly influenced by the structure and status of the Australian scientific community and varied greatly over time, particularly in the period around the Second World War.

In terms of the general employability of women graduates, the records of the Appointments Boards of the Universities of Melbourne and Sydney are very revealing. These records clearly show that sex was a significant factor for most employers outside the realm of academia, who usually specified the sex of the person they required.[33] The annual reports of these bodies emphasised the different prospects for female graduates, who were advised to take courses in typing and shorthand to improve their chances.[34] In late 1930s the University of Sydney Appointments Board began conducting surveys of the job advertisements in the major Australian newspapers, which naturally included scientific positions, and they were able to divide these neatly into jobs for men and jobs for women.[35] This situation did change dramatically during the Second World War and by 1941 the University of Sydney Appointments Board reported that:

> Never before in the history of the world has there been so great a demand for women with scientific knowledge ... Jobs which have hitherto been the

> prerogative of men have opened their doors wide to women … Employers who once refused to take women scientists … are now begging for them.[36]

Naturally enough, these expanded opportunities ceased with the end of war, and again the appointments boards were quick to note these changes. An article in the *Argus* in 1947 reported the University of Melbourne Board's opinion that the options for women were decreasing, however '[i]f they are prepared to teach … there are many vacancies, and some will no doubt also obtain positions as scientific librarians or information officers.'[37] Women's horizons were contracting despite the very strong demand for scientists in general in the post-war period.

Reading through the correspondence of male university professors from this period also clearly reveals the gendered nature of the scientific workforce. Writing in 1940 in response to an inquiry regarding the existing opportunities for women science graduates, Professor Ashby, of the Sydney Botany School, outlined the position thus:

> The opportunities for a woman Honours graduate are as follows: If she is given a First Class, she is almost certain to get some kind of post-graduate scholarship … Under these conditions she could do research and obtain a higher degree. The permanent positions in Botany for women are of the following kinds: (i) academic work (naturally depending upon chance positions) (ii) research work with the Council for Scientific and Industrial Research (there are several women with Honours degrees employed) … (iii) research position in State Departments … these are rare (iv) teaching schools … Briefly I think we could launch a First Class woman graduate, but there may be some difficulty in finding a permanent appointment, other than teaching, for a Second Class Graduate.[38]

Ashby's correspondence regarding his female students' attempts to find employment further reveals the significance of sex in scientific employment. This reference written in 1943 is a further example:

> There is no doubt whatever that Miss Mills is a far better candidate … However if it is necessary to have a man for this position, and Miss Mills is therefore not eligible, I suggest that consideration be given to Mr Simpson.[39]

When another former student wrote to Ashby regarding her prospects of obtaining a position at the National Herbarium, he replied '[s]o long as we can overcome the serious misfortune of your not being a man (which as you say weighs heavily with the Department of Agriculture) the chances of your getting this appointment are good.'[40]

Such biases certainly extended even into the supposedly egalitarian domain of the universities.[41] While university appointments were supposedly solely based on academic merit, precluding any other influences, when one examines the extant records of the processes through which such appointments were made, it becomes patently clear that, for both male and female candidates, other factors were almost always taken into consideration and were often decisive. There was certainly a wide scope for sex and gendered assumptions to become highly significant. Indeed, in the absence of institutional barriers to women's employment, it was within the universities that such biases were most explicitly articulated. The extent of their power is thus also brought most strongly into relief.

When the University of Melbourne appointed its first female professor in 1975, coincidentally International Women's Year, the Vice Chancellor proclaimed that, '[i]n making appointments to its academic posts the University … has not, for many generations, considered the sex of candidates for appointments to be a relevant matter.'[42] In contrast to this assertion, a study conducted in the same year found that women were proportionally no better represented on the academic staff of the University than they had been in 1951.[43] Furthermore, records relating to university appointments and promotion clearly reveal that sex was rarely irrelevant to a candidate's prospects. The correspondence of Professor Turner of the University of Melbourne School of Botany, to give just one example, clearly reveal the operation of such biases. Throughout the 1940s and 50s, Turner wrote numerous letters seeking recruits for his department. Almost invariably, he specified a preference for male applicants. For example in 1957 he wrote to several colleagues, stating that he was, 'looking for a good youngster (preferably a man) with experience in teaching and if possible with a PhD degree.'[44] The phrases 'a good man', 'a suitable young man', 'a fairly senior man' are repeated time and again throughout Turner's correspondence. Furthermore, he in turn received many similar requests. When Turner was considering which of his Senior Demonstrators should be promoted, he reflected on the merits of the one of his female staff, and noted that, 'I would normally prefer to promote one of the men, [however] I recommend her promotion very strongly.'[45] The significance of this correspondence is not so much that it reveals the personal biases of Professor Turner, but that the wide number of scientists involved shows that such attitudes were widespread.

The fact that clearly science was not in reality an egalitarian domain, makes the question of why women scientists are so reluctant to accept this, or to represent their lives in terms of these restrictions, even more intriguing.

Thus I am seeking to explore the influences which allowed some Australian women to feel such a sense of freedom outside traditional feminine spheres prior to the emergence of the feminist movement of the 1960s, with its sharp critique of the limitations placed on women in Australian society. And there were many factors which made this both possible and reasonable, apart from their sheer numbers.

One of these factors was certainly the particular structure of Australian science. While today Australia has a reasonably strong and well supported scientific community, this is a relatively recent development. Isolated as it was from the prestigious centres of learning in Europe and America, science had a relatively low status within the Australian community up until the Second World War.[46] Few students studied science, there was little funding of scientific research, and the scientific community was very small. In the period up to 1940, only around 500 masters degrees in science had been awarded by all Australian universities.[47] These conditions certainly influenced women's entry into science. Commenting on the period up to 1920, Kelly has suggested that the small size and low status of science meant that women enjoyed relative easy access.[48] While women's career prospects certainly differed from those of men, few faced any great obstacles to finding some type of scientific employment. The majority of women science graduates made good use of their qualifications. Of the 62 pre-1920 Melbourne graduates, at least 28 remained single and worked throughout their lives.[49] Mackinnon has noted that 47 per cent of the 200 women who graduated from the University of Adelaide prior to 1922 never married, and presumably also had to work to support themselves.[50] By the 1930s women were an integral part of the Australian scientific community. Naturally enough, this presence was further consolidated during the Second World War. As science became increasingly important to the war effort, women scientists were at a premium. Nor were they unilaterally pushed out of these jobs at war's end. The influx of ex-servicemen into the universities meant women's services, as demonstrators and temporary lecturers, were if anything in greater demand. The continued lack of suitably qualified men, and the great expansion of scientific occupations, meant women with science degrees remained highly employable.

Moreover, while it is true that within the popular imagination science was generally viewed as a male domain, there were some influences which might be seen as encouraging women to enter such areas. As Dyason also observed, the late 1930s and 1940s were a time when women were going places.[51] 'Firsts' for women were reported proudly and approvingly in the media, and women in unusual occupations were often featured in the women's pages of the newspapers. For example in 1935 there was a spate of articles reporting on the conference of the Australian Federation of University Women in Melbourne, which featured a speech on the subject of women's contributions to science. All of these articles reported approvingly on this large gathering of educated women and none contained

any hint of surprise at the choice of topic for the introductory speech or any contradiction of the speaker's assertion that women had already made important contributions to science.[52] Moreover, such articles generally implied that a 'masculine' occupation was not necessarily incompatible with respectable femininity.

While there were certainly conflicting influences at work, the women's pages of the newspapers, and many women's magazines, were filled with articles encouraging women to take a greater role in all spheres of public life. Furthermore, while there were certainly conflicting influences at work, the emancipated woman was often presented as a symbol of modernity.[53] Women's increasing status, and their increasing arenas of activity, were often represented as an inevitable and positive consequence of the progress of society. The implication of modernity that change and progress were inescapable encompassed ideas of social change and changing gender roles and relations as well. Since science was itself one of the prime symbols of the modern age, women's entry into the field could sometimes be viewed as a natural progression. As one 1944 article noted:

> This is a century of scientific development and an age of increasing fields of activity for women. With such parallel trends "Women and Science" is but a logical outcome. But, in addition to being natural and logical, it is also a desirable and essential development.[54]

With the onset of war, articles explicitly encouraging women to enter technical and scientific fields proliferated and women scientists' contributions to the war effort were widely praised.[55] These articles tended to focus on the importance of the work such women were undertaking, although sometimes the fact that they still retained their femininity was also stressed. For example, a 1944 article on Jean Millis, entitled 'Beauty and Brains can go together', was neatly divided into two sections the first of which dealt with the importance of Miss Millis' work on nutrition in times of food rationing. The second gave her 'Simple Rules for health and beauty', and read:

> Millis is a fresh complexioned blonde. She has perfect teeth and blue eyes … Not at all like an academic spinster … Her rules for health and beauty are simple and easy. Make sure you have three-quarters of a pint milk each day. Have some fresh fruit or raw vegetable daily and include potatoes in your daily menu.[56]

Her status as a nutritionist was used to give weight to this advice.

The size and prestige of Australian science was greatly enhanced during the Second World War and this continued into peacetime as employment

opportunities abounded both in research and in a multitude of allied areas. For the first time, science became a viable and recognisable career choice. In this sense, true professionalisation of science came comparatively late to Australia. It is thus not surprising that women's position within science also underwent significant alteration at this time. In the post-war years the proportion of women studying science dropped dramatically and did not reach the levels seen in the 1920s and 1930s again until the 1970s. Furthermore, it seems that science was regendered in such a way that women's previous high participation in the field was all but forgotten.[57] It was only really in this era that the masculine image of science came to be reflected in the numbers of students studying science and in the structure of scientific employment. As science expanded, so it became more hierarchical and more low status positions and occupations were created. Emerging areas of employment became designated masculine or feminine and women were increasingly channelled into subordinate roles, and into allied professions such as technical librarians, dietitians and of course teaching. Barriers relating to marriage also became far more significant, as few women graduates were willing to remain single in order to pursue a career. While marriage rates among tertiary educated women remained lower than those among the general population,[58] the single career path was far less popular among women graduates in the post-war period. However, for this group, marriage did not necessarily mean an end to participation in paid employment. Only a small proportion of these women stopped work permanently after marriage or children, although few worked continuously. Furthermore, most worked in areas in which women were well accepted, such as university demonstrating and teaching, or in fields which were female dominated, such as hospital laboratories and dietetics.[59] The cumulative effect of these changes meant the achievements of women entering science in the 1940s would, in relative terms, be considerably less than those of earlier generations. However, while few maintained continuous careers, most returned to the workforce after having children – becoming perhaps the first generation of women to combine marriage and motherhood with professional careers. And, despite the increasing obstacles, most retained their view of science as a place where the issue of gender simply drops away.[60]

Finally, family, class and a sense of loyalty to their profession were also clearly highly significant in terms of how these women both perceived and chose to represent themselves and their lives. Compared to most women, and indeed men, of their time, they were extremely fortunate, a fact which some were clearly aware of. This made them unlikely to think of their lives in terms of barriers or restrictions. These women generally came from relatively privileged families with supportive attitudes towards higher education for women. Most attended single sex schools which supported scientific studies and where girls were encouraged to go on to university.[61] Few had to struggle to pursue their interest in science. In a

period when access to tertiary education was extremely limited - in 1940 less than three per cent of all those aged between 18 and 21 were enrolled in a university course and only 1.7 per cent of women in this age group were engaged in tertiary studies[62] - women of particular class, race, and educational backgrounds enjoyed a peculiar privilege which contributed to the sense of freedom they felt. Furthermore, the ideal of meritocracy is a major pillar of the claim of science to authority and objectivity. This may also partly explain the reluctance of many women scientists to contemplate the possibility that either sex or gender have an impact within the scientific profession. This could in fact amount to an attack on the integrity of the discipline to which they had devoted their lives. Given this context, and the other influences described above, it is hardly surprising that the accounts of women who entered science prior to the 1950s concentrate on the sense of freedom and acceptance they felt within their profession rather than any obstacles they might have faced.

What I have been trying to suggest is that, while reference to the 'masculine' construction of science may help explain women's absence, it does seem to become problematic when looking at women's presence in science. Certainly women studying or working in science in Australia in the first half of this century did not view the supposedly masculine nature of science as a barrier to their interests, nor did they view science as intrinsically hostile to women. An examination of the experiences and attitudes of women entering such supposedly highly masculine arenas of public activity reveals much about the specific operation of dominant discourses of gender in the specific context of Australia from the late-nineteenth to the mid-twentieth century. In particular, it reveals the multiple and often conflicting influences at work in public representations and understandings of science, within scientific and educational institutions, as well as around the formation of individual gender identity. Within all of these realms, concepts of gender interacted with, and were modified by, understandings and experiences of class, race and professionalisation, as well as by constructions of the nature of scientific endeavour itself. While this study has focussed on science as an apparently highly gendered arena of activity, these conclusions could well be true for other areas of professional employment requiring access to university education and indeed to the many and varied new fields of employment which have emerged since the late nineteenth century – few of which emerged pre-gendered.[63]

The growing body of literature on the feminist movement in the inter-war period in Australia suggests that certain groups of women felt an increasing sense of self-confidence and self-importance in their interventions in the public arena.[64] I would argue that much of this sense of self-confidence was also reflected in the attitudes of professional women of this period. Women entering into the study or practice of science in Australia were, in general, neither rebels nor radicals. Their decision to enter into the realm of science, and the freedom they felt within it, were as much a positive product

of their class and culture as for any 'typical' middle-class housewife. While there is certainly a wealth of evidence which shows that sex did in fact count within the world of science, this was not the primary lens through which this group of women interpreted their experiences. Rather than portraying these women as victims, their lives can best be understood in terms of their privileged status and the undercurrents of support for women (or at least white, middle-class women) to extend their influence over and contributions to the 'public' sphere. While the prospects and outcomes for women in science certainly differed from those of similarly privileged white men, this is not necessarily the only significant aspect of their experiences.

Notes

[1] *Advertiser*, 16 December 1885.
[2] *Advertiser*, 17 December 1885.
[3] There is a large body of literature on this subject. See for example E.F. Keller, *A Feeling for the Organism: The Life and Times of Barbara McClintock*, W.H. Freeman Company, New York, 1983; M. Rossiter, *Women Scientists in America: Struggles and Strategies up to 1940*, John Hopkins University Press, Baltimore, 1995; G. Kass-Simon & P. Farnes (eds), *Women of Science: Righting the Record*, Indiana University Press, Bloomington, 1990; M. Alic, *Hypatia's Heritage: A History of Women in Science from Antiquity Through the Nineteenth Century*, The Women's Press, London, 1986; S. Kohlstedt, 'In from the Periphery: American Women in Science, 1830-1880', *Signs*, vol. 4, no. 1, 1978, pp.81-96; H. Zuckerman, J. Cole & J. Bruer (eds), *The Outer Circle: Women in the Scientific Community*, W.W. Norton, New York, 1991; Londa Schiebinger, *Has Feminism Changed Science?*, Harvard University Press, Cambridge MA., 1999; A. Abir & D. Outram (eds), *Uneasy Careers and Intimate Lives: Women in Science 1789-1979*, Rutgers University Press, New Brunswick, 1987.
[4] E.F. Keller, 'How Gender Matters, or Why is it so Hard For Us to Count Past Two?', in G. Kirkup & L. Keller (eds), *Inventing Women: Science, Technology and Gender*, Polity Press, Cambridge, 1992, p.47. See also other chapters in this book and other work by Keller including *Reflections on Gender and Science*, Yale University Press, New Haven, 1985; E.F. Keller, 'Feminism and Science', in S. Harding & J. O'Barr (eds), *Sex and Scientific Inquiry*, University of Chicago Press, Chicago, 1987, pp.234-241; E.F. Keller, 'The Wo/Man Scientist: Issues of Sex and Gender in the Pursuit of Science', in Zuckerman, Cole & Bruer, *The Outer Circle*, pp.227-236. See also J. Harding (ed.), *Perspectives on Gender and Science*, Falmer Press, London, 1986.
[5] See for example work by Nessy Allen including, 'An Exception to the Rule: The Career of an Australian Woman Physicist', *Australian and New Zealand Physicist*, vol. 30, no. 12, 1993, pp.305-309; 'Australian Women in Science: Two Unorthodox Careers', *Women's Studies International Forum*, vol. 15, no. 5/6, 1992, pp.551-562; 'A Pioneer of Gastroenterology: The Career of an Australian Woman Scientist', *Historical Records of Australian Science*, vol. 11, no. 1, 1996, pp.35-50.
[6] Allen, 'Australian Women in Science', p.551.
[7] See for example R. Home (ed.), *Australian Science in the Making*, Cambridge University Press, Sydney, 1988; R. MacLeod, *The Commonwealth of Science: ANZAAS and the Scientific Enterprise in Australia*, Oxford University Press, Melbourne, 1988; C. Schedvin, *Shaping Science and Industry: A History of Australia's Council for Scientific and Industrial Research, 1926-1949*, Allen & Unwin, Sydney, 1987.
[8] S. Kohlstedt, 'In from the Periphery'; A. Shteir, 'Botany in the Breakfast Room: Women and Early Nineteenth-Century British Plant Society', in Abir & Outram, *Uneasy Careers and Intimate Lives*, pp.33-43; A. Shteir, 'Gender and "Modern" Botany in Victorian England', *Osiris*, vol. 12, 1997, pp.29-38; D. Carr & S. Carr (eds), *People and Plants in Australia*, Academic Press, Sydney, 1981; A. Moyal, *A Bright and Savage Land*, Penguin, Melbourne, 1986.
[9] Kholstedt, pp. 83-84; A. Moyal, 'Invisible Participants: Women in Science in Australia, 1830-1950', *Prometheus*, vol. 11, no. 2, pp.175-176. See also Anne Shteir's work on botany in Britain in the nineteenth century.

[10] University of Adelaide Archives (UAA), Registrar's Office Records, Series 485, Annual and Cumulated Statistics 1907-1985.
[11] F. Kelly, 'Learning and Teaching Science: Women Making Careers 1890-1920', in F. Kelly (ed.), *On the Edge of Discovery: Australian Women in Science*, The Text Publishing Company, Melbourne, 1993, p.44.
[12] C. Turney, U. Bygott & P. Chippendale, *Australia's First: A History of the University of Sydney. Vol. 1, 1850-1939*, Hale & Iremonger, Sydney, 1991, p.643.
[13] D. Temple, 'Women in Science and Medicine', in B. Cass et al., *Why So Few? Women Academics in Australian Universities*, Sydney University Press, Sydney, 1983, p.155; J. Carey, *Women and Science at the University of Melbourne: Reflections on the Career of Dame Margaret Blackwood*, The University of Melbourne, History of the University Project, Parkville, 1996, pp.15-17; figures covering the period from 1930-55 have been compiled from the relevant issues of *The University of Sydney Calendar*, *The University of Melbourne Calendar*, *The University of Adelaide Calendar* and the Commonwealth Bureau of Statistics, *University Statistics*.
[14] For staff lists see the relevant issues of the *Calendars* of the various universities and the *Commonwealth Universities Yearbook*.
[15] G. Poiner & R. Burke, *No Primrose Path: Women as Staff at the University of Sydney*, University of Sydney, 1988, p.11; Kelly, 'Learning and Teaching Science', pp.37-75; The University of Adelaide, *Centenary of the First Woman Graduate: Women at the University of Adelaide, 1874-1985*, nd.
[16] Kelly, 'Learning and Teaching Science', p.68.
[17] Temple, 'Women in Science and Medicine', p.155; see also relevant issues of *The University of Sydney Calendar*.
[18] See the relevant issues of *The University of Adelaide Calendar* and UAA, Series 200, General Correspondence, files 1032/1901 and 135/1911.
[19] In 1908 Alfred Ewart, the Professor of Botany, wrote to the University of Melbourne Council regarding his need for additional staff: 'As lack of funds may prevent the appointment of a male lecturer at £400, I suggest as a temporary expedient the appointment of a woman lecturer and demonstrator at £150-£200.' University of Melbourne Archives, UM312, Registrar's Office Correspondence, 1908/10, letter dated 1 August 1908.
[20] A. Mackinnon, *The New Women: Adelaide's Early Women Graduates*, Wakefield Press, Netley, 1986, p.204; F. Kelly, *Degrees of Liberation: A Short History of Women in the University of Melbourne*, The Women Graduates Centenary Committee of the University of Melbourne, 1985, pp.78–82.
[21] D. Dyason, 'Diana Dyason', in H. Dow (ed.), *Memories of Melbourne University: Undergraduate Life in the Years Since 1917*, Hutchinson, Melbourne, 1983, p.99. Dyason went on to become the Head of the Department of History and Philosophy of Science.
[22] Ann Moyal has also briefly noted this feature of the accounts of Australian women scientists in her article 'Invisible Participants'; See also J. Carey, 'Barriers Unknown? Margaret Blackwood's Life in Science', Honours thesis, University of Melbourne, 1995 and *Women and Science at the University of Melbourne*. The pervasiveness of this belief is clearly shown in the interviews with women scientists presented in R. Bhathal, *Profiles: Australian Women Scientists*, National Library of Australia, Canberra, 1999 and in many of the testimonies presented in Nessy Allen's work, cited above.
[23] The survey covered women graduates from the Universities of Melbourne, Sydney and New England. Over 320 responses were received representing over 20 per cent of all women science graduates of these universities in this period. A small number of women graduates of the University of Adelaide were also surveyed.
[24] Survey number 274 (University of Sydney graduate of 1944, Chemistry major, worked for a period as a part-time university chemistry tutor).
[25] Survey number 19 (University of Melbourne graduate of 1949, Botany major, career spent in the CSIRO).
[26] Survey number 38 (University of Melbourne graduate of 1948, Zoology major, later worked as an optometrist and then a secondary teacher).
[27] Interviews have been conducted with 27 women, mostly selected from survey respondents. Of these, 18 worked within the universities at some point.
[28] Interview number 1, 11 July 1998. The subject graduated from the University of Sydney.
[29] See also Australian Archives, Australian Association of Scientific Workers, Sub-Committee on the Status of Women in Science, unpublished report, series B551/0, item 1944/88/9396, which

shows that women working in the universities were far less likely to report discrimination than women in other types of employment.
[30] University of Adelaide, Barr Smith Library, Australia Federation of University Women Oral History Collection, Interview with Patricia Thomas (nee Mawson), 2 September, 1989.
[31] University of Adelaide, Barr Smith Library, Australia Federation of University Women Oral History Collection, Interview with Madeleine Angel, 16 November, 1984. Again, this impression is confirmed by my survey results.
[32] It was the official policy of most Australian universities, from at least the early 1900s, to accept men and women on equal terms, both as students and as members of staff. The major exception to this was the University of Western Australia where a marriage bar was imposed (See P. Crawford & M. Tonkinson, *Missing Chapters: Women Staff at the University of Western Australia, 1963-87*, University of Western Australia Press, Nedlands, 1988). There was no official marriage bar at the other universities, although in practice almost all women academics were single. Anti–nepotism rules also hindered the employment prospects of women at the University of Sydney. See N. Allen, 'Australian Women in Science: A Comparative Study of Two Physicists', *Metascience*, vol. 8, 1990, p.78.
[33] University of Melbourne Appointments Board, *Annual Report*, University of Melbourne, Melbourne, 1933; Appointments Board, University of Sydney, Sydney; *Annual Report*, University of Sydney, Sydney, 1924.
[34] Kelly, *Degrees of Liberation*, p.98.
[35] Appointments Board, University of Sydney, Sydney; *Annual Report*, University of Sydney, Sydney, 1939.
[36] *Daily Telegraph*, 3 July 1941.
[37] *Argus*, 9 January 1947.
[38] University of Sydney Archives (USA), G50, series 8, item 8, Prof. E. Ashby to the Vice Chancellor, University of Sydney, 23 February 1940.
[39] USA, G50, series 10, file 'Personnel 1942-43', Ashby to the Secretary, CSIR, 1 November 1943.
[40] USA, G50, series 2, item 11, Miss A. Melvaine to Ashby, 8 April 1940.
[41] See for example the correspondence of Professor John Stuart Turner of the Melbourne Botany School, contained in the UMA, Turner Collection, Box 69, folder 00494, (especially Turner to various academic colleagues, 25 June 1957).
[42] D. Derham, 'The New Professor', Letter to the *Age*, 8 November 1975.
[43] Women's Working Group, *Women's Working Group Report, University of Melbourne, University Assembly*, University of Melbourne, Melbourne, 1975, p.73.
[44] UMA, Turner Collection, Box 69, Folder 00494, Prof. Turner to various academic colleagues, 25 June 1957.
[45] UMA, Turner Collection, Box 65, File 00308, Turner to the Registrar, 26 February 1957.
[46] R. Home, 'Australian Science and its Public', *Australian Cultural History*, no. 7, 1988, pp.86-103.
[47] J. Gani, *The Condition of Science in Australian Universities: A Statistical Survey*, Pergamon, Oxford, 1963, p.9.
[48] Kelly, 'Learning and Teaching Science', p.62.
[49] Ibid., p.45.
[50] A. Mackinnon, *Love and Freedom: Professional Women and the Reshaping of Personal Life*, Cambridge University Press, Cambridge, 1997, p.92.
[51] Dyason, p.100.
[52] *Age*, 3 September 1935; *Argus*, 3 September 1935; *Sun*, 3 September 1935; *Herald*, 4 September 1935.
[53] For a study of the contrasting discourses of gender and modernity see R. Felski, *The Gender of Modernity*, Harvard University Press, Cambridge MA., 1995.
[54] *Age*, 3 June 1944.
[55] See for example the *Age* 17 April 1941, 17 March 1944, 3 June 1944.
[56] *Sun*, 15 August 1944.
[57] Margaret Rossiter has made a similar observation in her study of American women scientists.
[58] P. McDonald, *Marriage in Australia: Age at First Marriage and Proportions Marrying 1860-1971*, Dept. of Demography, Institute of Advanced Studies, Australian National University, Canberra,

1974, p.214.
[59] These conclusions are based on my survey of women science graduates.
[60] Ibid.
[61] Ibid.
[62] C. Saunders, *Student Selection and Academic Success in Australian Universities*, Government Printer, Sydney, 1948, p.135.
[63] See for example G. Clarsen, 'Women, Modernity and Cars in Interwar Victoria', in M. Crotty