

Eleanor Ormerod (1828–1901) as an economic entomologist: ‘pioneer of purity even more than of Paris Green’†

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Ah, but Eleanor, the Bot and Hessian have more power over you.... Under the microscope you clearly perceive that these insects have organs, orifices, excrement; they do, most emphatically, copulate. Escorted on the one side by the Bos or Warble, on the other by the Hessian Fly, Miss Ormerod advanced stately [*sic*], if slowly, into the open.... Upon her head the hood of Edinburgh most fitly descended; pioneer of purity even more than of Paris Green.¹

In 1924, Virginia Woolf wrote a short story based upon the life of Eleanor Ormerod. A wealthy spinster, Ormerod achieved notoriety in late nineteenth-century Britain as an economic entomologist. In 1904, *Nature* compared her to Caroline Herschel and Mary Somerville.² In terms of recent scholarship devoted to the history of women in science, Ormerod’s career differed markedly from that of her two predecessors.³ The emotional or intellectual support of a brother, husband, father, or male family relation made no considerable contribution to her commitment to the study of entomology. Furthermore, her life as an independent spinster offered no positive proof for Francis Power Cobbe’s dictum: as she aged, Eleanor Ormerod showed no tendency to become a ‘women’s rights woman’.⁴ She publicly accepted or internalized the dominant, masculine ideology of science;⁵ and by contemporary standards, she achieved success.⁶

† *Editor’s note.* This essay was a specially commended entry in the Society’s Singer Prize Competition.

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1 Virginia Woolf, ‘Miss Ormerod’, *The Dial* (December 1924), 77, 471.

2 ‘A lady entomologist’, *Nature* (7 July 1904), 70, 219–20. On Somerville and Herschel, see Elizabeth C. Patterson, ‘Mary Somerville’, *BJHS* (1969), 4, 311–39; and Peggy Aldrich Kidwell, ‘Women astronomers in Britain, 1780–1930’, *Isis* (1984), 75, 534–47.

3 See, for instance, Pnina G. Abir-Am and Dorinda Outram (eds.), *Uneasy Careers and Intimate Lives: Women in Science 1789–1979*, London, 1987. Although more in the ‘listing’ tradition, Margaret Alic, *Hypatia’s Heritage: A History of Women in Science from Antiquity to the late Nineteenth Century*, London, 1986, tends to be a retrieval of great women behind, or beside, great men.

4 Sally Gregory Kohlstedt, ‘Maria Mitchell and the advancement of women in science’, in Abir-Am and Outram (eds.), op. cit. (3), 134.

5 In this respect, Ormerod’s story falls short of the goals of present-day feminism. A recent trend among overtly feminist historians of science is the search for a ‘female epistemology’. See Sylvana Tomaselli, ‘Collecting women: the female in scientific biography’, *Science as Culture* (1988), 4, 95–106. Evelyn Fox Keller, ‘A world of difference’, in her *Reflections on Gender and Science*, London, 1985, 158–76, posits the career of geneticist Barbara McClintock as a partial example of a female epistemology of science.

6 I do not pretend to be a ‘knight errant’ rescuing Ormerod from the tower of neglect; she managed to achieve a modicum of contemporary fame. See Robert Wallace, ‘Ormerod, Eleanor Anne’, *DNB*, Oxford, 1912, 53–4; S. A. Neave and F. J. Griffin, *The History of the Entomological Society of London, 1833–1933*, London, 1933, 155–6; Marilyn Bailey Ogilvie, *Women in Science, Antiquity through the Nineteenth Century: A Biographical Dictionary with Annotated Bibliography*, London, 1986, 142–3; and Alic, op. cit. (3), 116–17.

Although for most of her active career in entomology Eleanor Ormerod shared a house with her older sister, Georgiana, and a female amanuensis, very little historical evidence of this sphere of Ormerod's life remains. Moreover, as a spinster, living under these domestic arrangements, she escaped some of the trappings of the sexual division of labour, which helped demarcate separate spheres. And as a wealthy, socially conservative woman, she did not suffer from the prejudice faced by working-class women. But, as recent literature on class and race in women's history has demonstrated, the prescriptive ideal of womanhood and the reality of women's experiences were complex and multifaceted.⁷ Contemporary racial ideology relegated *all* women to one of the 'lowest rungs on the social ladder'. In addition, Ormerod's status as a spinster rendered her sexually suspect beyond the bounds of institutions – patriarchal household, religious or philanthropic sisterhoods – which guarded accepted feminine purity.

Eleanor Ormerod was socially marginalized because of her gender. This paper attempts to demonstrate Ormerod's use of science to achieve social legitimacy and prestige. Furthermore, I argue that her marginalization was fundamental to her development of a new specialty – economic (or agricultural) entomology – which lay in the penumbra of natural and agricultural science. Her public acceptance and dissemination of a masculine ideology of science *did not* negate Eleanor Ormerod's gender consciousness. Through a narrative of her life and an analysis of several of her professional campaigns, I shall demonstrate the manner in which Ormerod confronted the prescriptive ideal of a spinster. She used professional status to justify campaigns which challenged accepted notions of feminine purity.

Born 11 May 1828, Eleanor Anne Ormerod came to maturity at a time when the commentators of genteel Victorian society confronted a perceived increase in the number of unmarried women.⁸ Harriet Martineau, the renowned Radical, raised the alarm with an article that appeared in *The Edinburgh Review* in 1859. Employing the census statistics for 1851, Martineau drew attention to the large disproportion between the sexes:⁹ over half a million 'redundant' women faced no hope of marriage.¹⁰ The 1850s and 1860s witnessed a plethora of articles and pamphlets addressing the 'spinster problem'.¹¹ In a society faced with the stormy vicissitudes of rapid social and economic changes, well-defined ideological

7 For good historiographical essays, see Sylvana Tomaselli, 'Reflections on the history of the science of women', *History of Science* (1991), 29, 185–205; Sally Shuttleworth, 'Patriarchal science', *Science as Culture* (1991), 2, 443–57; and Dorinda Outram, 'Fat, gorillas and misogyny: women's history in science', *BJHS* (1991), 24, 361–7.

8 Lee Holcombe, *Victorian Ladies at Work*, Newton Abbot, Devon, 1973, 10–11; Eleanor Ormerod, *Eleanor Ormerod, LL.D. Economic Entomologist. Autobiography and Correspondence* (ed. Robert Wallace), London, 1904, 2.

9 [Harriet Martineau], 'Female industry', *The Edinburgh Review* (April 1859), 109, 293–336, looks at the plight of women forced to earn a living because of the disproportion between the sexes.

10 See: Michael Anderson, 'The social position of spinsters in mid-Victorian Britain', *Journal of Family History* (Winter 1984), 9, 377–93, for a quantitative analysis of the 1851 census statistics as they pertain to single women.

11 As a sample of the vast literature devoted to 'redundant women' in Victorian England, see *ibid.*; Ruth Freeman and Patricia Klaus, 'Blessed or not? The new spinster in England and the United States in the late nineteenth and early twentieth centuries', *Journal of Family History* (Winter 1984), 9, 394–414; Jane Lewis, *Women in England 1870–1950*, Sussex, 1984, 3–14; and Martha Vicinus, *Independent Women*, London, 1985, 1–45.

parameters and social institutions were the anchors of stability.¹² Since the mid-eighteenth century, a doctrine which relegated woman to the private sphere and left man to the public sphere was increasingly espoused. Falling beyond the veil of marriage and the patriarchal household, the spinster represented a challenge to the Victorian ideal of domesticity and dependence.

At a time when social commentators and early feminists alike grappled with the redefinition of woman's role in society, Eleanor Ormerod charted a unique course. By her own account, she began her intensive study of entomology in March 1852.¹³ At twenty-four, she would not have been faced with the inevitable prospect of spinsterhood through the constraints of age. Although commentators depicted old maids in their mid-twenties and thirties, in reality the age of marriage in Victorian Britain was highly dispersed.¹⁴ But Ormerod faced further delimiting factors that made marriage an unlikely eventuality. Born into a wealthy county family, her sole avenue to marriage would have been through the increasingly rigid rites of upper-class Society.¹⁵ The passage of a girl into a woman marked the transition 'into Society'. Ironically, Society authors most frequently employed the metaphor of a butterfly emerging from a chrysalis: Ormerod never emerged, as such. Although her father, George Ormerod, attended to his duties as magistrate for the counties of Cheshire, Gloucester and Monmouth, he cared little for Society.¹⁶ An amateur historian, George Ormerod occupied himself with 'literary and topographical' interests and led a reclusive life. This decision bore important repercussions for the entire family: none of the three daughters, and only three of the seven sons married.

Deprived of access to Society, Eleanor Ormerod, like countless other unmarried women of her class, lacked any alternative institution to escape the strict family discipline. Like Constance Maynard (1849–1935), a pioneer in higher education, Ormerod must have sought out the far reaches of the family estate just to attain privacy;¹⁷ and to flee the 'autocratic' rule of her father. Eleanor Ormerod spent more than half of her life on her father's 800-acre estate in Gloucestershire, between the Severn and Wye rivers. Natural history pursuits lent purpose to her flights for privacy. In March 1852, at age twenty-four, her studies became more specialized. Armed with a copy of James F. Stephens's (1792–1852) *Manual of British Coleoptera or Beetles* (1839), she proceeded to make an intensive examination of one facet of entomology. Presciently, she began by dissecting her arthropodal prey, and learning the intricacies of its anatomy.

The precipitating event that shot Eleanor Ormerod beyond the confines of familial privacy was the death of her father in 1873. Ormerod was among one of the fortunate 20

12 Vicinus, op. cit. (11), 2–10. Leonore Davidoff, *The Best Circles*, London, 1973, demonstrates how Society became a more rigid, formalized institution in response to the flux and uncertainty of the first half of the nineteenth century. Through an insightful analysis of a cluster of dichotomies, L. J. Jordanova, 'Natural facts: a historical perspective on science and sexuality', in *Nature, Culture and Gender* (ed. Carol P. McCormack and Marilyn Strathern), Cambridge, 1980, 42–69, looks at the role that science played in propagating an ideology bent on the creation of clear gender demarcations.

13 Ormerod, op. cit. (8), 53.

14 Anderson, op. cit. (10), 392.

15 Davidoff, op. cit. (12), 50–2.

16 For information on George Ormerod, see Ormerod, op. cit. (8), 8–12. An excellent analysis of the Ormerod home life is given by Eleanor Ormerod's cousin, Diana Latham, in *ibid.*, 14–19.

17 Vicinus, op. cit. (11), 14.

per cent of Victorian spinsters supported in later life by some form of inheritance.¹⁸ Upon the break-up of the family home, she and her older sister Georgiana removed themselves to the residence of an uncle, Dr Mere Latham, in Torquay.¹⁹ After three years, the two sisters moved to a home of their own at Spring Grove, Isleworth, where they could be closer to London, and to Joseph D. Hooker, director of Kew Gardens, and his wife. Until she and her sister made their final move to Torrington House, St Albans, Hertfordshire, in 1887, Ormerod exploited her intimacy with the Hookers to continue her entomological investigations in the gardens at Kew.

A half century earlier, Britain's 'queen of science', Mary Somerville, required the independence and freedom of widowhood and an inheritance before she could seriously devote herself to her mathematical studies.²⁰ Ormerod's entomological contributions to a wider audience began after the death of her mother in 1860, and in the final years of her father's protracted illness. In 1868, Ormerod responded to a plea from the Royal Horticultural Society and the Science and Art Department. Through the pages of the *Gardeners' Chronicle and Agricultural Gazette*, these two organizations requested aid in the creation of a collection illustrative of insects baneful and beneficial to British agriculturists and horticulturists.²¹ For approximately ten years, Ormerod submitted insect specimens which either she or the estate's agricultural labourers had procured. This activity, however, was merely a prelude to her later efforts. Eleanor Ormerod's entomological endeavours 'were not approved of nor taken seriously by some of her elders, and could not have been carried out until after the break up of the home on the death of Mr. Ormerod'.²²

In Victorian England, marriage was a social definition of singular importance for women. Pruned for the narrow confines of the private and personal spheres, a girl's education was usually restricted to the honing of talents – drawing, music, foreign languages – necessary for the Society setting.²³ As the Schools Enquiry Commission reported in 1867: 'The wealthiest class very generally do not send their daughters to school'.²⁴ Eleanor Ormerod was no exception. While her brothers benefited from the musings of Thomas Arnold at Rugby, she received instruction from her mother at home.²⁵ Moreover, although the Ormerod family participated little in the rounds of Society, they restricted their daughters' educational curricula to Society skills – moral precepts, French, drawing and music.

Single women confronted the plight of ideological and economic marginality in mid-Victorian Britain. As the number of spinsters grew, ideologues and social commentators sought new roles for them that would not rupture the underpinnings of the division of the

18 Anderson, *op. cit.* (10), 382.

19 Diana Latham, in Ormerod, *op. cit.* (8), 19; Robert Wallace, in *ibid.*, 73.

20 See: Patterson, *op. cit.* (2).

21 Ormerod, *op. cit.* (8), 54–5.

22 Latham, in *ibid.*, 16.

23 Davidoff, *op. cit.* (12), 92–3.

24 Quoted in W. J. Reader, *Professional Men*, London, 1966, 170. Holcombe, *op. cit.* (8), 22–3, discusses the Taunton Commission and women's education.

25 Ormerod, *op. cit.* (8), 3–4.

sexes. In two private lectures, delivered in 1855 and 1856, the early feminist Anna Jameson offered a solution.²⁶ Women, she suggested, could bring the domestic world into the public sphere. By helping the sick and weak, women could devote their natural, maternal skills to the regeneration of society. Institutional communities, such as sisterhoods and deaconesses, offered an alternative to the patriarchal household, and, at the same time, permitted single women to play a nurturing, public role. Their feminine purity intact, single women could enter new forms of work.

Only when taken in this historical context, do the achievements of Eleanor Ormerod become remarkable. In 1892, the wealthy philanthropist and anti-vivisectionist Baroness Burdett-Coutts wrote to Ormerod and requested an account of the ‘genesis of her organization’.²⁷ Proudly bemused, she confided to a correspondent, ‘What could I say? There is not a woman but myself and my sister in it’. Eleanor Ormerod was of the same ‘heroic generation’ as Florence Nightingale.²⁸ Both were exceptional Victorian women who placed faith in individual efforts, and had no time for vocal feminist causes. After Ormerod delivered a paper on ‘Injurious Insects’ at the Richmond Athenaeum in March 1882, Lydia Becker (1827–90), an accomplished botanist and a vocal proponent of feminism,²⁹ publicly praised Ormerod as ‘proof of how much a woman could do without the help of man’.³⁰ Ormerod deftly responded that she relied upon the generosity and support of men to accomplish her tasks.

In 1877, with the freedom of spinsterhood, and the independence of an inheritance, Eleanor Ormerod ‘captured an unclaimed area’, upon which she built a public³¹ career.³² In the last quarter of the nineteenth century, there were numerous calls for the creation of a government entomologist in Britain. Before the Select Committee on Wild Birds Protection (1873), entomologist Albert Müller and ornithologist C. O. Groom Napier invoked the example set by the United States in a call for the establishment of a British government entomologist.³³ In 1876, several articles in *The Times* highlighted government sponsored economic entomology in the USA and in France, and concluded: ‘What course will be followed in England has not yet been announced’.³⁴ Facing the perceived threat of an imminent invasion of the Colorado potato beetle one year later, Andrew Murray (1812–78), a member of the Scientific Committee of the Royal Horticultural Society,

26 Mrs [Anna] Jameson, *Sisters of Charity and the Communion of Labour. Two Lectures on the Social Employments of Women*, London, 1859. For the historical significance of these lectures, see Vicinus, op. cit. (11), 15; and Holcombe, op. cit. (8), 9.

27 Ormerod to Dr J. Fletcher, 21 November 1892, in Ormerod, op. cit. (8), 214.

28 Vicinus, op. cit. (11), 33–4, discusses Florence Nightingale in the context of a ‘heroic’ generation.

29 Ann B. Shteir, ‘Botany in the breakfast room: women and early nineteenth-century British plant study’, in Abir-Am and Outram (eds.), op. cit. (3), 36–7, 39.

30 Lady Hooker, quoted in Ormerod, op. cit. (8), 86.

31 Unless stated otherwise, I use the term ‘public’ to indicate a wide, popular recognition.

32 ‘At first women did not claim arenas already controlled by men...; rather, they captured unclaimed areas and pushed out from there’. Vicinus, op. cit. (11), 15.

33 See the evidence of Albert Müller in, *Parliamentary Papers* [hereafter PP], 1873, 13, *Select Committee on Wild Birds Protection*, 795–9. Specifically, Q. 3121; and C. O. Groom Napier, ‘Statement as to the reproductive powers of insects. Appendix No. 3’, in *ibid.*, 825–7.

34 The quotation comes from: ‘Insectology’, *The Times*, 4 October 1876, 10, col. 6. In addition, see ‘Economic entomology’, *The Times*, 16 September 1876, 11, col. 2.

brought the matter before the Privy Council, only to face inaction.³⁵ At the behest of Dr Maxwell Masters (1833–1907), editor of the *Gardeners' Chronical*, and John Chalmers Morton (1821–81), editor of the *Agricultural Gazette*, Eleanor Ormerod responded to the calls for an entomologist and issued a short, seven-page pamphlet, entitled *Notes for Observations of Injurious Insects*, in early 1877.³⁶

Notes for Observations of Injurious Insects was, in fact, a questionnaire. As such, it harkened back to at least the seventeenth century.³⁷ In 1665, for instance, the Royal Society's 'Georgical Committee' issued its 'Enquiries'. By the nineteenth century, the questionnaire had become part of the standard methodological tradition within natural history. When Dawson Turner and Lewis Weston Dillwyn needed information for their *Botanist's Guide* (1805), they circulated a four-page questionnaire throughout the country. Upon the founding of the Geological Society in 1807, George Greenough and Arthur Aiken distributed their *Geological Inquiries* to members. In 1839, Charles Darwin distributed his *Questions on the Breeding of Animals* in an early, unsuccessful attempt to gather information on artificial selection. With these models before her, Eleanor Ormerod began to build a career in entomological 'network research'. In the autumn of 1877, she published and distributed a compilation of the information she had gleaned in the form of her first 'semi-official' annual report. The reports, which ran continuously until 1900, were sold for 1s 6d. As this price was below the cost of production, Ormerod retained the respectability of a gentlewoman, through the pretext of philanthropic work, and at the same time, 'nurtured' a publicly visible career.

Significantly, eminent agriculturists and horticulturists initiated Ormerod's first public foray into the field of economic entomology. The 'unclaimed area', that a socially marginalized person could capture, was the borderland between natural and agricultural science.³⁸ The greatest representative of metropolitan entomological science – the Entomological Society of London (established 1833) – played only an incidental role in the promotion of economic entomology: the collection and classification of nature's insects remained the primary concern of its members throughout the nineteenth century. Andrew Murray, the most active exponent of economic entomology in the years surrounding the Colorado Beetle Scare of 1877, rarely attended Entomological Society meetings.³⁹ John

35 Andrew Murray, 'On extirpation of injurious insects', *Journal of the Society of Arts*, (8 June 1877), 25, 734–8. On the Royal Horticultural Society, see Harold R. Fletcher, *The Story of the Royal Horticultural Society 1804–1968*, London, 1969.

36 Ormerod, op. cit. (8), 59–60; W. Fream, 'Agricultural entomology', *Journal of the Royal Agricultural Society of England* [Hereafter *JRASE*], 3rd series (1892), 3, 839–43; and Eleanor Ormerod, 'Notes for observers', [Reprint of 'Notes for observations of injurious insects', London, 1877] in her *Notes of Observations of Injurious Insects. Report, 1877*, London, 1878.

37 On 'network research' in natural history, see David Elliston Allen, *The Naturalist in Britain*, London, 1976, 67; James A. Secord, 'Darwin and the breeders: a social history', in *The Darwinian Heritage* (ed. David Kohn), Princeton, 1985, 528–33; and Reginald Lennard, 'English agriculture under Charles II: the evidence of the Royal Society's "Enquiries"', *The Economic History Review* (1932), 6, 23–45.

38 Secord, op. cit. (37), 519–42; and idem, 'Nature's fancy: Charles Darwin and the breeding of pigeons', *Isis* (1981), 72, 163–86, explore this borderland, and examine how marginalized agriculturists used science for social mobility.

39 'Andrew Murray, F.L.S.', *The Entomologist's Monthly Magazine* (1877–78), 14, 216. For information on the Colorado Beetle Scare of 1877, see J. F. McDiarmid Clark, 'Beetle mania: the Colorado Beetle Scare of 1877', *History Today*, December 1992, in press.

Curtis, the ‘father of economic entomology’, joined the Entomological Society after his reputation had already been made, and quickly resigned.⁴⁰ And Eleanor Ormerod, who probably did more than any other individual to promote economic entomology in Britain, placed little faith in the Entomological Society of London, as it had ‘no special bias towards applied Entomology’.⁴¹

In a lecture delivered at the Royal Agricultural College, Cirencester in 1881, Ormerod explicitly distanced herself from the nineteenth-century natural history tradition of collection and classification.⁴² The knowledge of insect *habits* and *structures* applied to the control and diminution of insect depredation of agricultural and horticultural crops was her stated concern. She thereby allied herself with an emergent group of agriculturists intent upon using science for purposes of social mobility or for the affirmation of cultural hegemony. Although the roots of this ideology of agricultural science lay in the late eighteenth century, science was not firmly wedded to agriculture until the Victorian era.⁴³ Armed with – and emboldened by – Justus von Liebig’s *Organic Chemistry in its Application to Agriculture and Physiology* (1840), a new generation of landed gentry and aristocracy adopted the ideology of agricultural science as a concomitant part of the new spirit of professionalism. Burdened with the increasing complexity and volume of government and landed estate business, and imbued with Clapham’s moral solemnity, the aristocracy subsumed the professional commitment to ‘laborious activity’ in an effort to maintain their social leadership.⁴⁴ By 1849, the *Quarterly Review* declared: ‘In England everybody farms.’ With the return of prosperity in the 1840s, landowners looked to artificial manures and new drainage techniques to place them at the forefront of agricultural progress.

One of the most prominent manifestations of the new and serious commitment to agricultural science was the establishment of the English Agricultural Society (the Royal Agricultural Society of England (RASE) after 1840) in 1838.⁴⁵ As a prelude to this, Henry Handley, Member of Parliament for Lincolnshire, published his influential *Letter to Earl Spencer... on the Formation of a National Agricultural Institution*. The substance of Handley’s *Letter* bears a striking resemblance to the ideology of science identified by Morris Berman.⁴⁶ Handley asserted that agriculture must follow the lead of ‘enterprising manufacturers’, and apply science and capital to improvements:

40 Neave and Griffin, op. cit. (6), 139–40.

41 Ormerod, op. cit. (8), 244.

42 Miss Eleanor A. Ormerod, *A Lecture on Injurious Insects Delivered at the Royal Agricultural College, Cirencester... on Thursday, October 20th, 1881*, Cirencester, 1881.

43 J. D. Sykes, ‘Agriculture and science’, in *The Victorian Countryside* (ed. G. E. Mingay), 2 vols., London, 1981, i, 260–72.

44 David Spring, *The English Landed Estate in the Nineteenth Century: Its Administration*, Baltimore, 1963, 45–58; idem, ‘Aristocracy, social structure, and religion in the early Victorian period’. *Victorian Studies* (March 1963), 6, 263–80; and G. Kitson Clark, *The Making of Victorian England*, London, 1962, 217–18.

45 On the founding of the RASE, see Ernest Clarke, ‘The foundation of the Royal Agricultural Society’, *JRASE*, 3rd series (1890) 1, 1–19; and Nicholas Goddard, *Harvests of Change: The Royal Agricultural Society of England 1838–1988*, London, 1988, 1–30. On the RASE’s contribution to agricultural science, see Sykes, op. cit. (43), 261; and Nicholas Goddard, ‘Agricultural societies’, in Mingay (ed.), op. cit. (43), i, 246–51.

46 Morris Berman, *Social Change and Scientific Organization*, London, 1978.

Science... by which is to be understood, that knowledge which is founded upon the principles of nature, illustrated by demonstration... is the pilot that must steer us into these hitherto imperfectly explored regions, where I am well convinced a mine of wealth is still in store for British agriculture. *Chemistry, Botany, Entomology, Mechanics, require but to be invited, to yield us a harvest of valuable information to guide and warn us* [emphasis mine].⁴⁷

With its motto – ‘Science with Practice’ – the resultant RASE was a triumph for the Baconian technological conception of science.⁴⁸ Amongst its objectives were: ‘to encourage men of science in their attention to the improvement of agricultural implements..., the application of chemistry to the general purpose of agriculture, the destruction of insects injurious to vegetable life, and the eradication of weeds’.⁴⁹

Desperate to earn a living as an entomologist, John Curtis (1791–1862) exploited the new commitment to agricultural science.⁵⁰ After moving to London in 1819, he worked as a writer and as a commissioned entomological agent for wealthy patrons, such as James Charles Dale (1791–1872).⁵¹ In 1824, Curtis embarked upon the publication of a collector’s work entitled, *British Entomology, Being Illustrations and Descriptions of the Genera of Insects found in Great Britain and Ireland*. Illustrated and written by Curtis, this serial publication ran to a total of 193 issues, and took fifteen years to complete. It left him a bitter and financially impoverished man. Upon his failure to gain a position at the British Museum in 1840, he spitefully decried:

I am sick of London & of Entomologists with a few exceptions, but love the Science as much as ever.... If I could afford it I would pile up my 3000£’s worth of stock [of *British Entomology*] in the Garden & set fire to it & then People would know the value of it.⁵²

In the same letter, he announced his intention to take up economic entomology. Curtis’s pioneering efforts in economic entomology must be seen in this context. In a sense, he forsook metropolitan entomological science, and turned to agriculturists for support and legitimation.

John Lindley may have been instrumental in Curtis’s reorientation. In 1841, Lindley and Joseph Paxton began publication of the *Gardeners’ Chronicle*. To this periodical, John

47 Henry Handley, *A Letter to Earl Spencer (President of the Smithfield Club) On the Formation of a National Agricultural Institution*, London, 1838, 6–7.

48 I realize that ‘Baconian’ is a protean term. Richard Yeo, ‘An idol of the market-place: Baconianism in nineteenth century Britain’, *History of Science* (1985), 23, 251–98, demonstrates that ‘Baconianism’ referred to an epistemology and methodology of science throughout the nineteenth century. I, therefore, qualify my use of Baconianism with ‘technological’ throughout this paper to distinguish it from nineteenth-century meanings and discussions of the term.

49 ‘Royal Charter, incorporating the English Agricultural Society as the Royal Agricultural Society of England. March 26, 1840’, *JRASE*, 2nd series (1876), 12, p. xxxvi.

50 G. Ordish, ‘Scientific pest control and the influence of John Curtis’, *Journal of the Royal Society of Arts* (1968), 116, 298–309; idem, *John Curtis and the pioneering of pest control*, Reading, 1974; idem, *The Constant Pest*, London, 1976, 146–66; and [J.O.] Westwood, ‘Notice sur John Curtis’, *Annales de la Société Entomologique de France* (1863), 3, 525–40. Goddard’s *Harvests of Change*, op. cit. (45), 94–138, helps place Curtis and Ormerod within the RASE’s expanding consultancy work.

51 ‘Obituary. James Charles Dale, M.A., F.L.S.’, *The Entomologist’s Monthly Magazine* (1872), 8, 255–6.

52 J. Curtis to J. C. Dale, Letter 190, 25 August 1840, Dale MSS, Hope Library, University Museum, University of Oxford.

Curtis submitted numerous articles on economic entomology, between 1841 and 1855, under the pseudonym 'Ruricola'.⁵³ In 1841, the RASE also commissioned him to contribute articles on injurious insects to its journal.⁵⁴ The series ran until 1857, and culminated in the publication of Curtis's *Farm Insects* in 1860.⁵⁵ Curtis explained to Dale in 1841: 'engaged as I am with two periodicals besides many other affairs... my hands are pretty full of what *must* be done to keep the Wolf from the door'.⁵⁶ John Curtis looked to agricultural entomology for economic and social mobility.⁵⁷

Following in Curtis's footsteps, Eleanor Ormerod constructed a large portion of her career upon an association with the RASE. As a woman, however, she faced obstacles unknown to her predecessor and to her colleagues. In the absence of a formalized system of institutions which determined career patterns, the sanction of voluntary institutions was particularly important for the budding, nineteenth-century British career scientist.⁵⁸ In May 1882, Eleanor Ormerod became Honorary Consulting Entomologist to the RASE.⁵⁹ This followed her election to the Entomological Society of London in 1878,⁶⁰ and the publication of five annual reports, a *Manual of Injurious Insects, with Methods of Prevention and Remedy* (1881), and a special report on the turnip fly (1882). As Honorary Consulting Entomologist, she prepared annual and periodic monthly reports, and responded to queries from members. She received no remuneration for her efforts.

Ormerod was torn between conflicting values. As a member of the landed gentry, she realized that receipt of money would taint her work.⁶¹ As a woman bent on a scientific career, she also realized that a fee conferred professional status and recognition. Eleanor Ormerod was content to remain honorary as long as she received respect and recognition. Ultimately, her resignation from the RASE resulted from a perceived affront to her status as a professional scientist.

In 1870, the government established the Veterinary Department as part of a response to rinderpest, or cattle plague. Thirteen years later, the Veterinary Department became the

53 For a complete list, see Westwood, op. cit. (50), 532–4.

54 John Curtis, 'Observations on the natural history and economy of the different insects affecting the turnip crop', *JRASE* (1841), 2, 193–213.

55 John Curtis, *Farm Insects*, Glasgow, 1860.

56 Dale MSS, Curtis to Dale, Letter 202, 22 December 1841.

57 On the uses of science for social mobility, see Arnold Thackray, 'Natural knowledge in cultural context: the Manchester model', *The American Historical Review* (1974), 79, 672–709; Morris Berman, "'Hegemony" and the amateur tradition in British science', *The Journal of Social History* (Winter 1975), 8, 30–50; and see Ian Inkster, 'Introduction: aspects of the history of science and science culture in Britain, 1780–1850 and beyond', in *Metropolis and Province: Science in British culture 1780–1850* (ed. Ian Inkster and Jack Morrell), London, 1983, 16–20, 39–45. S. E. D. Shortt, 'Physicians, science, and status: issues in the professionalization of Anglo-American medicine in the nineteenth century', *Medical History* (1983), 27, 51–68, applies Thackray's model of the marginalized, provincial man to a study of the process of the professionalization of medicine.

58 T. W. Heyck, *The Transformation of Intellectual Life in Victorian England*, London, 1982, 56–59.

59 'Report of the Council, May 22nd, 1882', *JRASE*, 2nd series (1882), 18, p. xxxii.

60 Rev. Canon Fowler, 'The President's Address', *The Transactions of the Entomological Society of London*, pt v, 1901, p. xxxiv.

61 When it was proposed that she should receive a government pension, Ormerod proclaimed: 'assuredly I should feel inexpressibly lowered if I accepted a pension'. See Ormerod to Robert Wallace, 1 April 1901, in Ormerod, op. cit. (8), 322.

Agricultural Department of the Privy Council. The latter, in turn, metamorphosed into the Board of Agriculture in 1889.⁶² Economic entomology found its way into the re-established Board of Agriculture through the agency of Charles Whitehead. In 1884, he proposed that reports on injurious insects should be published by the Agricultural Department.⁶³ Eleanor Ormerod assisted Whitehead with this government entomological work. Upon the formal creation of the Board of Agriculture, Whitehead received the paid position of Agricultural Adviser. Within two years of the appointment, Ormerod ceased her ‘underground (unacknowledged) Government work’. She explained:

I regretted very much indeed not continuing help I could give to Mr. Whitehead about his entomological Government work, but it was too severe a task, and it prevented my giving proper attention to my own, and likewise when the post of Agricultural Adviser was avowedly a paid one, I felt, and my friends felt, that if aid were needed it ought to be on a business footing and obtained from professional helpers.⁶⁴

Ormerod’s entomological work was not a form of disinterested philanthropy.

In 1891, the diamond-back moth threatened the turnip and swede crops of Great Britain. The Council of the RASE responded with a resolution to lend its assistance and its officials to a Board of Agriculture enquiry.⁶⁵ Charles Whitehead, a member of the Seeds and Plant Diseases Committee of the RASE, vocally supported this resolution: Eleanor Ormerod threatened to resign over it.⁶⁶ Clearly, she felt that the RASE resolution of 29 July 1891 was an attempt to force her back into the service of the Board of Agriculture. Entomological work on the diamond-back moth was not at issue. Ormerod had already produced an extensive report on the subject for the RASE.⁶⁷ Status and recognition were the crux of her grievances. She refused to permit a negative, servile interpretation of her honorary status. Her vocal refusal to participate in a Board of Agriculture enquiry was an exercise of her professional independence. Although the rift was mended, Ormerod resigned from the RASE in July of the following year under the pretext of poor health.⁶⁸ In August 1892, she confided to Robert Wallace:

Who will they get to take my place [at the Royal]? It seems to me a great pity that there is not a properly paid and competent officer for the Board of Agriculture and R.A.S.E. I am safe in

62 On veterinary science in eighteenth- and nineteenth-century Britain, see Sykes, *op. cit.* (43), 265–6; and Reader, *op. cit.* (24), 155. On the creation of the Board of Agriculture, see Christabel Orwin and Edith Whetham, *History of British Agriculture 1846–1914*, London, 1964, 202; and Sir Francis L. C. Floud, *The Ministry of Agriculture & Fisheries*, London, 1927, 1–20.

63 Charles Whitehead, *Retrospections*, Maidstone, n.d. [1908], 75–8. Whitehead started to receive remuneration for his government work in 1888. In addition, see Ordish, *Curtis*, *op. cit.* (50), 104–5; and Malcolm Burr, *The Insect Legion*, 2nd edn, London, 1954, 300.

64 Ormerod to Dr J. Fletcher, 13 February 1890, in Ormerod, *op. cit.* (8), 202. In addition, see Ormerod to Dr J. Fletcher, 20 January 1890, in *ibid.*, 202.

65 “‘The diamond-back Moth Caterpillar,” Royal Agricultural Society of England, Proceedings of the Council, Wednesday, July 29, 1891’, *JRASE*, 3rd series (1891), 2, pp. lxxxv–lxxxviii.

66 “‘Seeds and Plant Diseases,” Royal Agricultural Society of England, Proceedings of the Council, Wednesday November 4, 1891’, *JRASE*, 3rd series (December 1891), 2, p. clxx.

67 Eleanor Ormerod, ‘The Diamond-Back Moth’, *JRASE*, 3rd series (1891), 2, 596–630.

68 “‘Seed and Plant Diseases,” Royal Agricultural Society of England, Proceedings of the Council, Wednesday, July 27, 1892’, *JRASE*, 3rd series (1892), 3, pp. lxxxvii–lxxxviii. *Nature* (10 September 1891), 44, 451; and *ibid.* (1 October 1891), 44, 528, indicated that Ormerod’s resignation was not solely due to poor health.

saying this, for I never intend to take office again, not for any amount of money that could be offered, neither do I mean to do the work of Government or Society under the polite name of 'kindly co-operating!'⁶⁹

Like H. C. Watson, 'Distributor' for the Botanical Society of London, in the 1840s,⁷⁰ Eleanor Ormerod resigned her unofficial position when the rest of the Society failed to accord her due respect.

By the strictest anachronistic, attribute-oriented definition, Ormerod was not a professional.⁷¹ She was not a member of a self-conscious, internally regulated group; nor did she derive an income from the sale of élite knowledge or skills. Self-taught in entomology, and completely financed from landed wealth, Eleanor Ormerod might, alternatively, fall within the rubric of Roy Porter's careerist 'gentleman' amateur.⁷² But Ormerod eschewed the 'amateur ethos': she clearly identified with the *professional ethos* that pervaded the scientific community in the last quarter of the nineteenth century. She actively participated in the lobby for scientific and technical education and promoted the place of the expert or specialist in government.⁷³

With a son attending the Royal Agricultural College, Cirencester (established 1845), Charles Dickens announced in 1868:

That part of the holding of a farmer or landowner which pays best for the cultivation is the small estate within the ring fence of his skull.... The farmer's occupation is the oldest, the most necessary, and, when rightly pursued, one of the worthiest a man can follow. Of late years it has risen to the dignity of a liberal profession, and the young Englishman may go through part of his special training for it in a well appointed college.⁷⁴

In the second half of the nineteenth century, the growth of higher agricultural education was part of the development of professional technical training.⁷⁵ Between October 1881 and June 1884, Eleanor Ormerod delivered six lectures as special lecturer on economic entomology at the Royal Agricultural College. In 1883, she contributed to the dissemination of economic entomology amongst schoolteachers by delivering ten lectures at South Kensington's Institute of Agriculture. The latter effort resulted in the publication of her *Guide to Methods of Insect Life* (1884), which metamorphosed into *A Text-Book of*

69 Ormerod to Robert Wallace, 18 August 1892, in Ormerod, op. cit. (8), 281.

70 Allen, op. cit. (37), 111–12.

71 For a sociological analysis of science as a profession, see Joseph Ben-David, 'The profession of science and its powers', *Minerva* (July 1972), 10, 362–83. For an historical treatment of the traditional (i.e. liberal) professions, see Reader, op. cit. (24). For a cautionary tale on professionalization and the history of science, see Susan Faye Cannon, *Science in Culture: The Early Victorian Period*, New York, 1978, 137–65.

72 Roy Porter, 'Gentlemen and geology: the emergence of a scientific career, 1660–1920', *The Historical Journal* (1978), 21, 809–36.

73 Roy MacLeod, 'Introduction', in *Government and Expertise: Specialists, Administrators and Professionals, 1860–1919* (ed. Roy MacLeod), Cambridge, 1988, 1–24; and idem, 'Science and examinations in Victorian England', in *Days of Judgement: Science Examinations and the Organization of Knowledge in Late Victorian England* (ed. Roy MacLeod), Cheshire, 1982, 1–24.

74 [Charles Dickens], 'Farm and college', *All the Year Round* (10 October 1868), 20, 414. In addition, see R. Boutflour, 'The Royal Agricultural College, Cirencester', *Agricultural Progress* (1938), 15, 1–7.

75 For an excellent synthesis of the scattered literature, see Steward Arthur Richards, 'Agricultural Science in British Higher Education 1790–1914', Unpublished M.Sc. thesis, History of Science, University of Kent at Canterbury, 1982.

Agricultural Entomology (1892) in the wake of a series of government measures, which provided strong administrative and financial support for agricultural education.⁷⁶ In addition, Ormerod contributed ‘suggestions and revisions’ to the relevant parts of William Fream’s *Elements of Agriculture* (1892), which, in its modern form, remains a standard agricultural textbook to this day.⁷⁷ In 1889–90, Ormerod succeeded in having agricultural entomology established as a voluntary subject for the Senior Examination of the RASE, and as a compulsory examination subject at the Royal Agricultural College.⁷⁸ And from 1896 to 1899, she acted as an examiner in agricultural entomology for the University of Edinburgh.⁷⁹ As part of an unsuccessful lobby to have agricultural science established as a degree subject, she offered the University of Oxford £100 in 1897.⁸⁰ Through lectures, textbooks and examinations, Eleanor Ormerod played a seminal role in the institutionalization of economic entomology. Although it was an unabashed derivation of US technology and priorities, Ormerod promulgated the ‘normal science’ of economic entomology in Great Britain.

An analysis of Eleanor Ormerod’s role in the professionalization of agricultural science confronts an immediate paradox. In the absence of equal efforts to promote education for women, Ormerod’s push for professionalization created opportunities for scientific employment unavailable to her. She was, moreover, aware of her plight. When that leader in agricultural education, the University of Edinburgh, decided to establish a chair in economic entomology in 1889, Ormerod observed:

Who ever is to take the position of lecturer? I am complimented by the expression of a wish from the authorities who have the election in hand that I should take it; but then Lady Professors are not admitted in Scotland.... I think I could do all that is wanted, but then, oh! Shades of John Knox!⁸¹

In this instance, Ormerod had to content herself as the *éminence grise*. At her suggestion, William Fream, of the Downtown College of Agriculture, was hired as Steven Lecturer in economic entomology.⁸² Ormerod’s status as a woman debarred her from ‘public’ – i.e. paid – work. Although the RASE retained a salaried consulting chemist and consulting botanist, Ormerod’s position was honorary. Her unpaid status was not due to the perceived value of economic entomology. The RASE appointed Cecil Warburton as her successor in 1893, at a salary of £200 per annum.⁸³

76 The Local Government Act of 1888, the Technical Instruction Act of 1889, the Board of Agriculture Act of 1889, and the Local Taxation (Customs and Excise) Act of 1890. See *ibid.*, pp. 118–19.

77 Moreton, ‘Preface’, to W. Fream, *Elements of Agriculture*, London, 1892; Henry Edmunds, ‘Eighty years of Fream’s *Elements of Agriculture*’, *JRASE* (1973), 134, 66–77.

78 Eleanor A. Ormerod, *Report of Observations of Injurious Insects and Common Farm Pests During the Year 1890, With Methods of Prevention and Remedy. Fourteenth Report*, London, 1891, p. v.

79 Ormerod to Robert Wallace, 19 March 1896, in Ormerod, *op. cit.* (8), 282; and Ormerod to Wallace, 30 January 1899, in *ibid.*, 285–6.

80 Ormerod to Dr J. Fletcher, 15 May 1897, in *ibid.*, 224–5; J. A. Scott Watson, ‘The University of Oxford’, *Agricultural Progress* (1937), 14, 95–100.

81 Ormerod to Dr J. Fletcher, 24 December 1889, in Ormerod, *op. cit.* (8), 200–1.

82 Gwyn E. Jones, ‘William Fream: agriculturist and educator’, *JRASE* (1983), 144, 36–7.

83 “‘Seeds and Plant Diseases’”, Royal Agricultural Society of England, *Proceedings of the Council*, Wednesday, March 1, 1893’, *JRASE*, 3rd series (1893), 4, p. xxxviii.

Aware of the limitations that womanhood brought to her scientific career, Eleanor Ormerod attempted to distance herself publicly from accepted notions of woman. First and foremost, she wanted to be recognized as a professional technological scientist.⁸⁴ Ormerod achieved her ends by assaulting notions of feminine purity under the banner of economic entomology. She thereby allied herself with the ‘male’ science bent upon the dissection of the passive, feminine bosom of nature.⁸⁵ The remainder of this paper will investigate the mutually reinforcing relationship between Ormerod’s professional ambitions and her struggles to free herself from prescriptive ideals of feminine purity.

In 1884, Eleanor Ormerod began one of her first specialized, in-depth investigations. The ox-warble fly (*Hypoderma bovis*) was her subject. Her choice of an insect that attacked cattle was well calculated. The expansion of livestock husbandry and the intensification of production methods helped establish veterinary science as a profession in England.⁸⁶ The Royal Veterinary College (established in 1792) and the Royal College of Veterinary Surgeons (established in 1844) were both part of a concerted, self-conscious effort to monitor professional standards. Moreover, the spread of livestock diseases, cattle plague being the most recent (1865–66), brought veterinary matters to the forefront of agricultural concerns. The Board of Agriculture was a direct descendant of the government Veterinary Department.

A Dipteran parasite, by the standards of Victorian ideologues, was hardly appropriate subject matter for feminine consideration. In 1890 Ormerod reported to the RASE:

It is impossible in a wood engraving to convey the loathsome appearance of a maggot-infested hide when the pests are full grown, and showing through or breaking through the coating of their cells filled with putridity.

The affected portion of the surface of the carcass commonly called ‘licked beef’ may be generally described as of a greenish-yellow colour and flabby appearance, with a frothy discharge oozing from the surface after being exposed for some hours to the air, and the jelly-like matter on the surface, which necessarily must be cleared away... is a cause of great loss to butchers during the warble season.⁸⁷

Issued from the pen of a ‘sexually suspect’ spinster, these were not the reassuring words of feminine purity.

When J. C. Medd approached her to contribute material to the Agricultural Education Committee in 1900, Ormerod suggested something devoted to fly attacks on farm stock. She stipulated that the Committee should indicate on the published pamphlet that they had requested her to prepare it. This, she maintained, would ‘shield’ her from the imminent accusation that she had tenaciously touched upon ‘what might be called “Veterinary”-things that might involve discussion unbecoming of a lady writer’.⁸⁸ Eleanor Ormerod used

84 Berman, op. cit. (46), 1–74, studies Humphry Davy as a ‘technological scientist’.

85 I have borrowed this metaphor from Jordanova, op. cit. (12), 57–8.

86 Iain Pattison, *The British Veterinary Profession, 1791–1948*, London, 1983; E. L. Jones, ‘The changing basis of agricultural prosperity, 1853–73’, *Agricultural History Review* (1962), 10, 102–19; Sykes, op. cit. (43), 265–6; and Reader, op. cit. (24), 155.

87 Eleanor Ormerod, ‘Annual Report for 1889 of the Consulting Entomologist’, *JRASE*, 3rd series (1890), 1, 181–4.

88 Ormerod to J. C. Medd, 14 July 1900, in Ormerod, op. cit. (8), 272–3.

public sanction and approval to taste the forbidden fruits of professionalism and impurity. The two, of course, were not mutually exclusive.

In the *First Annual Report of the Agricultural Adviser* (1887), Charles Whitehead (and, of course, Eleanor Ormerod) noted that Charles V. Riley, chief entomologist to the US Department of Agriculture, had criticized his British counterparts for their failure to use arsenical mixtures against insect pests of fruit trees.⁸⁹ As part of a discussion of Paris green in her annual report for 1889, Ormerod explained: 'I might almost say that the leading official entomologists of Canada and the United States have thought me to blame in not bringing forward here what has been proved there to be of great service by trial of many years, and over an area of thousands of miles.'⁹⁰ On 28 December of the same year, she fired off a cablegram to James Fletcher (1852–1908), banker and Parliamentary Librarian turned Canadian Dominion entomologist.⁹¹

Is not 'Paris-green' the same as 'Scheele's green', that is, arsenite of Copper, nor arseniate? With us arseniate of copper is a bluish powder; please write.⁹²

Within the year, Ormerod embarked upon the next great crusade of her entomological career – the push for Paris green. Paris green, a copper acetoarsenite (approximately $3\text{Cu}(\text{AsO}_2)_2 \cdot \text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2$), and Scheele's green, a copper arsenite (CuHAsO_3), were pigments used to colour most green paints in the nineteenth century.⁹³ In the late 1860s, Paris green was elevated to the status of indispensable insecticide in the United States. The precipitating event was the masticating mania of the Colorado potato beetle (*Leptinotarsa decemlineata*).⁹⁴

Prior to the 1850s, the Colorado beetle was an innocuous Coleoptera that fed upon the wild solanums of the Rocky Mountains. When speculative miners penetrated the Rockies, they introduced potatoes to the Colorado beetle. The latter developed a voracious appetite for the new foodstuff, and began a relentless seventy-mile-a-year march towards the Atlantic. In the summer of 1867, farmers in Illinois and Indiana applied Paris green in a desperate attempt to destroy the destructive insect. Word of this efficacious insecticide spread rapidly. Within the first decade of its introduction as an insecticide, in excess of 500 tons of Paris green were sold annually in the New York City market alone. And London purple (approximately calcium arsenite), a by-product of the aniline dye industry, entered the market as a rival insecticide.

The Colorado potato beetle never invaded the shores of Britain, and British farmers were slow to adopt Paris green as an insecticide. Their apparent reluctance cannot be entirely

89 PP, 1888, 106, *First Annual Report of the Agricultural Adviser to the Lords of the Committee of Council for Agriculture. 1887* [c-5275], 360–1.

90 Eleanor A. Ormerod, *Report of Observations of Injurious Insects and Common Farm Pests During the Year 1889, With Methods of Prevention and Remedy. Thirteenth Report*, London, 1890, 70–1.

91 'James Fletcher, LL.D. Memorial Number', *The Ottawa Naturalist* (1909), 22, 189–211.

92 Ormerod to Dr J. Fletcher, 28 December 1889, in Ormerod, op. cit. (8), 201.

93 James Whorton, *Before Silent Spring*, Princeton, 1974, 20. Whorton gives an excellent summary of his book in his 'Insecticide spray residues and public health: 1865–1938', *Bulletin of the History of Medicine* (1971), 45, 219–41.

94 Charles V. Riley, *The Colorado Beetle*, London, 1877; Whorton, *Before*, op. cit. (93), 17–26; and Ordish, *Constant Pest*, op. cit. (50), 149–56.

attributed to a more informed opinion of Paris green's poisonous attributes. Both in North America and in Great Britain, the medical profession was aware of the toxicity of these compounds.⁹⁵ The debate that raged in late nineteenth-century medical circles revolved around the chronic toxicity of arsenic. More specifically, practitioners disagreed about the quantity and frequency of exposure necessary to induce chronic arsenicism. Much of the ambivalence stemmed from professional self-interest. Fowler's solution, an arsenic-containing patent medicine, was prescribed as a veritable panacea throughout the nineteenth century.

Ultimately, irresolute medical opinion led to a focus upon acute toxicity and a neglect of chronic toxicity. Although entomologists discovered spray residues of 0.9 mg of arsenic per apple – easily enough to produce chronic illness – they were oblivious to the dangers of repeated exposure to these levels. If British farmers appeared reluctant to spray their crops with Paris green, they showed little trepidation about its ubiquitous presence elsewhere. In the early 1880s, the Medical Society of London compiled a partial list of arsenic-tinted items.⁹⁶ Wallpaper, candles, book covers, children's toys, playing cards, lamp shades and sweetmeat wrappers were all covered with toxic tints.

Britain lagged behind North America in the use of Paris green – indeed, in economic entomology – because it lacked insect devastations on the same scale; and consequently lacked the same economic imperatives. A massive expansion in mechanized, capital-intensive agriculture occurred in nineteenth-century North America.⁹⁷ Many of the crops brought under cultivation were non-indigenous. Often new insect life accompanied these novel crops. Without their native predators to keep them in check, insect pests ran rampant. In 1898, US federal entomologist L. O. Howard found that thirty-seven of the seventy worst insect pests in the United States were imported.⁹⁸

Although it was the engine of economic growth and expansion in nineteenth-century America, agriculture suffered economic decline in Britain.⁹⁹ Its portion of the national income dropped from about 30 per cent at the beginning of the century to approximately 5 or 6 per cent by 1900. Whereas in Britain the area of agricultural land fell by 1.5 million acres between 1830 and 1900, the Americans doubled the amount of their improved land from 189 million to 414 million acres in the last two decades of the century alone.

95 Whorton, *Before*, op. cit. (93), 24–69. For information on the use of Paris green in Britain, see *ibid.*, 68–88; Ormerod, op. cit. (90), 70–5; *idem*, op. cit. (78), 84–96; and *idem*, *Paris-green (Or Emerald-green): Its Uses and Methods for its Application, as a Means of Destruction of Orchard Moth Caterpillars*, London, 1891.

96 Whorton, *Before*, op. cit. (93), 39.

97 On this change, and its relationship to the professionalization of American agricultural entomology, see John H. Perkins, *Insects, Experts, and the Insecticide Crisis: The Quest for New Pest Management Strategies*, London, 1982, 241–64.

98 H. C. Coppel and J. W. Mertins, *Biological Insect Suppression, Advanced Series in Agricultural Sciences* (ed. G. W. Thomas *et al.*), Berlin, 1977, 4, 22. For the development of American economic entomology, and the increasing use of insecticides, see Conner Sorensen, 'The rise of government sponsored applied entomology, 1840–1870', *Agricultural History* (1988), 62, 98–115; Thomas R. Dunlap, 'Farmers, Scientists, and Insects', *Agricultural History* (1980), 54, 93–107; and *idem*, 'The triumph of chemical pesticides in insect control', *Environmental Review* (1978), 5, 38–47.

99 Bernard Bailyn *et al.*, *The Great Republic*, 3rd edn, Toronto, 1981, 297–8, 577–62. B. A. Holderness, 'Agriculture and industrialization in the Victorian economy', in Mingay (ed.), op. cit. (43), i, 179–99; and *idem*, 'The Victorian farmer', in *ibid.*, 227–43.

Herein lay one of the greatest differences between American and British agriculture. Land, for the Americans, was a temporary and expendable resource: soil exhaustion was not a concern. In contrast, Britain faced the demands of feeding a burgeoning population on diminishing lands. In the United States, economic entomology developed as a response to the immediate and visible depredations of insect enemies, brought on by a huge-scale ecological upheaval in the countryside. In Britain, economic entomology trailed on the coat-tails of an agricultural science devoted to improving the output of a limited amount of land.¹⁰⁰

Eleanor Ormerod played a pivotal role in the promotion of large-scale use of Paris green. Professional interests and a need for an effective insecticide lay behind her endorsement. Her role as 'referee' between foreign entomological experts and British farmers formed the foundation of her expertise. As a referee, she saw herself as a bridge between scientific knowledge and practical applications. Britain's growing horticulture industry provided the opportunity for her to participate actively in the process. In the depression years of 1873–1904, horticulture was one of the few branches of farming to expand its acreage.¹⁰¹ Of necessity, entomology and horticulture enjoy an intimate relationship.¹⁰² Eaten directly, without first being cooked, the appearance of fruit is very important. Furthermore, an orchard represents a capital-intensive investment, which cannot be ploughed up and replanted in the event of an insect invasion.

In the Vale of Evesham, where horticulture dominated the local agricultural economy, leading fruit-growers formed a committee of experiment in February 1890.¹⁰³ At their request, Eleanor Ormerod became their entomological adviser. In the past, the Toddington fruit-growers had grease-banded their trees or applied paraffin and soft soap solutions to stave off destructive caterpillars and moths. Dissatisfied with their results, they turned to Ormerod for sage advice. She, in turn, referred them to James Fletcher, Dominion entomologist of Canada, who suggested Paris green applications.

Ormerod was familiar with the success of Paris green long before 1890. Her referral to Fletcher was another calculated move. As a recognized male expert, he was Ormerod's entrance ticket to her Paris green crusade. As she explained to Fletcher in the autumn of 1890:

I always feel, and I try to acknowledge, that the real usefulness of my work is derived from the kind co-operation I am allowed the benefit of. Just look at the Paris-green matter. I quite sheltered myself behind your name as an active referee. The good folks were hard of belief anyhow, but I really doubt if I could have driven the nail home without having you to fall back on.¹⁰⁴

100 In a letter to Arthur Young, George Washington noted this difference between the two countries' approaches to agricultural practice. See Fred W. Kohlmeyer and Floyd L. Herum, 'Science and engineering in agriculture: a historical perspective', *Technology and Culture* (1961), 11, 379, n18.

101 P. J. Perry, *British Farming in the Great Depression 1870–1914*, Newton Abbot, Devon, 1974, 120–3.

102 J. P. Hudson, 'Fruit crops: a rather special case', in *Pesticides and Human Welfare* (ed. D. L. Gunn and J. G. R. Stevens), Oxford, 1976, 81–91.

103 'The preservation of small birds, etc.', *The Gardeners' Chronicle*, 3rd series (29 March 1890), 7, 386–7; 'Editorial notices', *The Gardeners' Chronicle*, 3rd series (10 May 1890), 7, 585; Ormerod, op. cit. (87), 176–7; Ormerod, 'Reports of Consulting Entomologist', *JRASE*, 3rd series (1890), 1, 407–12; Ormerod to Professor Riley, 10 April 1890, in Ormerod, op. cit. (8), 183.

104 Ormerod to Dr J. Fletcher, 6 October 1890, in Ormerod, op. cit. (8), 204.

By February 1892 she was proudly composing her own epitaph:

Surely it should be recorded of me, 'SHE INTRODUCED PARIS-GREEN INTO ENGLAND.'¹⁰⁵

Allied with Canadian and American expert advice, Ormerod, a single woman, implored farmers to drench Nature in a slurry of poison.

As a chemical, Paris green imparted the same technical mystique as J. B. Lawes's extremely successful superphosphate of lime.¹⁰⁶ Moreover, Paris green required mechanical devices for its application.¹⁰⁷ On 21 March 1891, a contest of sprayers was held at the Crystal Palace, the temple of mid-Victorian science. Reflecting on this event, Ormerod remarked:

I am fairly broadcasting the P.G. [Paris green] pamphlets. Many years ago when a railway bridge on a new method of construction was made over the Wye near my old home, the natives were 'afraid for their lives' to go over it, but the ingenious plan was struck of running any one gratuitously over and back all day long – the trains of trucks were crammed, the people shouted for joy, and the victory was won; and now I am carrying out the same principle. Gentle and simple, wise and very unwise, are wanting Paris-green pamphlets, and I hope that by the sheets of advice &c., that have to be sent accompanying, that the very silliest souls will not do harm; and meanwhile we are getting the subject popularized.¹⁰⁸

Given the health threat that British bridges posed throughout the nineteenth century,¹⁰⁹ the analogy was more apt than Ormerod probably realized. For her, Paris green was the tool of a technological scientist.

In the summer of 1897, Eleanor Ormerod entered upon the *pièce de résistance* of her scientific career. In the name of science, she called for the extermination of the house sparrow (*Passer domesticus*).¹¹⁰ The 'sparrow question' involved multifarious scientific and social issues, and was laden with a host of ideological contradictions. Ormerod and her colleague, W. B. Tegetmeier, sought to attain professional status upon the heads of lifeless sparrows.¹¹¹

Discontent with the scavenger ways of birds was not unique to the 1890s.¹¹² In 1533, an act was passed in England ordering parishes to wage war on jackdaws, crows and rooks.

105 Ormerod to Dr J. Fletcher, 2 February 1891, in *ibid.*, 206–7.

106 Sir E. John Russell, 'Rothamsted Experimental Station', *Agricultural Progress* (1937), 14, 1–3; and *idem*, *A History of Agricultural Science in Great Britain 1620–1954*, London, 1966, 88–106, 143–75.

107 For an excellent survey of the different sprayers that were available, see Charles Whitehead, 'Methods of preventing and checking the attacks of insects and fungi', *JRASE*, 3rd series (1891), 2, 217–56.

108 Ormerod to Dr J. Fletcher, 23 March 1891, in Ormerod, *op. cit.* (8), 208–9.

109 See: Reader, *op. cit.* (24), 123–5.

110 Eleanor Ormerod and W. B. Tegetmeier, 'Appendix', in W. B. Tegetmeier, *The House Sparrow (The Avian Rat)*, London, 1899, 73–90.

111 As Secord has shown, Tegetmeier was, like Ormerod, a person who operated on the borderland between natural scientists and agriculturists. Tegetmeier assisted Darwin with his work on artificial selection. See, especially, Secord, 'Nature's fancy', *op. cit.* (38), 174–6. As an eminent pigeon fancier, ornithologist and apiarist, Tegetmeier was well placed to aid Ormerod. On Tegetmeier's entomological connections, see E. W. Richardson, *A Veteran Naturalist Being the Life and Work of W. B. Tegetmeier*, London, 1916, 42–50.

112 To put the house sparrow in historical perspective, see E. L. Jones, 'The bird pests of British agriculture in recent centuries', *Agricultural History Review* (1972), 20, 107–25. In particular, see pp. 118–20, 123–4; and Karl H. Dannenfeldt, 'The control of vertebrate pests in Renaissance agriculture', *Agricultural History* (1982), 56, 553–4.

A further act was introduced in 1566 granting bounties, to be paid by churchwardens, on an array of noxious birds and mammals. Throughout the eighteenth century, most parishes had 'sparrow clubs', which dispensed money for dead birds and eggs. In Warwickshire in 1768, the rate was twopence per dozen.¹¹³ By 1870, however, 'sparrow money' had almost disappeared from parish accounts. The invective dumped on the house sparrow in the 1890s, however, was decidedly different from most of these antecedent efforts. The single-minded focus on the evil ways of the house sparrow was unique to the 1890s: finches, wood-pigeons, skylarks, rooks, and other granivorous birds managed to escape attack.

The resuscitation of sparrow clubs in the early 1890s undoubtedly had some foundation in the increased presence of *birds* on farmland. The combined effects of the diminution of woodlands to feed the edacious iron industry, the General Inclosure Act of 1845, developments in gun technology, and the growth of urbanization had adverse consequences for Britain's indigenous bird-life. After the enclosures of the eighteenth and nineteenth centuries, many forest species settled into a new habitat created by a network of hedgerows. To this day, 80 per cent of Britain's farmland birds are forest species.¹¹⁴

Changes in the countryside of late nineteenth-century England fostered an increased farmland bird presence. Birds thrive on a mixed arable/livestock farm, where opportunities for sustenance are greatest.¹¹⁵ Moreover, an inefficient, neglected farm increases feeding opportunities. The latter half of the nineteenth century witnessed the apogee of high farming in England.¹¹⁶ And at the heart of high farming lay a mixed system of growing cereals and keeping livestock. Furthermore, the combination of bad harvests and a massive collapse in grain prices in the late 1870s resulted in the neglect of many farms.¹¹⁷ Some were converted to pasture and some just fell hopelessly into rough grazing. While England's arable farmers probed the depths of agricultural depression, her bird-life soared over an almost perfect environment.

As urbanization impinged upon the agricultural landscape, passerine peregrinations became increasingly troublesome. Completely dependent upon a symbiotic relationship with man, the sparrow prefers an urban environment to a rural one. Generally, the house sparrow will not migrate beyond two miles of its breeding grounds.¹¹⁸ Rural, agricultural areas that border on urban centres, therefore, face the greatest sparrow threat. This was borne out by the evidence brought against the bird in the late nineteenth century. In *The House Sparrow (The Avian Rat)* (1899), W. B. Tegetmeier reported:

113 D. Summers-Smith, *The House Sparrow*, London, 1963, 217–19.

114 Raymond J. O'Connor and Michael Shrubbs, *Farming and Birds*, Cambridge, 1986, 10–11.

115 *Ibid.*, 57–78, 186.

116 James Caird, *High Farming Under Liberal Covenants The Best Substitute for Protection*, 3rd edn, London, 1849, is the classic nineteenth-century statement on high farming. P. J. Perry, 'High farming in Victorian Britain: prospect and retrospect', *Agricultural History* (1981), 55, 156–66, provides the best historiographical overview. F. M. L. Thompson, 'The second agricultural revolution, 1815–80', *Economic History Review*, 2nd series (1968), 21, 62–77, is another important article. For an excellent recent contribution to the literature, see B. A. Holderness, 'The origins of high farming', in *Land, Labour and Agriculture, 1700–1920: Essays for Gordon Mingay* (ed. B. A. Holderness and Michael Turner), London, 1991, 149–64.

117 J. T. Coppock, 'The changing face of England: 1850-circa 1900', in *A New Historical Geography of England* (ed. H. C. Darby), Cambridge, 1973, 608–14; and Perry, *op. cit.* (101).

118 Summers-Smith, *op. cit.* (113), 224; and O'Connor and Shrubbs, *op. cit.* (114), 72.

The vast amount of injury inflicted by the sparrow is recognised by every agriculturist, and more particularly by the allotment holders whose plots are near villages and homesteads. The evil has led to the formation of Sparrow Clubs.¹¹⁹

The house sparrow received special criticism because of its ubiquitous presence in rural and urban settlements.

Created in 1891, the Epping and District Sparrow Club was the model for these re-emergent organizations.¹²⁰ Interestingly, in the same year, townspeople began the popular pastime of bird-feeding.¹²¹ Ornithology, in fact, experienced a renaissance in the last decade of the nineteenth century. Originally, ornithology grew out of the field sports. Late nineteenth-century interest in the subject, however, set the gun down in favour of field glasses. The campaign against the house sparrow was a direct response to the growth of interest in ornithology and protectionism. Emergent expert scientists entreated the general public *not* to feed breadcrumbs to the bothersome sparrow, because they had empirical evidence that this granivorous bird was a pest.¹²² In short, the experts knew best. At a time when people expressed a fervour for bird-*watching*, Eleanor Ormerod implored them to reload their dusty guns.

Ormerod's interest in the house sparrow – and, indeed, her most damning evidence against it – had its origins in American agricultural literature.¹²³ In 1885, the United States Department of Agriculture created a Division of Ornithology. One of the first extensive reports to emanate from the new Division was *The English Sparrow (Passer Domesticus) in North America, Especially in its Relation to Agriculture* (1889).¹²⁴ Not indigenous to North America, the house sparrow was introduced in the mid-nineteenth century, in the hope that it would combat harmful insects. In the 1880s, opinion began to turn against the sparrow. By 1889, seven of the states that had eagerly introduced sparrows had enacted laws against them. The case against the sparrow rested on its feeding habits. Careful dissections of their crops by entomologists and ornithologists proved that house sparrows fed primarily upon grain seeds: insects were a negligible part of their diet. Armed with this empirical evidence, American ornithologists demanded the repeal of legislation protecting the sparrow; and they triumphed immediately in several states. Eleanor Ormerod found a success story for technological science which she desired to emulate.

Ormerod's most vocal opposition came from Edith Carrington. Born into a family of naturalists in 1853, Carrington received her instruction in natural history at the feet of Charles Kingsley. Imbued with a 'wish for no higher mission than to live and die in the cause of God's beautiful and sinless mute creatures', she embarked upon a literary career

119 W. B. Tegetmeier, op. cit. (110), 65.

120 Ibid., 66–8, reprinted the rules of the Club as a model for others to follow. Leaflet no. 84 of the Board of Agriculture and Fisheries, 1908, provided details for organizing a sparrow club. See E. L. Jones, op. cit. (112), 120.

121 Allen, op. cit. (37), 191–9, 231–3.

122 See, for instance: Miss E. A. Ormerod, 'The house sparrow', in *Ornithology in Relation to Agriculture and Horticulture* (ed. John Watson), London, 1893, 52.

123 Robin Doughty, *The English Sparrow in the American Landscape: A Paradox in Nineteenth Century Wildlife Conservation*, Oxford: School of Geography, Univ. of Oxford, Research Paper 19, 1978.

124 Earl Cathcart, 'Wild birds in relation to agriculture', *JRASE*, 3rd series (1892), 3, 326–9; and Summers-Smith, op. cit. (113), 175–6, 209, 218–19.

at age thirty-five.¹²⁵ In late Victorian Britain, the cause of animal welfare was part of a sustained effort to extend woman's role as moral guardian into the public realm. In general, women comprised the majority of the membership of the anti-vivisectionist societies, which arose in the last quarter of the nineteenth century.¹²⁶ A regular contributor to *The Animals' Friend* (established 1894) and to the publications of Henry Salt's Humanitarian League (established 1891), Edith Carrington was an active participant in the protectionist and anti-vivisectionist causes.¹²⁷

Eleanor Ormerod's demand for the death of the house sparrow conflicted with the dominant ideology of a woman's role in Victorian society. This was not lost to her opponents. Upon the publication of her sparrow pamphlet, the Rev. J. E. Walker informed her:

I have read it, and I must confess, the last paragraphs with an increase of pain, for I had hoped that the crusade against God's sparrows, proclaimed to all and sundry, however cruel and brutal, in the newspaper article might have been only inspired by and not suggested in the pamphlet bearing a lady's name.... How far nobler is the crusade against sin and fashion, which are the real and awful causes of misery, suffering and poverty.... It is the crime of liquor traffic, of legalised betting, etc., that these things induce poverty, wretchedness, disease. I would to God that you madam, would turn your great talents in the truest interests of the poor against these causes of national loss and misery.¹²⁸

Walker entreated Ormerod not to 'steel' her 'compassionate, womanly heart' with her scientific studies. Instead, he suggested, she should devote herself to philanthropic works, and fulfil her duty as a woman.

Through the pages of *The Animals' Friend* and through her Humanitarian League publications (*Spare the Sparrow* (1897) and *The Farmer and the Birds* (1898)), Edith Carrington opposed Eleanor Ormerod with surprisingly refined preservationist arguments.¹²⁹ Carrington employed the ancient 'background concept'¹³⁰ of the balance of nature to combat the intervention of man and materialist science. The proliferation of the house sparrow, she maintained, resulted from the destruction of its natural enemies, such as the sparrow hawk. She blamed the game preservation laws for the diminution of the latter's numbers. Furthermore, she realized that evidence drawn from lands where the sparrow was introduced as a non-indigenous bird was inappropriate invective to bring

125 Edith Carrington, 'Miss Edith Carrington: portrait and autobiography', *The Animals' Friend* [hereafter AF] (July 1894), 1, 24.

126 Mary Ann Elston, 'Women and anti-vivisection in Victorian England, 1870–1900', in *Vivisection in Historical Perspective* (ed. Nicolaas, A. Rupke), London, 1987, 259–94. For information on nineteenth-century bird protectionism, see Phyllis Barclay-Smith, 'The British contribution to bird protection', *The Ibis* (1959), 101, 115–22; and E. S. Turner, *All Heaven in a Rage*, London, 1964, 172–200.

127 Donald Worster, *Nature's Economy: A History of Ecological Ideas*, 1977; reprinted London, 1985, 185–6.

128 Rev. J. E. Walker to E. A. Ormerod, 13 August 1897, in 'Spare the sparrow', AF (October 1897), 4, 16–17. In addition, see J. E. Walker to E. A. Ormerod, 10 August 1897, in 'God save the sparrow', AF (September 1897), 3, 241.

129 See, for example, Edith Carrington, *The Farmer and the Birds*, London, 1898, which was published for the Humanitarian League; and idem, 'The sparrow-hawk', AF (October 1897), 4, 4–6. For a useful historical overview of the philosophical underpinnings of preservationism, see John Passmore, *Man's Responsibility For Nature*, London, 1974, 1–40.

130 Frank Egerton, 'Changing concepts of the balance of nature', *The Quarterly Review of Biology* (June 1973), 48, 322–50.

against it in a native environment. Carrington comprehended the interconnections of Nature. She complained that scientists did not ‘sufficiently generalize’: they did not understand that, as the modern ecological dictum states, ‘it is impossible to do one thing only’.¹³¹

When Eleanor Ormerod first considered farmland birds in the early 1880s, she opposed interventionist, protectionist impulses by appealing to the balance of nature.¹³² By 1884, with a burgeoning US anti-sparrow literature before her, she modified her position. She called for direct, interventionist action against the sparrow, in the name of ‘*a counterbalance – a legal and economic, rather than a natural, balance*’.¹³³ By the late 1890s, Ormerod and her ally, W. B. Tegetmeier, ignored the preservationist argument. Tegetmeier dismissed Carrington and other opponents as scientifically inaccurate. Dissections of sparrow crops proved conclusively that this bird fed upon the grain of man, and that it did not destroy injurious insects. Tegetmeier argued:

The only well-known authors who have written in defence of the sparrow are two writers of popular works on natural history, but whose compilations are not recognised by any naturalists as those of competent observers. I mean the Rev. J. G. Wood and the Rev. F. O. Morris. The works of both these writers are amusing and adapted to please popular taste; but it would be difficult to find any books on natural history containing more inaccuracies, or which are more destitute of any evidence of practical observation.¹³⁴

Primarily, Tegetmeier and Ormerod used the ‘sparrow question’ to establish their reputations as recognized experts. The *field observation* evidence *against* the sparrow was extremely weak. In the survey Ormerod made in 1891, she received comment upon the house sparrow from seven farmers who had witnessed the habits of the bird: four thought that the sparrow was beneficial, and three thought that it was baneful to agricultural crops.¹³⁵ Similarly, the US commission on ‘The English sparrow in North America’ received 307 reports in favour of the bird, and 265 reports opposed to it.¹³⁶ Ormerod and Tegetmeier ignored field observation evidence – normally, the life-blood of Ormerod’s annual reports – on the grounds that it was the inaccurate work of *amateurs*. Ormerod and Tegetmeier represented the new empirical science, bent upon the dissection of nature’s anatomy. As such, they rejected the natural theology of the Rev. J. G. Wood, the Rev. F. O. Morris and other natural philosophers of the early nineteenth century.

When Tegetmeier published his *House Sparrow* in 1899, he elected to include Ormerod’s pamphlet as an appendix. Ormerod responded to this gesture:

I most truly think it a great distinction that my name should be associated [on the title-page of ‘The House Sparrow’] with that of an Ornithologist of such world-wide reputation as yourself, and as it is your wish I very heartily agree. The only alteration I would suggest is that the word ‘Miss’ should be removed. I do not like the word if it is not quite needed; and would it not be

131 Passmore, *op. cit.* (129), 24.

132 Eleanor A. Ormerod, *Report of Observations... During the Year 1883, With Methods of Prevention and Remedy*, London, 1884, 42.

133 Eleanor A. Ormerod, *Report of Observations... During the Year 1884, With Methods of Prevention and Remedy. Eighth Report*, London, 1885, p. vi.

134 Tegetmeier, *op. cit.* (110), 46.

135 Eleanor A. Ormerod, *op. cit.* (67), 627–9.

136 G. W. Murdock, ‘The English sparrow in America’, in Watson (ed.), *op. cit.* (122) 186–8.

well to add a reference to my being an authorised agricultural worker? It may protect me from some 'mendacities'.¹³⁷

On the wings of the sparrow, Eleanor Ormerod sought the status of a professional technological scientist. She perceived her womanhood as an obstruction in her path. As Virginia Woolf later quipped: "'Miss' transmits sex: and sex may carry with it an aroma."¹³⁸

On 14 April 1900, Eleanor Ormerod became the first female recipient of an honorary LL D degree from the University of Edinburgh. At the presentation ceremony, University officials eulogized her 'as the protectress of agriculture and the fruits of the earth – a beneficent Demeter of the nineteenth century'.¹³⁹ This description belied the ideological conflicts which beset her scientific career. Reference to Demeter conjured up the arcadian, feminine conceptions of nature which had been overthrown by the masculine, 'imperialistic', Baconian science that Ormerod practised.¹⁴⁰ Moreover, equating the spinster Ormerod with the guardian of marriage represented a cruel irony.

In the throes of massive economic, social, and ecological upheavals, Victorian ideologues constructed an increasingly rigid model of womanhood, based upon the virtues of domesticity and dependence. As part of her effort to gain the status and recognition of a specialized scientist, Eleanor Ormerod publicly denied her sexuality. She allied herself with expert veterinary scientists, entomologists and ornithologists, often to the exclusion of accepted, feminine philanthropic work. In direct contradiction to the image of pure spinster, she commended farmers to squeeze parasitic flies from warbled flesh; and to spread the pall of Paris green over Eden's orchards. The house sparrow, whose very name conjured up images of domesticity, received the death sentence from her pen. Through the agency of the warble fly, Paris green, and the house sparrow, she achieved her goal. With great insight, Virginia Woolf closed her short story:

'Old Miss Ormerod is dead,' said Mr Drummond, opening *The Times* on Saturday, July 20th, 1901.

'Old Miss Ormerod?' asked Mrs. Drummond?¹⁴¹

By the end of her career, Eleanor Ormerod had achieved the recognition of the male-dominated public sphere. Ormerod's success rested upon a denial of her sexuality.

137 Ormerod to W. B. Tegetmeier, 14 September 1898, in Ormerod, op. cit. (8), 167–8.

138 Virginia Woolf, *Three Guineas*, London, 1938, 92, quoted in Lewis, op. cit. (11), 196.

139 Sir Ludovic Grant, quoted in Ormerod, op. cit. (8), 95–6.

140 Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution*, 1980; reprinted London, 1982; and Evelyn Fox Keller, 'Baconian science: the arts of mastery and obedience', in her *Reflections*, op. cit. (5), 33–42.

141 Woolf, op. cit. (1), 474.