



PALGRAVE STUDIES IN  
THE HISTORY  
OF SCIENCE AND TECHNOLOGY



# Women and the Natural Sciences in Edwardian Britain In Search of Fellowship

Peter Ayres

palgrave  
macmillan

Palgrave Studies in the History of Science  
and Technology

Series Editors  
James Rodger Fleming  
Colby College  
Waterville, ME, USA

Roger D. Launius  
Auburn, AL, USA

Designed to bridge the gap between the history of science and the history of technology, this series publishes the best new work by promising and accomplished authors in both areas. In particular, it offers historical perspectives on issues of current and ongoing concern, provides international and global perspectives on scientific issues, and encourages productive communication between historians and practicing scientists.

More information about this series at  
<http://www.palgrave.com/gp/series/14581>

Peter Ayres

Women and the  
Natural Sciences  
in Edwardian Britain

In Search of Fellowship

palgrave  
macmillan

Peter Ayres  
Lancaster University  
Lancaster, UK

Palgrave Studies in the History of Science and Technology  
ISBN 978-3-030-46599-5      ISBN 978-3-030-46600-8 (eBook)  
<https://doi.org/10.1007/978-3-030-46600-8>

© The Editor(s) (if applicable) and The Author(s), under exclusive licence to Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use. The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Cover illustration: World History Archive / Alamy Stock Photo

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

## PREFACE: ‘ASSOCIATIONS OF PERSONS UNITED BY SOME COMMON INTEREST’

Through the Victorian era, age-old prejudices still prevailed concerning the fitness of women to be scientists or, more generally, to enter the professions. It was pointed out by men that the weight of a woman’s brain was less than that of a man’s; others argued that the physical exertion of a working life would imperil a woman’s reproductive health (Cock and Forsdyke 2008, 178; Rayner-Canham and Rayner-Canham 2003). Or, quite simply, it was held that a woman’s first duty was to support her husband and his children, and not to spend her time pursuing some high-flown science. Such attitudes infected even the thinking of women; writing about ‘Our School Girls’, Mrs CE Humphry, one of the first female journalists (and an extremely popular one) reflected;

*What is the use of class successes if they are won at the expense of health? And though scholarships are very pleasant things...they may cost too dear. If the money they save has to go on doctors’ fees, of what earthly use are they.*  
(Humphry 1898, 19)

It is neither the purpose of this book to examine how those particular prejudices were overcome, nor to review the debate that ‘the mind has no sex’—a debate which has stretched down the years, from Lydia Becker’s proposal to a meeting of the British Association for the Advancement of Science (1868) that differences between the minds of women and men were a result of nurture rather than nature, until today (Gianquitto 2013). It is a debate which continues to occupy the energies of some of the finest

feminist scholars, who ask whether women 'do' science in a way that is different from the way it is done by men, and, by extension, whether feminism has changed science.

It is the purpose of this book to look at one little explored aspect of the wider debate, the historical exclusion of women from leading scientific societies and the impact that that had on their efforts to become integrated into the world of professional science. The promise held out by the fundamental tenet of 18th century European Enlightenment that 'all men are by nature equal' was not realised for, as the nineteenth century progressed, women were progressively excluded as the culture of science was gradually closed to them (Schiebinger 1999, 13 and 69). There occurred, in parallel, a professionalization of science and a privatisation of the family, the two spheres being, respectively, the domain of men and women.

My own past interests have centred on the professionalization of botany in the decades immediately preceding World War I. In writing about some of the leading men of the time I have been struck by how often their researches were assisted by women, although each for only a short time—suggesting that either a lack of funding, or marriage, ended each woman's connection with her successful man and, thereby, her potential career. The names of a few women do, however, recur again and again in the pages of fledgling journals such as the *New Phytologist* (in which I declare a personal interest) and the *Annals of Botany*. Perhaps they were women who, exceptionally, found permanent employment, or who enjoyed private means? My enquiries into the lives of these women led me to seek comparisons with the lives of women in other natural sciences and, almost inevitably, parallels became apparent—not least the difficulties all women had in acquiring fellowships in scientific societies.

The wider background to the late-Victorian and Edwardian periods involves, of course, women's fight for the right to vote (a fight which itself spawned numerous clubs, associations, and societies). It is not a coincidence that the two struggles were contemporaneous, and as individual lives are explored, it will be seen that the same women were often involved.

The extent to which women in the natural sciences depended on male help is explored, as is the question why some men chose to be 'enablers', when others stood in the way of women's progress. In such analysis, two things should be borne in mind. First, it is probable that the majority of

male scientists had no strong views one way or the other. Second, many men were educated in an all-male environment; they knew little about the abilities and interests of females of the same age. Unfamiliarity could all too easily lead to an awkwardness and shyness, resulting in them avoiding social or professional interactions with the opposite sex.

Finally, with tongue somewhat in cheek, I return to my own earlier interests. Writing about Charles Darwin led me to his grandson, Bernard, golf correspondent of *The Times* newspaper from 1907 to 1953. Bernard's interests stretched, however, beyond golf clubs to 'Gentlemen's Clubs', which he called, '...associations of persons united by some common interest meeting periodically for cooperation or conviviality' (Darwin 1943). He could easily have extended his definition to include Societies.

In 1941, with most of Europe under Nazi domination, the London publisher Collins launched a series of social history books called 'Britain in Pictures'. The slim volumes were designed to boost morale but also to record a British way of life that was at risk of extinction. Bernard Darwin was invited to contribute a book on the subject of 'British Clubs' (Darwin 1943). Gentleman's clubs, ranging from dining to debating to sporting ones, and mostly dating from the eighteenth or nineteenth centuries, were, he argued, a defining characteristic of British society. While some of the 'Social Clubs' have since Darwin's time admitted women, for example, The Athenaeum in 2002, others, such as Boodle's, Brooks's, and White's are still for men only. To be fair, the University Women's Club (founded in 1921 as the University Club for Ladies) excludes men, but the overall conclusion is that in London's clubland, centred in St James', at the heart of the metropolis, old habits die hard.

Is it any wonder then that the oldest of Britain's scientific societies, which were effectively gentlemen's clubs, were so resistant to change, so averse to opening their doors to women? Male scientists—supposedly enlightened and rational—were no better than their non-scientific peers.

This book explores how prejudice and ignorance in those societies were slowly overcome by a small band of women, and their sympathetic male supporters. Or, as Bernard might have put it, '...how women became clubbable'.



## REFERENCES

- Cock, A., and D.R. Forsdyke. 2008. *Treasure Your Exceptions: The Science and Life of William Bateson*. New York: Springer.
- Darwin, B. 1943. *British Clubs*. London: William Collins.
- Gianquitto, Tina. 2013. Botanical Smuts and Hermaphrodites; Lydia Becker, Darwin's Botany and Education Reform. *Isis* 104: 250–277.
- Humphry, Charlotte E. 1898. *A Word to Women*. London: James Bowden.
- Rayner-Canham, Marelene F., and G.W. Rayner-Canham. 2003. Pounding on the Doors: The Fight for Acceptance of British Women Chemists. *Bulletin for the History of Chemistry* 28: 110–119.
- Schiebinger, Londa. 1999. *Has Feminism Changed Science?* Cambridge, MA: Harvard University Press.

## BY THE SAME AUTHOR

- Harry Marshall Ward and the Fungal Thread of Death.* 2005. St. Paul Mn.: American Phytopathological Society.
- The Aliveness of Plants. The Darwins at the Dawn of Plant Science.* 2008. London: Pickering and Chatto.
- Shaping Ecology: The Life of Arthur Tansley.* 2012. Chichester: John Wiley.
- Medicinal Plants in Wartime. Britain's Green Allies.* 2015. Kibworth: Matador.

## ACKNOWLEDGEMENTS

In pursuing the women who sought fellowship I needed practical help from many, many groups and institutions, and it was always given cheerfully and generously. The archivists and historians to whom I owe thanks are Nicola Allen (Woburn Abbey), Gill Butterfill and Philippa Lewis (Kew), Mark Carine, Helen Pethers, and Laura Brown (Natural History Museum), Elen Curran (James Allen's Girls School), Katrina Dean (Cambridge University Library), Brent Elliot (Royal Horticultural Society), William George (Essex Field Club), Alison Harvey (Cardiff University), Mary Henderson (Dundee Women's Trail), Debbie Hunt (Royal Microscopical Society), Nancy Janda (Hunt Institute for Botanical Documentation, Carnegie Mellon University, PA), Pete Kinnear (Dundee University), Paula Lightfoot (Yorkshire Naturalists Union), Gillian Murphy (London School of Economics), Kate O'Donnell (Somerville College, Oxford), Norman Porrett (British Mycological Society), Carol Sandford (Holmesdale Natural History Club), Carol Stewart (Strathclyde University), Naomi Sturges and Matilda Watson (Girton College, Cambridge), Anne Thomson (Newnham College, Cambridge), Annabel Valentine and Ellis Huddart (Royal Holloway College), Hannah Westall (Girton College, Cambridge), Alison Wheatley (Handsworth College). At the Linnean Society, Gina Douglas, and Liz McGow gave invaluable help.

On the trail of Mrs Farquharson, Claire Jones, Sarah Pedersen, Val Pollitt, and Lindy Moore were most helpful; on that of Emma Turner, James Parry kindly supplied a lot of information; and in my pursuit of Lilian Clarke, Dawn Sanders and Roy Vickery gave both insights and

encouragement. Cynthia Burek guided me most helpfully on the subject of Maria Ogilvie-Gordon, and John Maris introduced me to the family tree of the Embletons.

I thank Patricia Fara (Churchill College, Cambridge) and Jane Robinson (Somerville College, Oxford) for their interest and support. Old friends, Jeff Duckett and Miriam David, offered much-needed help and advice.

And, finally, the project would never have been initiated or completed without the unwavering support of my wife, Mary. To her I owe my greatest thanks.

## Praise for *Women and the Natural Sciences in Edwardian Britain*

“In this compelling history with modern relevance, Peter Ayres describes the female pioneers who realised that scientific success lay in solidarity. Networking towards the future, they campaigned for entry into universities, societies and laboratories, collectively achieving the individual recognition they deserved.”

—Patricia Fara, Fellow of Clare College, Cambridge and author of  
*A Lab of One's Own: Science and Suffrage in the First World War*

“This is discovery in the purest sense of the word: the revelation of something always there, but forgotten. In *Women and the Natural Sciences* Peter Ayres presents us with a group of fascinating pioneers. He polishes away the accretion of convention, institutional prejudice and natural diffidence, allowing their extraordinary—and ordinary—achievements to shine at last.”

—Jane Robinson, social historian and author of *Ladies Can't Climb  
Ladders: the Pioneering Adventures of the First Professional Women*

# CONTENTS

1	Fellowship and a Woman's Place in Edwardian Britain	1
2	Joining the Like-Minded. Societies and Meeting Places	11
3	Educational Opportunities for Girls and Women	33
4	How Mrs Farquharson Triumphed but Was Excluded from a Glittering Occasion	59
5	Miss Sargant and a Botanical Web	81
6	Approved by Mrs Farquharson?	113
7	Microbiology Learned Through Practice	127
8	An Unavoidable Need for Male Support	145
9	Diverse Paths to Dentistry, Exploration, and Wildlife Photography	165

<b>10 They Sought Fellowship but Did They Make Good Fellows?</b>	187
<b>Appendix: The First Female Fellows of the Linnean Society</b>	201
<b>Bibliography</b>	203
<b>Index</b>	217

## LIST OF FIGURES

- Fig. 2.1 Over 40 men and women of the Essex Field Club gathered at Tyler's Common, near Upminster, on 26 July 1890. (Source: Permission of the Essex Field Club) 22
- Fig. 3.1 Newnham College teaching staff, 1896. Back row: Helen Klaassen (second from left); front row: Ida Freund (third from left); Eleanor Sidgwick (fifth), Margaret Tuke (sixth), and Philippa Fawcett (far right). (Source: Reproduced by courtesy of the Principal and Fellows of Newnham College, Cambridge) 44
- Fig. 3.2 The Balfour Biological Laboratory for Women, University of Cambridge. The bust of Francis Maitland Balfour overlooks the students' worktables. The laboratory was housed in what had formerly been a Congregational chapel. (Source: Reproduced by courtesy of the Principal and Fellows of Newnham College, Cambridge) 46
- Fig. 3.3 Setting off on a geological expedition to the Lake District, July 1890. Thomas McKenny Hughes is seated, front left; his wife, Carrie, stands near right (both wear 'deer-stalker' hats). An anonymous correspondent of *The Queen and Lady's Newspaper* (2nd August 1890), observed that while the young women arrived 'anaemic and nervous', they left 'rosy and vigorous' after twelve days in wind and rain. (Source: Courtesy of The Sedgwick Museum of Earth Sciences, University of Cambridge) 53



- Fig. 4.1 Mrs Robert Farquharson (née Marian Ridley), (a) during her marriage and sometime before 1898, (b) ca. 1903–1904, during widowhood at Tillydrine House. Her attempts to join the Linnean and other societies were made in the years between the photos. (Source: Fig. 4.1a is from Fraser-Mackintosh (1898), Fig. 4.1b is from Royle (1903)) 60
- Fig. 5.1 First year students at Girton College, Cambridge, 1881. Ethel Sargent is on the left end of the middle row. (Source: Permission of the Mistress and Fellows of Girton College, Cambridge) 84
- Fig. 5.2 The Suffrage Shop in Tunbridge Wells, Kent, a centre for fund raising, ca. 1910. (Source: <https://www.flickr.com/photos/lseilibrary/40080806642/in/photolist-244NBqo>) 90
- Fig. 5.3 Margaret Benson, Head of the Botany Department at Royal Holloway College, Egham, Surrey. (Source: Supplied from the archives (PP26/10/7) of Royal Holloway College, University of London) 94
- Fig. 5.4 Kammatograph. The device was invented and patented by Leonard Kamm of Powell Street, London. (Source: From Jones, Claire. 2010. Bodies of Controversy. Women and the Royal Society. *HerStoria Magazine*, 6: 20–24) 106
- Fig. 5.5 Ethel Sargent, centre front, among botanists at the 1913 meeting of the British Association for the Advancement of Science. Also in the front row are (left to right); G.S. West, R.H. Yapp, O. Stapf, J. Reinke, D.H. Scott, and F.W. Oliver. (Source: Courtesy of the Hunt Institute for Botanical Documentation, Carnegie Mellon University, Pittsburgh, PA) 109
- Fig. 6.1 Alice Embleton, on the left, and Celia Wray, in the centre, of a group of suffrage supporters photographed in Barnsley, Yorkshire, after the General Election of 1910. Sir Joseph Walton, the successful Liberal candidate, had voted in favour of the Women's Enfranchisement Bill of 1908. In the election, 7560 signatures were separately collected in favour of women's suffrage. (Source: <https://www.flickr.com/photos/lseilibrary/31268307763>) 124
- Fig. 7.1 Gulielma Lister, 1926, or 'Miss Gully' as she was known around the small Dorset town of Lyme Regis. She was President of the Essex Field Club, 1916–1919. (Source: Permission of the Essex Field Club) 135
- Fig. 8.1 Edith Saunders. (Source: Permission of the Principal and Fellows of Newnham College, Cambridge) 159

- Fig. 9.1 Pupils ‘learning by doing’ at the James Allen’s Girls’ School. The ‘Botany Gardens’ were the idea of Lilian Clarke. Originally set out as a series of systematic beds, she later changed them (with the guidance of Arthur Tansley) to represent different ecological types found in Britain: heath, bog, salt marsh, sand dunes, etc. (Permission of James Allen’s Girls’ School, Dulwich) 171
- Fig. 9.2 Emma Turner’s accommodation while working on the Norfolk Broads. The houseboat on the right, *The Water-Rail*, was her main living accommodation. An island provided a safe anchorage on Hickling Broad and a place for a small hut, in which she had a darkroom and sleeping accommodation for visitors. Her one constant companion was a large dog, which may be seen to the left of the hut 182



## CHAPTER 1

---

# Fellowship and a Woman's Place in Edwardian Britain

As the twentieth century opened, women were increasingly challenging a world designed by and for men, their confidence enhanced by the better education they were enjoying. Educational reform, in particular the formation of the Girls Public Day School Company (1872), had led to the foundation of schools that recognised the importance of both the quality of their teaching and the range of subjects taught. Ever greater numbers of girls from upper and middle-class homes were attending school, rather than being educated at home, most girls receiving thereby at least a rudimentary education in the natural sciences. And for many girls, they found science was to their liking. Conveniently for them, educational reforms in late Victorian times had extended to the universities where, in conjunction with the opening of new colleges and halls of residence for women, more science courses were admitting women. Male tutors may not have always been welcoming, limited laboratory facilities were not always shared equally with male students, and field work presented for women special problems associated with dress and chaperonage, but women were not deterred; this in spite of the fact that the many who studied at Oxford or Cambridge were not allowed *formally* to graduate until 1920 and 1947, respectively.

The difficulties experienced by women while undergraduates were nothing compared with those faced subsequently if they wished to undertake post-graduate work and, ultimately, make a career in science. As Marsha Richmond (1997) concluded from her examination of Cambridge's

Balfour Biological Laboratory for Women, ‘women were excluded from the social community of science’. Unlike The Balfour, few laboratories in Britain offered either bench space or employment for women graduates. A small handful of women were wealthy enough to be able to finance their own research laboratories, while others were able and willing to survive on unpaid work, if they could find laboratory space and a sympathetic research director or head of laboratory. Many more women could only pursue a career in science if they could find paid employment, and that brought them into direct competition with men.

Women’s social exclusion from the community of science was due to many factors, not least the contemporary prejudices of many male scientists concerning both the intellectual and physical abilities of women. One aspect of social exclusion, which has remained largely unexplored until now, was the difficulty women faced in joining scientific and learned societies—a difficulty which was a consequence of male prejudices, and a desire for exclusivity. In order to know and be known by potential research directors and employers, a women needed interactions with male scientists of seniority and influence, but how and where could those interactions occur in a proper and socially acceptable manner? The most practical place would be within the learned societies associated with each science. These gave their male members the chance to air their ideas, to test the results of their research, and a means of becoming known personally by their peers, but women were denied those same opportunities because they were denied formal Fellowship of most societies—they were disadvantaged. The botanist and suffrage campaigner, Lydia Becker, argued that such exclusion lay at the heart of ‘the scientific disabilities of women’ (Bernstein 2006, 87).

This book tells how women successfully fought to be included in the social community of science; specifically, how they won the right to join scientific societies and no longer be disadvantaged as they sought to find a work place and build a career. Success was in some cases attributable to the efforts of individual women, in other cases to the supportive networks which women built. It will be seen that there was support too from sympathetic men; men who often worked within societies to overcome the prejudices of the fellows and persuade them of the advantages of admitting women.

## TARGETS FOR MIDDLE-CLASS WOMEN

The term 'Edwardian Era' includes strictly the years, 1901–1910, when Britain was ruled by Edward VII, but it is often stretched, as here, to include the 1890s when, as Prince of Wales, 'Bertie' set the tone of the nation. Both before and after his coronation, in 1902, he openly enjoyed a string of mistresses, Frances 'Daisy' Greville, the Countess of Warwick, being one of them (Heffer 2017, 89). Renowned for her beauty, Daisy was exceptional in another way, for she was a social reformer intent on improving the lot of women—though, for her, this meant those middle-class ones having some education.

According to the national census of 1901, such middle-class women comprised about 5% of that part of adult female population which was self-supporting, either by necessity or choice. The remaining 95% of self-supporting women were from the working-classes, labouring mostly in industry or domestic service and having little or no education. Daisy's particular interest was in agriculture and horticulture and it was in those areas, which she termed 'the lighter classes of agriculture', that she sought to provide training and job placements, healthy alternatives to a dreary life that might otherwise be spent as a governess. The typical target of her plans would be a middle-class women who had a small inheritance but who needed to make it work for her financially, just as it might in a small, well run, horticultural establishment (Scott 2017, 47). In 1898, Daisy established the Lady Warwick Hall (of residence) in Reading, a forerunner of the University of Reading, where women could be taught by staff of the Oxford University Extension College. In 1903 her establishment moved when she set up the much larger and independent Studley Horticultural and Agricultural College for Women, in Warwickshire. Subjects such as entomology found their way onto the curriculum but, generally, there was little emphasis on science *per se*. In dealing with only the 'lighter classes of agriculture', the ambitions of the college were strictly gendered, not extending to full equality of the sexes (Opitz 2014).

In another sphere, however, Daisy was more ambitious. She founded the Lady Warwick Agricultural Association for Women which, as reported by *The Times* of 21st October, 1899, had two days earlier held its first annual meeting—at Stafford House, St James, London—when, as part of the proceedings

*The chairman moved, and Mrs Garrett Anderson MD seconded, a resolution: That it is desirable and important that duly qualified women should have the advantage of full fellowship in Scientific and other Learned Societies, e.g. the Royal, the Linnean and the Royal Microscopical.*<sup>1</sup>

The targets had been identified.

In support of the motion, a paper by Mrs Farquharson of Haughton was read, though in her absence by Mr R. Moran. Already committed to joining scientific societies, as and when an opportunity arose, Marian Farquharson was greatly encouraged by the tone of Lady Warwick's meeting, its aristocratic leadership, and the publicity it received (Anon. 1899). She was already a member of the Royal Microscopical Society, though not a *full* member since women's involvement with that Society's activities was limited until 1909, and her scientific achievements fell way short of those required for a fellowship of the Royal Society, so she focussed her attention on the Linnean Society, the world's oldest extant biological society. By the end of 1904 she had successfully persuaded that Society to make women fellows—known at the time as 'Lady-Fellows' and sometimes referred to here as Linnaeus' Ladies—although she paid a price, for her own application was rejected. The Linnean was not the first, but it was *among* the first scientific societies to admit women; thanks to the widespread respect in which it was held, it set an important precedent for other societies.

## FELLOWSHIP AND WOMEN

Fellowship, or membership, of such a society was of fundamental importance because it provided not only a vital meeting place where women could, in theory, meet and mix freely with male fellows but it also carried with it a range of other practical benefits. Thus, fellowship gave access to specialist libraries, to museums, and to reference collections, that is to established learning. Fellowship offered places where a passionate interest could be shared with other enthusiasts, and it provided opportunities to learn from friendly experts.

<sup>1</sup>The chair was Mr Marshall Dugdale, barrister and High Sheriff of Montgomeryshire. Stafford House was a home of the 4th Duke of Sutherland. His wife, Millicent, was half-sister to Daisy Warwick and, like her, a renowned society hostess and social reformer.

The idea of fellowship represented something else, more tantalising than even those practical benefits. The very exclusive and elusive nature of fellowship made it a prize in its own right, something which demonstrated women's equality with men.

No longer satisfied with membership of one or more of the various field clubs which had opened up across Britain during the later decades of the nineteenth century, many women were thus actively seeking fellowship, knocking with increasing fervour on the doors of scientific societies, hoping to gain admission—though in many cases being disappointed.

Later chapters will explore the lives of those women who were successful in becoming the Linnean's first female fellows because they provide a panoramic snapshot of women's involvement in the natural sciences in the Edwardian Era, their interests ranging through botany, geology, and genetics, and their qualifications from nothing formal to the possession of higher degrees. Some were the products of the old methods of private tuition while, in contrast, others had passed through well-endowed schools offering a diversity of educational experiences. These, and the women who struggled to join comparable societies, illustrate also how limited was the range of opportunities available in later life, even for those who were the most highly educated and motivated to play an active role in the natural sciences. They were not in the main the highest-fliers scientifically; they were not immortalised by discoveries forever associated with their names. They did, however, commit their lives to the natural sciences, in some cases being paid for their work, in other cases not. By their example they made easier the path for succeeding generations of women who aspired to play a full part in the natural sciences—as the equals of men.

### PROFESSIONALIZATION OF THE NATURAL SCIENCES

Within late-Victorian Britain a gradual change was happening which was to have a significant bearing upon women's struggle to join scientific societies. It was professionalisation, and it affected the ambitions of men as well as those of women. The source of new knowledge was increasingly the laboratory, a place where studies relied on complex and expensive equipment; equipment operated by highly skilled professionals. Amateurs could still contribute to the sciences, as the lives of many of our subjects will show, but the pressure on women to join the culture of the professional laboratory was growing inexorably. In this respect, the Edwardian era was one of accelerating transition.

The history of British science in the eighteenth and nineteenth centuries is replete with examples of major advances made in country houses, either by the aristocratic or wealthy owners, or by their poorer protégées. Thus, in the late eighteenth century Lord Shelburne's Bowood House in the deepest countryside of Wiltshire became famous not only as a weekend meeting place for the leading intellectuals and politicians of the day but as somewhere that sheltered and provided a laboratory for the researches of two brilliant mavericks, the Unitarian preacher Joseph Priestley and the Dutch émigré Jan Ingen Housz, men who *inter alia* contributed significantly to our understanding of photosynthesis in green plants (Beale and Beale 2011, 411).<sup>2</sup>

Moving forwards 100 years, and involving some whose names will recur later, Lord Rayleigh's scientific endeavours and social circle were based on three large estates; his own, Terling Place near Chelmsford in Essex (where in the West Wing in 1894 he conducted his Nobel Prize winning researches on argon—the 'noble gas' he discovered in collaboration with William Ramsay), Whittingehame in East Lothian (the 86-roomed neo-classical home of his brother-in-law and future Prime Minister, Arthur James Balfour), and Hatfield House, in Hertfordshire. The number of scientific papers produced by Rayleigh from those houses far exceeded those originating from his time (1879–1885) as Director of the Cavendish Laboratory in Cambridge. At Whittingehame there was an extensive collection of fish, bird, insect, and fossil specimens, which helped inspire the career of Arthur's young brother, Francis Maitland Balfour, the future Cambridge zoologist (Chap. 3). The collection of Lepidoptera was especially fine, thanks to their sister Alice's lifelong efforts (she became in 1916 a Fellow of Royal Entomological Society, a society whose doors had always been open to women) (Opitz 2004).

The tensions current through the Edwardian Era are illustrated by the life of Dukinfield Henry Scott, Botanical Secretary of the Linnean Society from 1902 to 1908. On the one hand, Scott was old fashioned for his family wealth meant that he never had to rely on paid employment. On the other hand, he was a thoroughly modern laboratory researcher: like many other British botanists and zoologists, and chemists too, when he was young he had been attracted to study in a German university. 'The chief characteristic of German university life', said Scott, 'was the dominance of research over mere learning' (Scott 1925). There was emphasis on

<sup>2</sup>Ingen Housz was also a guest of the Earl of Warwick, a forebear of Daisy's husband.