

JOHN LUBBOCK, SCIENCE, AND THE LIBERAL INTELLECTUAL

by

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John Lubbock's longest standing scientific research interest was entomology. Some of his earliest systematic investigations of insect and marine life began under the tutelage of Darwin. Darwin shaped the trajectory of, and the programme for, Lubbock's natural history work. But to understand John Lubbock's identity as a scientist, he must be located within the context of the Victorian 'intellectual'. This paper traces Lubbock's entomological work from its early development under Darwin to his later work on insect sensory physiology and comparative psychology. Far from being the death of his scientific career, Lubbock's entry into Parliament marked the pinnacle of his career as a scientific intellectual. He built on his early work on invertebrate anatomy, physiology, and taxonomy, and on his archaeological and anthropological research to expound his vision of mental evolution. His research on 'savages'; on ants, bees, and wasps; and on his dog, 'Van', permitted him to expatiate upon the psychic unity of all sentient beings, which, in turn, underpinned his overarching educational programme.

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II.

Raving politics never at rest - as this poor earth's pale history runs, -
What is it all but a trouble of ants in the gleam of a million million suns

XV.

What but a murmur of gnats in the gloom, or a moment's anger of bees in
their hive? -

Peace, let it be! for I loved him, and love him for ever; the dead are not dead
but alive.¹

In the 1880s, Poet Laureate Alfred, Lord Tennyson drew on his knowledge of developmental geology, biology, and astronomy to ponder the insignificance and ephemerality of life, in a poem entitled, 'Vastness'. Tennyson, who was grieved by the loss of his beloved friend and fellow Apostle, Arthur Hallam, sought refuge from a Carlylean

age, 'at once destitute of faith and terrified at scepticism'.² Like countless other nineteenth-century intellectuals, he turned to a hybrid of theistic faith and hopeful developmentalism. Although 'Vastness' marked a return to some of his most familiar themes, he referenced social insects on this occasion.³ As analogues of humans and their behaviour, ants and bees accentuated the evolutionary continuum between man and animal. Moreover, they highlighted the minute size of life on earth in relation to the 'plurality of worlds', which constituted the infinite expanse of the universe. In referring to social insects, Tennyson was tapping into contemporary interests. In 1888, evangelical evolutionist Henry Drummond declared:

A few years ago, under the distinguished patronage of Mr. Darwin, the animal in vogue with scientific society was the worm. At present the fashionable animal is the ant.⁴

John Lubbock was the British scientist most responsible for the ants' successful ascent to the lofty heights of fame. The ant, in return, provided Lubbock with a means to pursue and propagate a professional ideal, grounded in the dominant moral sensibilities of the age and in the tenets of scientific naturalism.

First chairman of the Metaphysical Society, and a frequent contributor to the new higher journalism, John Lubbock was a central figure in the generalist intellectual culture which arose in Victorian England. The Metaphysical Society, which was Knowles's brain-child, met nine times a year in London between 1869 and 1880 to hear papers which addressed a wide spectrum of theological, philosophical, and scientific issues.⁵ By his own admission, attendance at these meetings forced T.H. Huxley to define his own variety of unbelief as 'agnosticism'.⁶ As a forum for the Victorian cultural élite, the fate of the Metaphysical Society mirrored the transformation of the mid-Victorian intellectual. It was the institutional manifestation of the new higher journalism, with nine periodical editors among its membership.⁷ The periodical press underwent rapid expansion in the several decades following the abolition of the newspaper tax in 1855. Shaped in part by the new

clerisy, which had imbibed a commitment to merit and competition at the reformed and expanded Universities of Oxford and Cambridge, a new medium of cultural authority arose to feed growing middle classes, who ‘hungered for intellectual guidance’.⁸ But first the Metaphysical Society, then higher journalism, foundered on the rocky shoals of specialization and professionalization. When, upon its dissolution, the Metaphysical Society elected to transfer its remaining funds to *Mind*, ‘the first “professional” philosophical journal’, it was a harbinger of a realignment of the general culture of the late Victorian intellectual.⁹

At first glance, John Lubbock’s chairmanship of the Metaphysical Society may seem insignificant. His family noted that he belonged to so many societies – often acting as president – that ‘he had an “Annual Meeting” every day!’¹⁰ But the Metaphysical Society was the embodiment of the late Victorian ‘intellectual’; and for the purposes of this paper, it offers an apt introduction to Lubbock’s intellectual career. John Lubbock was chosen as first chairman because he moved between the interconnected worlds of politics, science, and the educated classes; and he seemed to embody the all-important quality of transcendence of party interest. If his multiplicity of identities and associations recommended Lubbock to his contemporary intellectuals, these have proved problematic for his biographers and historians. In particular, historians too often take their cue from Charles Darwin, and contend that Lubbock’s science became a pleasant distraction from politics and the City once he became head of the family bank and a Member of Parliament. But Lubbock entered Parliament in 1870 as a ‘scientific’ M.P., who had City connections. Rather than being peripheral, science remained central to the moral value of his life, and to his identity as a man of letters. When the *Times* reported on his first bid to become rector of the University of St Andrews in 1886, it asserted that he, a long-serving M.P., was a candidate on ‘pure literary grounds’, while his opponent, Arthur James Balfour, was nominated as an ‘eminent politician’.¹¹

Lubbock’s identity as a scientist has proven equally difficult to contextualize

historically. Some have argued that Lubbock is best remembered as an archaeologist and anthropologist.¹² But, if anything, his work in these fields constituted a brief tangent of a larger intellectual project. A decade after he both ceased active work on prehistory and entered Parliament, Lubbock became most renowned for his scientific research on social insects – ants, bees, and wasps. This work was, undoubtedly, inspired by Darwin; and it should be seen as a continuation of Lubbock’s formative education in invertebrate anatomy and physiology under the tutelage of the reclusive naturalist of Downe. But Lubbock’s work on prehistory, sensory physiology, and comparative psychology was part of a broader commitment to the defence and reform of the Established Church, and to the ‘moral regeneration of mankind’ through the power of education. Lubbock contended that a complete understanding and appreciation of mental evolution would permit him to achieve the pinnacle of promise evinced by his hopeful progressive developmentalism. In undertaking this programme, Lubbock contributed to the professionalisation of society. In his parliamentary career, he successfully introduced an unprecedented number of private member’s bills. The majority of these addressed scientific subjects or involved the regulation of professions or commercial practices. For Lubbock, his commitment to meritocracy – underpinned by industriousness and acquisition of knowledge – was a continuation of familial whig-liberal commitments. Lubbock, the proto-professionalising scientist, was actually the quintessential late-Victorian liberal intellectual.

Lubbock, Darwin, and invertebrate physiology

Undeniably, John Lubbock was both intellectually and geographically close to Charles Darwin, who took up residence at Down House just two years after Lubbock’s family had begun extensive renovations of an estate at High Elms, one mile from the village of Downe.¹³ Sir John William Lubbock (1803-1865), his wife Harriet, and their eleven children - John Lubbock being the eldest - were the first neighbours with whom the Darwins became intimate. Sir John W. Lubbock counselled Darwin on financial investments in land and railways; and both men devoted energies to common, paternalist educational and

charitable organizations in the village of Downe.¹⁴ With the consent of the young man's father, Darwin orchestrated the purchase of a microscope for John Lubbock. Before long, they were swapping lenses for their matching Smith and Beck simple dissecting microscopes.¹⁵

More important, Darwin encouraged and directed Lubbock's work in the anatomy and physiology of marine life and insects. In 1850, he successfully proposed sixteen-year-old Lubbock for membership to the Entomological Society of London.¹⁶ One year later, Darwin contacted England's leading insect physiologist, George Newport, to draw his attention to John Lubbock, who had 'a strong taste for dissecting insects'.¹⁷ Lubbock's first published paper was a description of a new species of *Calanidae* from Darwin's *Beagle* crustacean collection.¹⁸ Shortly after this article appeared in 1853, Darwin successfully asked American James Dwight Dana, one of the foremost experts on crustacea, to give Lubbock 'a little encouragement'.¹⁹ Darwin commented on and corrected Lubbock's manuscript paper about reproduction in the water-flea *Daphnia*, a freshwater crustacean, before communicating it to the Royal Society. On the basis of this paper, the Royal Society elected John Lubbock to a fellowship in 1858, at the relatively young age of twenty-four (figure 1). Charles Darwin, of course, was one of his proposers: Richard Owen, 'Britain's most accomplished naturalist of the Victorian period', organized the necessary signatures.²⁰ Only one year earlier, Lubbock gained membership to the Athenaeum Club, 'the metaphorical lodge of the [intellectual] "freemasonry"', on Darwin's recommendation.²¹ Through dinner parties at Down House, Lubbock met Francis Galton, J.D. Hooker, and Charles Lyell in 1854; T.H. Huxley in 1856; and John Stevens Henslow in 1857.²²

<Insert Daphnia sketch here: Figure 1: John Lubbock's sketches of Daphnia. Source: John Lubbock, Natural History Observations, LUA.22, loose leaf, Royal Society of London>

Taking stock of his supporters just months after the publication of the *Origin*,

Darwin numbered Lubbock as one of fifteen leading men of science who championed his theory of evolution.²³ By the 1850s, belief in the miraculous creation of species was in serious doubt among the educated classes. Robert Chambers's anonymously published *Vestiges of the Natural History of Creation* (1844) had generated considerable discussion about evolution.²⁴ While attending the annual meeting of the British Association for the Advancement of Science, Lubbock spent an evening in Hull in September 1853 discussing the 'mutability of species' with Charles Henry Strickland. The two men came to the conclusion that species 'might change into one another'.²⁵ But John Lubbock did not address the subject in print until after the Darwin-Wallace Linnean Society papers in 1858. In a paper given to the Royal Society that year, Lubbock posited intra-specific variation of the nervous systems of an insect, *Coccus hesperidum*, as evidence against the notion 'that such species were separately created'.²⁶ 'My neighbour and an excellent naturalist, J Lubbock is an enthusiastic convert', Darwin informed A.R. Wallace in April 1859.²⁷ References to Lubbock's work in the first (November 1859), third (March 1861), and fourth (1866) editions of the *Origin* were, perhaps, another manifestation of his support.²⁸

Within the field of biology, Lubbock was most prolific and successful as an entomologist. His major entomological monographs closely followed Darwin's research trajectory, if not also a Darwinian programme. Darwin wrote a major systematic study of Cirripedes (barnacles) for the Ray Society (1851-1854); two decades later, Lubbock wrote a systematic study of the insect orders Collembola (springtails) and Thysanura (silverfish) for the same society. Darwin wrote on the instinct, intelligence, habits, and expression of emotions in humans, worms, and other animals; and Lubbock did the same for insects. And both men produced books on the relationships between insects and flowers.²⁹

Undoubtedly motivated by a commitment to the primacy of taxonomy, a number of Lubbock's contemporaries considered the *Monograph of the Collembola and Thysanura* (1873) to be his greatest scientific achievement. The Thysanura, which are small, delicate, and sensitive to light, had, previously, been of little interest to collectors. Lubbock was the

first to suggest that the Thysanura and Collembola formed two distinct orders, and he proposed the name Collembola.³⁰ Like Darwin's Cirripedes, however, the Thysanura also provided Lubbock with embryological evidence on the origin of species. Darwin had been convinced of the validity of Louis Agassiz's speculations 'that the geological succession of extinct forms is in some degree parallel to the embryological development of recent forms'. Consequently, he argued that similarities in ontogeny (individual development) were indications of common descent: only, for example, by an examination of Cirripedes' larvae was he able to identify the barnacle as a crustacean.³¹

In the early 1870s, Lubbock applied to insects the embryological evidence of descent. With explicit reference to Ernst Haeckel's recent biogenetic law (theory of recapitulation), Lubbock's *On the Origin and Metamorphoses of Insects* (1874) demonstrated that perfect insects, which differed greatly in form, shared similarities in their larval state.³² Moreover, he used this evidence to trace the archetypal ancestors of insects to *Campodea*-form and *Lindia*-form progenitors. Significantly, Lubbock departed from the heavily morphological bias of the embryological research of the 1870s. He elaborated Darwin's contention that some active insect larvae might diverge in form due to adaptation to the exigencies of their environment at particular stages in their development. He thereby appealed to the priorities of both field naturalists and pure morphologists.³³

As a neighbour and mentor, Charles Darwin was a formidable influence on the intellectual career of John Lubbock. But there is a danger in adopting a Darwinian lens to analyse Lubbock's entire career. From the outset of his acquaintance with the Lubbock family, Darwin was sensitive to their wealth and prestige in City finance. Shortly after his move to Downe in 1842, he confided to his sister, Catherine: 'The great Astronomer Sir J. Lubbock is owner of 3000 acres here, & is building a grand house a mile off – I believe he is very reserved & shy & proud or fine – so I suspect he will be no catch, & will never honour us ...'.³⁴ Darwin's predictions proved erroneous, and he formed a friendly relationship with the Lubbock family, providing instruction and guidance in natural history for the young

John Lubbock. But throughout these early years of informal tuition, Darwin repeatedly fretted about the potentially deleterious effects of Lubbock's place in the 'City aristocracy'. Praising Lubbock to J.D. Dana in 1853, Darwin cautiously predicted, 'if he can resist his future career of great wealth, business & rank, [he] may do good work in Natural History'.³⁵ Several years later, Darwin offered Lubbock a similar evaluation, after reading a draft of his paper on the reproduction of *Daphnia*: 'you will do much in Nat. History, notwithstanding your terrible case of "pursuit of knowledge under riches"...'.³⁶

Darwin's early concerns for Lubbock's scientific promise must be borne in mind when considering his often repeated lamentations surrounding Lubbock's foray into politics. The younger man's first unsuccessful attempt to gain a parliamentary seat in 1865 coincided with the publication of his *Pre-Historic Times* and with the death of his father. Writing to J.D. Hooker in 1865, Darwin proclaimed:

I am heartily glad you like Lubbock's book so much. It made me grieve his taking to politics, and though I grieve that he has lost his election, yet I suppose, now that he is once bitten, he will never give up politics, and science is done for. Many men can make fair M.P.'s; and how few can work in science like him!³⁷

Pre-Historic Times brought together a series of papers that Lubbock had either published in the *Natural History Review* or delivered as lectures at the Royal Institution. Both modes of dissemination linked him to the 'public science' of T.H. Huxley, John Tyndall, and other scientific naturalists, with whom he increasingly aligned himself. Although the majority of the book principally drew on diffusionist ethnography, the final chapter introduced natural selection to the 'prehistoric movement': Lubbock placed the 'antiquity of man' within the rubric of hopeful developmentalism. Darwin delighted in the profundity of the final chapter; took pride in the fruits of intellectual abilities which he had 'discovered a dozen years ago'; and then registered despair at Lubbock's venture into politics. Five years later, Lubbock won a parliamentary seat for Maidstone and published *The Origins of Civilisation and the Primitive Condition of Man*, his fully developed argument for socio-cultural evolution.³⁸

Lubbock's subsequent paucity of contributions to the prehistoric movement might

be taken as vindication of Darwin's predictions; but this would be a mistake. Lubbock's work on prehistory was part of a larger intellectual project, upon which he continued to work and to make significant contributions. Lubbock's research on sensory physiology of insects and other animals built on his early investigations of invertebrate physiology and his subsequent work on the antiquity of man. In the concluding chapter of *Pre-Historic Times*, he argued:

But even to animals which possess a clearly defined nervous system, we must ascribe very different degrees of sensibility. The study of the sensory organs in the lower animals offers great difficulties; but at least we know that they are, in many cases, few in number, and capable of conveying only general impressions. Every one will admit that the possession of a new sense or the improvement of an old one, is a fresh source of possible happiness; but how, it may be asked, does this affect the present question?³⁹

Lubbock had, of course, already answered his own question: according to his progressive developmentalism, natural selection led to increased happiness. More broadly, he declared that the progress of science would effect an improvement of the mind and would, thereby, increase happiness. His continuing contributions to science were part of his grand educational programme, which was rooted in his reading of natural selection as it applied to mental evolution.

Moreover, Darwin's distinction between a life of politics and a life of science must not be read anachronistically. At the time that Darwin made his pessimistic predictions, an occupational profession of science was still relatively rare, despite recent university reforms and a growth in learned scientific societies. Rather, a reclusive, independently wealthy naturalist, who wished to revolutionise natural history, failed either to envision or to acknowledge science as a new addition to the armoury of the 'man of letters', the 'educated classes', or the emergent 'intellectual'. With the death of his father in 1865, Lubbock acceded to the baronetcy and became head of the family bank. He commanded the wealth and independence necessary for a Victorian gentleman to become a successful intellectual.

And for the well-connected English intellectual, a parliamentary seat was the ultimate goal. Whereas Darwin lamented the possible implications of Lubbock's interest in politics, John Stuart Mill embraced them. Mill, a central figure in the overlapping worlds of politics and intellectual life, offered Lubbock any help that he could give.⁴⁰ After Herbert Spencer petitioned Mill on Lubbock's behalf, he responded: 'One of whom you express so high an opinion must be a very desirable member of the advanced liberal party in Parliament or anywhere'.⁴¹ Parliament was the great stage upon which Victorian educated classes tested and displayed their intellectual mettle.⁴² With the increasing profile of science as part of the rise of the intellectual in late Victorian Britain, a scientist, such as John Lubbock, could follow in the footsteps of the likes of Lyon Playfair: he could wield his scientific knowledge and skills in public service.⁴³

Whig-liberal intellectual

Darwin influenced Lubbock's scientific career, but 'intellectual father' obscures as much as it enlightens. On the one hand, it fails to capture adequately the developing relationship between the two men as collaborators.⁴⁴ In addition, it threatens to underplay the influence of Lubbock's parents. His mother, Harriet, played a strong role in the early education of her children. She nurtured Lubbock's interest in natural history, predicting that he would become a botanist.⁴⁵ Lubbock's father, Sir John William Lubbock, was a former student of William Whewell at Cambridge and an accomplished mathematician and astronomer. As such, he was part of the 'Cambridge Network' that looked to mathematics as a tool of intellectual and moral reform. He became a member of the committee of the Society for the Diffusion of Useful Knowledge (SDUK) in 1829, and produced his best known work - a revision of the London tide-tables - with the SDUK's encouragement. Through the effective use of mechanics' institutes and the nascent cheap literature movement, the SDUK (established 1826) became the corner-stone of a Broughamite educational programme for the working classes. It sought to inculcate self-help through self-knowledge, by employing a science-based curriculum. As first Vice-Chancellor of the

University of London (1837-42), a treasurer and vice-president of the Royal Society (1830-35, 1838-47), a treasurer of the Great Exhibition of 1851, and a patron of local schools in Kent, Sir John William Lubbock was in a position to exert influence on behalf of scientific education. Moreover, he contemplated running for M.P. for Cambridge University in 1832.⁴⁶

Like his father before him, John Lubbock combined banking and science with an active public life. After the death of his father, Lubbock became head of Robarts, Lubbock & Co. (established in 1772 as Sir William Lemon, Buller, Furley, Lubbock & Co.), which was one of the three most prominent established private deposit banks in late-nineteenth-century England. A combination of social and cultural attributes - three years of an upper-class education at Eton; a large country seat at High Elms; familial connections with members of the Court of Directors of the Bank of England; and the assumption of a strictly supervisory role at the family bank after 1882 - place Lubbock comfortably within Youssef Cassis's 'City aristocracy'.⁴⁷ As Timothy Alborn has convincingly argued, the Lubbocks' involvement in banking need not be seen as a separate distraction from serious scientific work. As head of a private bank, the Lubbocks would have assumed supervisory roles, which gave them the time and money to pursue intellectual and other interests. Their City connections furnished them with economic data, which they or their scientific peers could study systematically. Moreover, through their science and their banking, both men adhered to principles of rational investigation, underpinned by quantitative evidence.⁴⁸ In many ways, this commitment helped the younger Lubbock to forge intellectual bonds with the adherents of scientific naturalism.

At first glance, the Lubbocks' inclusion in Noel Annan's 'intellectual aristocracy' may seem at odds with a 'City aristocracy'. As Stefan Collini has pointed out, any attempt to categorize, definitively, a single person may run the risk of denying the complexities of life.⁴⁹ Although both social groupings were grounded in complex webs of kinship ties and a network of intermarriages, the intellectual aristocracy opposed wealth, as embodied in

plutocracy. Committed to meritocracy, the intellectual aristocracy opposed traditional aristocratic privilege. They were ‘wedded to gradual reform of accepted institutions and able to move between the worlds of speculation and government’.⁵⁰ Adopting Annan’s category, George Stocking, Jr. places John Lubbock among an intellectual aristocracy of evolutionary anthropologists, who used their expositions of socio-cultural evolution to reinforce a middle-class ideal of social mobility. Lubbock, according to Stocking, personally exemplified this ideal by his rise from baronet to the title of Lord Avebury in 1900, and by his acquisition of a castle in Kent.⁵¹ As part of the City aristocracy, Lubbock could, conceivably, oppose privileges of the traditional landed aristocracy. Like his father, Lubbock sought to rid society of untrained placemen in positions that required scientific expertise. And like his father, Lubbock envisioned these measures within a rubric of progressive developmentalism.

Frank Turner’s contends that Lubbock and his fellow X Club members formed the nucleus of scientific naturalism, a tool of scientific professionalisers, bent on wresting socio-cultural authority and leadership from the hands of the clergy.⁵² In retrospect, Lubbock played a significant role in espousing the values which underpinned emergent professional society. But Lubbock is best understood as promoting the liberal values of his Whig father. Although his father’s science was imbued with some of the moral fervour of early nineteenth-century evangelicalism, Lubbock’s science was strongly underpinned by Victorian liberalism’s ‘dominant ... moral sensibilities’. Lubbock was not intent on making science an occupational profession: he wanted to incorporate science into the armoury of an intellectual élite, who would lead the moral reformation of society.

John Lubbock – member of the City and intellectual aristocracies – is best understood as building on his father’s Broughamite Whig programme for science. As a ‘whig-liberal’, Lubbock used science to inculcate correct ethical and social behaviour.⁵³ Reflecting upon the state of the poor in his diary in 1853, he observed:

there [sic] high wages do them no good, it all goes in drink so that their

wives and families are as badly off as ever. There are fewer petty thefts but not fewer crimes. The delegates instil Chartism and infidelity, which are on the increase, into them. Education has not yet been able to counter this. Certainly there are thousands of Children yet, who go to no school.⁵⁴

From an early age, Lubbock contended that education was the pre-eminent instrument of the ‘moral regeneration of mankind’.⁵⁵ Working within a developmental framework, he later asserted that illiteracy spawned the criminal classes, who were civilization’s savages.⁵⁶ To maintain social stability, a whig-liberal clerisy had to instruct the nation in good political behaviour. Lubbock was in an excellent position to implement such a programme. He was a member of the Senate, Vice-Chancellor, and, finally, parliamentary representative for the University of London. He served on three royal commissions concerned with educational issues, the most significant being the far-reaching and comprehensive Devonshire Commission on scientific instruction and the advancement of science. And as Principal of the Working Men’s College, and an active supporter of the University Extension movement, he spread his educational panacea to the labouring classes and to the provinces.⁵⁷ In an age steeped in the rhetoric of morality and character, John Lubbock proclaimed that ‘the true glory of a nation’ consisted ‘in the moral and intellectual pre-eminence of the people’;⁵⁸ and that science would ‘raise and strengthen the national, as surely as the individual character’.⁵⁹

Lubbock was part of the governing or educated classes, who moved in overlapping political, social and intellectual worlds, which claimed to transcend ‘mere party feeling’. One way in which late Victorian intellectuals distinguished themselves from early nineteenth-century men of letters was their denunciation of sectarianism. Lubbock observed:

many of our countrymen assume as a self-evident truth that all religion must be dogmatic. Dean Stanley tells us that once, when he was Dean of Westminster, he endeavoured to prove to Lord Beaconsfield that a man might be very religious and yet withhold his judgment on dogmas.... If all Deans were like Dean Stanley, I should be sorry to lose them, but we might give up a good deal of dogma without any great disadvantage.⁶⁰

Throughout his life, Lubbock lived happily with an intellectual marriage of science and religion. While courting his second wife, John Lubbock briefly deferred his proclamations of love, 'because it was good Friday'.⁶¹ Less than a month later, he continued to woo Alice Lane Fox Pitt Rivers with a reading from the *Origin of Species*.⁶² Unlike many of his contemporary scientific naturalists, Lubbock suffered no crisis of faith. Charles Lyell, who struggled spiritually over the extension of evolution to the hallowed domain of man, informed J.D. Hooker, in March 1863: 'I shall lead more people on to Darwin and you, than one who, being born later, like Lubbock, has comparatively little to abandon of old and cherished ideas ...'.⁶³ As an intellectualist anthropologist, Lubbock believed that science provided correct naturalistic explanations in place of the erroneous past attempts of superstition and dogmatic religion.⁶⁴ Paraphrasing W.H. Freemantle, Lubbock contended that 'men of science and not the clergy only, are ministers of religion'.⁶⁵ Consequently, he associated with the broad church intelligentsia that defended a reformed Establishment;⁶⁶ and his closest friend was Balliol-educated Mountstuart Grant Duff. In addition, he sent his eldest son to Balliol, where he made frequent visits to the College's master, Benjamin Jowett.⁶⁷ Convinced that science exerted a purifying influence on religion, Lubbock used the tools of scientific naturalism to earn his place among the whig-liberal intellectual aristocracy, who were committed to the defence of a reformed Established Church and to the necessity of education to inculcate individual responsibility.

Only months after the first appearance of the *Origin*, the confluence of liberalism and naturalism became apparent. Published 21 March 1860, *Essays and Reviews* provoked the 'greatest religious crisis of the Victorian age'.⁶⁸ Drawn together by Henry Bristow Wilson and Mark Pattison, on behalf of radical Oxford bookseller John Parker, Jr., seven liberal Anglicans - Wilson, Pattison, Frederick Temple, Benjamin Jowett, Rowland Williams, Baden Powell, and C.W. Goodwin - produced a collection of essays which espoused the methods of science and biblical criticism. This core of Rugby and Balliol men sought freedom from the constraints of subscription to the 39 Articles, in the name of

theological liberalism. The bishops of the Established Church unanimously condemned the *Essays*. As a direct response to the bishops' declarations, which appeared in *The Times*, John Lubbock and William Spottiswoode canvassed scientists for their support of the Essayists. After consulting Huxley, Lyell, Jowett and A.P. Stanley, they circulated a memorial which stated:

Feeling as we do that the discoveries in science, and the general progress of thought, have necessitated some modification of the views generally held on theological matters, we welcome these attempts to establish religious teaching on a firmer and broader foundation.⁶⁹

The mixed responses that they received highlight the dangers of depicting the confrontation as a war between science and religion. Among refusals were J.F.W. Herschel, who opposed organized sectarianism in matters scientific or religious,⁷⁰ and anti-Darwinian entomologist Thomas Vernon Wollaston, who had a distaste for 'these recent, but hacknied [sic], importations fr[om] Germany'.⁷¹ In contrast, Christian Socialist, future canon of Westminster, and amateur scientist, Charles Kingsley boldly declared:

I will gladly sign your memorial...I shall not be made a bishop, or even a Dean & I don't want to be. I want Truth to flourish & conquer. I have dared & suffered for her.⁷²

Kingsley's proclamation of a quest for Truth resonated with Lubbock's liberal motivation to support the '*septem contra Christum*'. The memorial, he claimed, 'commits you to no opinions, except one in favor of free discussion & free thought'.⁷³

J.D. Hooker, however, remained unconvinced. Like Herschel, he felt that the memorial actually represented sectarianism. Moreover, it threatened disunity within the "body politic" of scientific men'. Hooker observed that most of the signatories were 'the young progressionists in Science', who represented 'one way of thinking in such matters as "Origin of Species", "Age of Man", etc. etc'; and that they might harm the image of science

‘amongst the outsiders’ by proffering their opinion on the foreign domain of religion. Although he would unhesitatingly oppose any challenge to ‘progression’ within science, the *Essays* clearly fell beyond his broadly demarcated disciplinary boundaries.⁷⁴ Lubbock did not share Hooker’s vigilance over the borders of science and religion. Whereas Hooker spoke as a professional scientist, Lubbock spoke for part of an aggressive whig-liberal clerisy. Evoking a military metaphor, he decried, ‘it is sadly irksome to do nothing while the battle of freedom is being fought, & I do think that the great liberal party should stand by their guns & their friends’.⁷⁵

Lubbock, and the circle of Darwinian supporters with whom he associated, continued to concern themselves with an amalgam of science, politics, and religious beliefs throughout the 1860s. Opposed to dogmatic theology, and committed to the cause of science, Lubbock and eight other men - Joseph Dalton Hooker, Thomas Henry Huxley, William Spottiswoode, John Tyndall, Edward Frankland, Thomas Archer Hirst, George Busk, and Herbert Spencer - united to create an informal dining club in late 1864.⁷⁶ Meeting the first Thursday of every month between October and June, the X Club wielded unparalleled influence within the scientific world for almost thirty years. In combination, the members of the X Club ‘conspired’ to promote their ideal of unfettered, scientific research. Committed to the creed of ‘scientific naturalism’, they believed that all phenomena in the material world could be reduced to naturalistic explanations; revelation had no explanatory role in the realm of scientific investigation.

Savages, social insects, and dogs

As the author of *Pre-Historic Times* (1865) and *The Origin of Civilisation and the Primitive Condition of Man* (1870), Lubbock was, in the early 1870s, best known as an archaeologist and an anthropologist. Upon his death in 1913, however, *Nature* recognized his biological texts - the *Monograph of the Collembola and Thysanura* (1873), *On the Origin and Metamorphoses of Insects* (1874), *Flowers, Fruits and Leaves* (1886), *Ants, Bees and Wasps* (1882), and *On the Senses, Instincts, and Intelligence of Animals* (1888) - as ‘five of his

most illuminating books'.⁷⁷ These, of course, built on his earliest research on invertebrate anatomy and physiology.

In 1874, Lubbock published his first in a long series of papers devoted to the social Hymenoptera. Within a decade, his commitment to the study of ants, bees, and wasps came to dominate his public image:

At this period of his varied career it is indeed evident that the aspect of his multitudinous industry which was impressing itself most vividly on the popular imagination was his study of the intelligence of hymenopterous insects. For the time being...it was over-shadowing all that he had done in antiquarian research, in other branches of science, in finance, or in social legislation.⁷⁸

In 1882, *Punch* produced a trenchant satirisation of Lubbock's multi-faceted public persona as one of their 'Fancy Portraits'. Underneath a caricature of Lubbock, as a bee hovering above flowers, was the following verse:

How doth the banking busy bee
Improve his shining hours
By studying on bank holidays
Strange insects and wild flowers!⁷⁹

By transforming him into the object of his studies, *Punch* captured Lubbock's avowed campaign to promote industriousness and self-help through self-knowledge. John Lubbock was the architect of the Bank Holiday Act, which was passed on 15 May 1871. *Punch's* verse sardonically acknowledged that Lubbock's political commitment to greater 'leisure' was anchored in his pedagogical ambitions. *The Entomologist's Monthly Magazine* later noted that, 'as the originator of the "Bank Holiday", his name will be for all time held in grateful remembrance by those Entomologists who are blessed with only a limited amount of leisure'. Lubbock successfully combined the roles of scientific naturalist and 'public moralist'.⁸⁰

Lubbock's work on social insects was not a complete departure from his

contributions to the prehistoric movement. As an archaeologist and a social anthropologist, he worked within a developmental framework. Like Daniel Wilson before him, Lubbock used ethnographic parallels to discern vestiges of primitive ancestors in contemporary savages: similar tools and implements were offered as evidence to connect contemporary nineteenth-century 'savages' with primitive ancestors. Lubbock was one of the earliest intellectuals to combine biological and social evolution in his study of primitive man; and he controversially denied savages religion. Teetering on the edge of animality, savages, therefore, became a 'missing link'.⁸¹ Lubbock's edifice of evolutionary progress rested upon a belief in the psychic unity of animal, savage, and European man. The savage, the ant, and the bee were perfectible; they could be civilised, domesticated, or tamed.⁸²

To establish effectively an evolutionary continuum, Lubbock sought to close the gap between humans and the minima of sentient beings, insects. Thus, John Lubbock, renowned arm-chair intellectualist anthropologist, embarked upon his studies of social insects with the intention of taming some bees.⁸³ Whereas he denigrated non-European peoples under the moniker of 'savage', Lubbock elevated wasps, bees, and ants to a 'rank next to man in the scale of intelligence'. He created a sensation at the annual meeting of the British Association in August 1872 when he presented a wasp that he had tamed, like a savage civilised. He had captured a wasp while on holiday in the Pyrenees, and was soon able to 'feed her' and 'stroke her' without eliciting a sting. *Punch* likened him to a flea tamer, and then proposed him for Lord Lieutenant of Ireland, for surely he could 'pacify the Irish hornets' nest'. He had established the continuity of mental evolution between animal and man, and had affirmed the superior rationality of nineteenth-century European man by demonstrating his control over sentient nature. Sadly, the wasp died on 18 February 1873, after nine months in the company of Lubbock. *Nature* accorded it a small obituary as it came to its final resting place on a pin in the British Museum (Natural History).⁸⁴

Although actively observing and experimenting on bees and ants since 1871, the taming of the wasp infused Lubbock with a new sense of mission. He recorded that he had

embarked upon a mission to ‘tame’ twelve bees three months after the wasp’s death. Scientific naturalists based their cultural authority on their ability to control and manipulate the natural world through rigorous experimentation. As part of a flourishing apicultural tradition, semi-domesticated bees seemed ideally suited to the scientist bent on subjecting insects to an experimental regime. The bees, however, did not easily submit to the experimentalist’s designs. In June 1873, Lubbock was stung a number of times and driven from the hives by bees that had been excited by the summer’s heat.⁸⁵ Not to be defeated, he established a Marriot flat glass hive in his sitting room, ‘so as to be able to observe them more continuously’, the following month. But the mutinous bees bolted, and Lubbock had to replace the swarm, the queen, and the hive on a number of occasions over the next eighteen months. He later explained:

I originally intended to make my experiment principally with bees, but soon found that ants were on the whole more suitable for my purpose. In the first place, ants are much less excitable, they are less liable to accidents, and from the absence of wings are more easy to keep under continuous observation.⁸⁶

In contrast to his experience with bees, Lubbock maintained and manipulated ant colonies for considerable lengths of time, using glass nests that he devised.⁸⁷ His plan of construction quickly became the model ‘glass apparatus’ for rearing and observing ant colonies; ‘Lubbock nests’ became standard equipment for myrmecologists.⁸⁸

Lubbock devoted a significant portion of his career to delineating the sensory physiology of social insects in order to demonstrate mental evolution. Unsurprisingly, perhaps, his inspiration came from Darwin. In Lubbock’s presidential address to the Entomological Society of London, he used Darwin’s evidence for the co-evolution of flowers and insects as a springboard for his own speculations regarding the comparative psychology of bees. Taking his cue from the pollination biology of Darwin and Conrad Sprengel, Lubbock pondered the bee’s ability to perceive ‘bright and conspicuous flowers’:

we obtain from these facts the best evidence that insects possess the faculty of perceiving and distinguishing colours. For as regards the vision, and indeed the other senses of insects, we have yet much to learn. We do not yet thoroughly understand how they see, smell, or hear; nor are entomologists entirely agreed as to the function or the structure of the antennae. This interesting subject offers a most promising field for study....⁸⁹

He speculated that insects possessed the power of reason, and were capable of feeling pain.

Significantly, he employed ants and ‘savages’ to support his suppositions:

Look, then, at the ants; they build houses, they keep domestic animals [aphids], and they make slaves; if we deny to them the possession of reason we might almost as well question it in the lower races of Man: insects cannot speak, indeed, but they evidently communicate by means of their antennae, just like certain North American Indians who cannot understand one another's language, but who can yet converse together with ease and fluency by a code of signs....⁹⁰

In retrospect, Lubbock's presidential address of 1866 was a programmatic statement for his future work on sensory physiology and comparative psychology.

Lubbock was an adherent of association psychology: he believed that all ideas emanated from sensations of the external world, which were bound together in the mind through associations and memory.⁹¹ Consequently, he proceeded on the assumption that an assessment of a being's sensory abilities would reveal a measure of its intelligence. After all, if consciousness in humans evolved gradually, it must exist, ‘probably in a less degree, in other animals’. ‘No one’, he continued, ‘...who has kept and studied pets, even if they be only ants and bees, can bring himself to regard them as mere machines’.⁹² Lubbock traced individual insects' responses to a barrage of sensory phenomena by marking them with dabs of paint. At various times, he deployed a high pitched whistle devised by Francis Galton, a sensitive flame apparatus loaned by John Tyndall, a telephone and sensitive microphone provided by Alexander Graham Bell, scented camel's hair brushes, tuning forks, a violin, and the squeaks and screams of his own voice.⁹³

Between 1874 and 1882, Lubbock broadcast the fruit of his research through the pages of the *Journal of the Linnean Society*, and through lectures delivered at the Royal Institution. These lectures and papers, drawn together into a single volume, metamorphosed into one of his most popular books, *Ants, Bees, and Wasps* (1882). It went through five editions in its first seven months, and it passed through thirteen more by 1929.⁹⁴ Although it was an acknowledged popular book, *Ants, Bees, and Wasps* contained original and lasting contributions to the sensory biology of insects. Using a rotating table devised by Francis Galton, Lubbock determined that ants followed scent trails, but that, in themselves, these trails provided no sense of direction. The latter attribute, he linked to the incident light and, thereby, laid the foundations for the elaboration of the ‘sun compass’ reaction. He trained bees to visit honey smeared on glass that was laid over different coloured cards to test their colour vision. His method of training, which was subsequently called ‘dressur’, became widely employed by the German school that was led by Karl von Frisch. Furthermore, by observing where in the spectrum ants arranged their brood, Lubbock proved that they were sensitive to ultra-violet rays.⁹⁵ In total, he achieved some success in penetrating the insects’ different perceptions of the world. Moreover, he presented the results of his experiments in an accessible, secular language. At a time when scientific disciplines began to move towards professional closure, John Lubbock believed that his contributions ‘need not, because they are popular, be the less truly scientific’.⁹⁶ As part of a late Victorian generalist culture, he popularized the scientific naturalists’ professional ideal to promote the ambitions of a whig-liberal clerisy.

Through John Lubbock’s informal and formal expositions and demonstrations, the ant, as ‘domesticated nature’, achieved immense notoriety. As ‘microcosms in the parlour’, Lubbock nests shared much in common with aquariums, but they differed in one important respect.⁹⁷ The Lubbock nest never became a middle-class fad in late Victorian Britain. Informally, however, Lubbock effectively wielded his ant nests as a form of parlour entertainment which was informed by experimentation. Befitting the gentleman intellectual,

he provided weekend gatherings for prominent members of Society circles and the educated classes at High Elms. Undoubtedly, a major drawing card was a Sunday visit to Charles Darwin, which Lubbock made a frequent feature. He truly was ‘Darwin’s Mercury’, introducing the reclusive naturalist of Downe to a veritable pantheon of Victorian celebrities. In early March 1877, for instance, he took his weekend guests - Huxley, Lyon Playfair, John Morley, and William E. Gladstone – ‘up to the hill-top’, where ‘the great statesman of liberalism met for the first time the great scientist of liberalism’.⁹⁸ Significantly, Lubbock’s ants were another feature of these weekend gatherings, with thirty to forty glass nests established in his rooms at High Elms. A friend noted that the ‘ants were duly visited’ as part of the weekend entertainment.⁹⁹ Even in the absence of his nests, Lubbock’s ants became a topic of interest in Society rounds. In December 1881, Lubbock, on request, regaled the Duchess of Cleveland, Bismarck, and other fellow guests at Woburn Abbey with talk of his ants.¹⁰⁰

John Lubbock was equally effective at reaching a broad popular audience. Although endowed with a weak voice, he drew large crowds to his lectures on ants. At the Dublin meeting of the British Association in 1878, the audience was so large that the organizers arranged for Lubbock to take his lecture outside. Rain prevented this course of action, and ‘hundreds’ were turned away. Lubbock proudly recorded in his diary: ‘My ants made quite a sensation’. In November 1881, he drew a crowd of six or seven hundred at the Bow and Bromley Institute; he lectured on ants to an audience of 2,000 at the Victoria Theatre in November 1885; and, in spite of miserable weather, 1,500 persons attended his address to the Wolverhampton Literary Society in January 1887. Less than a month after he successfully delivered two papers at the Aberdeen meeting of the British Association in 1885, the Queen sent Lubbock a request for copies of the papers and of his book, *Ants, Bees, and Wasps*.¹⁰¹ Naturally, when the Working Women’s College asked him to lecture in 1892, ‘they chose the Ants as subject’.¹⁰² Through his lectures, parties, and publications, he insured that the ants’ ubiquitous presence in nature was duly reflected in their successful

colonisation of the many strata of Victorian society.

If the ubiquity of semi-domesticated ants and bees encouraged investigation of them, the proximity of other domestic pets proved equally alluring for Lubbock. In a manner befitting Dr Doolittle, Lubbock informed *Nature* in 1883 of his ambition to teach ‘animals to converse’.¹⁰³ In early February of the same year, Lubbock acquired a black terrier puppy, named ‘Van’, upon which to experiment. Within a week, Lubbock had introduced the dog to a variant of his card-training technique. He placed cardboard pieces, with printed words, over everyday items – ‘food’, ‘tea’, ‘bone’, ‘water’. He separated the cards from the objects ten days later, and left Van to make his requests. ‘No one,’ he concluded, ‘who has seen him look down a row of cards and pick up the one he wanted could, I think, doubt that in bringing a card he felt that he is making a request, and that he could not only distinguish one card from another but also associate the word and object’. He was less successful with colour and arithmetical skills. Nevertheless, Lubbock considered these limitations inconsequential in light of the ‘very limited powers of savage men in this respect. After all, Australian aborigines could only count to four’.¹⁰⁴ Originally inspired by the case of American woman Laura Bridgman, who suffered from severe sensory disabilities, Lubbock’s experiments on his dog drew on the mental evolutionism that underpinned his prehistory, his sensory biology, and his pedagogy.

To achieve his educational ambitions, Lubbock repeated his combination of experimentation, parlour entertainment, and scientific proselytizing. By the time that pressures of work forced him to return the dog to its original owner in 1886, Lubbock’s social circles were abuzz with discussion of the intelligent dog.¹⁰⁵ Gladstone, as a weekend guest at High Elms, showed particular interest in the puppy’s progress. One year later, Van’s fame had spread abroad, and the French newspapers had ‘some amusing notices’ of him. Lubbock published short reports on Van in *The Spectator* and *Nature*, and delivered a paper on the same subject at the Aberdeen meeting of the British Association in 1885. And when he contributed another monograph to the International Scientific Series, his experiments on

Van constituted a chapter.¹⁰⁶ Upon the publication of *On the Senses, Instincts, and Intelligence of Animals with Special Reference to Insects* (1888), Benjamin Jowett wrote to Lubbock: ‘I am inclined to think that more light will be [shed] on the human mind from a study of the instincts of animals than from metaphysical speculations’.¹⁰⁷ Jowett was not alone in his positive assessment of Lubbock’s work. Acknowledged leaders in mental evolution and comparative psychology – George J. Romanes and C. Lloyd Morgan – considered Lubbock’s techniques and methods to be exemplars for specialist work in this field of study.¹⁰⁸

Conclusion

Like his list of the best hundred books which he published in 1886, Lubbock intended his scientific literature to serve an educational purpose.¹⁰⁹ His popular science was not targeted at a lower-middle-class or labouring audience. He wrote his hymenopteran expositions in one ‘voice’ for a multiplicity of contexts. Lubbock’s literature was not, however, a tool of social control that was meant to produce cogs in the industrial machine. ‘Now we advocate Education’, he explained, ‘not merely to make the man the better workman, but the workman the better man’.¹¹⁰ Lubbock used science to promote a professional ideal. Through his armchair anthropology, his tame wasp, his intelligent ants and bees, and his literate dog, Van, John Lubbock, first Baron Avebury, charted the evolutionary mental continuum between animal, savage, and educated European man. Wealthy banker, MP, anthropologist and biologist, Lubbock devoted his considerable skills to proselytizing the creed of scientific naturalism. In a career that spanned half a century, he contributed countless papers to learned societies and their journals, gave frequent public lectures, and produced approximately twenty books, many of these being best-sellers. As a public moralist, Lubbock was part of a generalist intellectual culture, and, therefore, steered a course between popular and increasingly professional science. His animal psychology, therefore, often elicited both respect and scepticism from his scientific and political peers and from a bemused wider public. Hobbling into the House of Commons on crutches one day, Lubbock

was greeted by an acquaintance: ‘Hallow! Lubbock, got the gout? That comes of teaching dogs to read’.¹¹¹ The commitment to the psychic unity of man, which underpinned Lubbock’s anthropology and comparative psychology, guided his educational approach. All persons were capable of becoming rational, civilized humans, in the image of the late-nineteenth-century British, educated, élite male. They just needed training in the values and knowledge of the intellectual aristocracy.

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 2. Thomas Carlyle’s essay on Sir Walter Scott, in his *Critical and Miscellaneous Essays*, 7 vols. (London, 1869), vi, p. 46, quoted in J.S. Mill, *On Liberty* (1859; rept. Harmondsworth: Penguin Books, 1984), pp. 81-2. See Alan Willard Brown, *The Metaphysical Society: Victorian Minds in Crisis, 1869-1880* (New York: Cambridge Univ. Press, 1947), pp. 1-9, 17; and Susan Faye Cannon, ‘The Cambridge Network’, in idem. *Science in Culture: The Early Victorian Period* (New York: Dawson, 1978), pp. 48-9.
 3. M. Millhauser, *Fire and Ice: The Influence of Science on Tennyson’s Poetry* (Lincoln: The Tennyson Society, 1971), esp. pp. 24-32.
 4. Henry Drummond, *Tropical Africa* (London: Hodder and Stoughton, 1888), p. 123. On Drummond, see James R. Moore, ‘Evangelicals and Evolution: Henry Drummond, Herbert Spencer, and the Naturalisation of the Spiritual World’, *Scottish Journal of Theology*, 38 (1985), 383-417.
 5. Brown, op. cit. (2). See, especially, pp. 10-13. For the solicitation of John Lubbock’s support for the nascent Society, see R.H. Hutton’s letter, dated 1 July 1869, in, Horace G. Hutchinson, *Life of Sir John Lubbock, Lord Avebury*, 2 vols.

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- (London: Macmillan and Co., 1914), i, pp. 100-101; and Lubbock's personal reminiscences in, *ibid.*, pp. 101-102.
6. Bernard Lightman, *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge* (Baltimore: The Johns Hopkins Univ. Press, 1987), pp. 6-31 (esp. 10-13); and William Irvine, *Apes Angels & Victorians: A Joint Biography of Darwin & Huxley* (1955; rept. London: Readers Union, 1956), pp. 192-204 (esp. 196).
 7. Christopher Kent, 'Higher Journalism and the Mid-Victorian Clerisy', *Victorian Studies*, 13 (December 1969), 181-98; Walter E. Houghton, 'Victorian Periodical Literature and the Articulate Classes', *Victorian Studies*, 22 (Summer 1979), 389-412; John Gross, *The Rise and Fall of the Man of Letters: English Literary Life Since 1800* (1969; rept. London: Penguin Books, 1969), pp. 74-110; Stefan Collini, *Public Moralists: Political Thought and Intellectual Life in Britain 1850-1930* (Oxford: Clarendon Press, 1991), pp. 52-59; T.W. Heyck, *The Transformation of Intellectual Life in Victorian England* (London: Croom Helm, 1982), pp. 28-33; and William C. Lubenow, *Liberal Intellectuals and Public Culture in Modern Britain, 1815-1914: Making Words Flesh* (Woodbridge, Suffolk: The Boydell Press, 2010), pp. 21, 90, and, especially, 149-52.
 8. Gross, *op. cit.* (7), p. 87.
 9. Collini, *op. cit.* (7), pp. 211-13.
 10. [Ursula] Grant Duff, 'Later Years', in *idem.*, ed., *The Life-Work of Lord Avebury (Sir John Lubbock) 1834-1913* (London: Watts & Co., 1934), p. 24.
 11. 'University Intelligence', *Times*, 26 November 1886, 9.
 12. Peter Rivière, 'Editor's Introduction', to John Lubbock, *The Origin of Civilisation and the Primitive Condition of Man* (London: Univ. of Chicago Press, 1978), pp. xiii-lxiv (xxvi-xxvii).
 13. Hutchinson, *op. cit.* (5), i, pp. 7, 15; and Charles Darwin, *The Correspondence of Charles Darwin*, eds. Frederick Burkhardt and Sydney Smith (Cambridge: Cambridge Univ. Press, 1983 sqq.), ii (1986), CD to Catherine Darwin [24 July 1842], pp. 323-25; CD to W.D. Fox [20 November 1843], p. 409.
 14. Darwin, *Correspondence*, *op. cit.* (13), iii (1987), CD to Susan Darwin [27 November 1844?], p. 86. Sir J.W. Lubbock leased 1 1/2 acres of land - which included the famous sandwalk - to Darwin in 1846. See CD to John William Lubbock [16 January 1846], pp. 276-77. Darwin, *Correspondence*, *op. cit.* (13), v (1989), CD to John William Lubbock, 6 September [1853], p. 154. J.W. Lubbock was chairman of a railway company, which ran an extension from Lewisham to Beckenham. See CD to W.E. Darwin [25 April 1855], pp. 321-22. Darwin, *Correspondence*, *op. cit.* (13), vii (1991), John Innes to CD, 9 January [1858-59], pp. 4-5.
 15. Darwin, *Correspondence*, *op. cit.* (13), iv (1989), CD to Harriet Lubbock [December 1848-1849], pp. 183-84; CD to John William Lubbock [December 1848-1849], p. 184. Darwin, *Correspondence*, *op. cit.* (13), vi (1990), CD to John Lubbock [29 July 1856], pp. 192-93. Hutchinson, *op. cit.* (5), i, pp. 23-24; and Grant Duff, *op. cit.* (10), p. 15.
 16. Darwin, *Correspondence*, *op. cit.* (30), iv (1988), CD to G.R. Waterhouse [January-June 1850], pp. 295-96. Lubbock was elected a member on 1 July 1850.

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 21. Darwin, *Correspondence*, op. cit. (13), vi (1990), CD to John Lubbock [6 March 1857], pp. 349-55. Lubbock was elected on 9 March 1857, but not under Rule II. See Collini, op. cit. (7), pp. 13 and 19.
 22. Thursday, 15 June 1854, and Friday 27 October 1854, Sir John Lubbock, 1st Baron Avebury, Diary, 1853-1863, *Supplementary Avebury Papers*, British Library [hereafter SAP], Add. MSS. 62679, ff. 43, 50; and Darwin, *Correspondence*, op. cit. (13), vi (1990), CD to John Lubbock, 24 April [1856], p. 87; and 11 and 12 August [1857], p. 442.
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 29. J.G. Myers, 'Lubbock as an Entomologist and Comparative Psychologist', [editor's introduction] to Sir John Lubbock, *Ants Bees and Wasps: A Record of Observations on the Habits of the Social Hymenoptera* (London: Kegan Paul, Trench, Trubner & Co., 1929), pp. ix-xiv (x), makes this comparison between Lubbock and Darwin. In addition, see L.S. Hearnshaw, *A Short History of British Psychology 1840-1940* (London: Methuen & Co., 1964), p. 86.
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 32. Sir John Lubbock, *On the Origin and Metamorphoses of Insects* (London: Macmillan and Co., 1874), p. 87. On the use of embryology as evidence for evolution, see S.J. Gould, *Ontogeny and Phylogeny* (Cambridge, Mass.: Belknap Press); Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance* (Cambridge, Mass.: Belknap Press, 1982), pp. 469-76. In the 1870s, Russian scientists developed techniques, which greatly assisted the study of invertebrate ontogeny. See L.S. Jacyna, 'Scientific Naturalism in Victorian Britain: An Essay in the Social History of Ideas', Unpublished Ph.D. Thesis, University of Edinburgh, 1980, pp. 214-70 (esp. 252).
 33. Lubbock, op. cit. (32), pp. 38-40; Darwin, op. cit. (31), p. 419. See Darwin, *More Letters*, op. cit. (27), i, pp. 330-32 (331). For Lubbock's dual appeal, see Jacyna, op. cit. (32), p. 265.
 34. Darwin, *Correspondence*, op. cit. (13), ii (1986), CD to Catherine Darwin, [24 July 1842], p. 325.
 35. Darwin, *Correspondence*, op. cit. (13), v (1989), CD to J.D. Dana, 27 September [1853], p. 157.
 36. Darwin, *Correspondence*, op. cit. (13), vi (1990), CD to John Lubbock, 27 October [1856], p. 251.
 37. CD to J.D. Hooker, [July 1865], in Darwin, *More Letters*, op. cit. (27), ii, pp. 156-57.
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39. Lubbock, *Pre-Historic Times*, pp. 486-87. For natural selection and happiness, see p. 482.
40. Collini, op. cit. (7), p. 20
41. J.S. Mill to Herbert Spencer, 9 April 1865: Letter 795 in J.S. Mill, *The Life and Letters of John Stuart Mill, 1849-1873*, ed. Francis E. Mincks and Dwight N. Lindley, in *Collected Works of John Stuart Mill*, ed. J.M. Robson, 31 vols (Toronto: University of Toronto Press, 1965-1989), xvi (1972), p. 1029.
42. Collini, op. cit. (7), p. 33.
43. For Playfair as a scientific intellectual, see Heyck, op. cit. (7), pp. 91-95.
44. See Alison Pearn's contribution to this issue. In addition, see Janet Browne, 'Darwin's Botanical Arithmetic and the "Principle of Divergence", 1854-1858', *Journal of the History of Biology*, 13 (Spring 1980), 53-90. Browne considers young John Lubbock's corrections of Darwin's statistical methods fundamentally important for the latter's formulation of the principle of divergence.
45. Mark Patton, *Science, Politics and Business in the Work of Sir John Lubbock, A Man of Universal Mind* (Aldershot, Hampshire: Ashgate, 2007), p. 17.
46. See [Miss A.M. Clerke], 'Lubbock, Sir John William', *DNB*, vol. 12 (London, 1909), pp. 227-28; Cannon, op. cit. (2), pp. 29-71 (esp. 41-42); and James P. Henderson, 'Sir John Wiliam Lubbock's *On Currency* – "an interesting book by a still more interesting man"', *History of Political Economy*, 18 (1986), 383-404. On the SDUK and Broughamite education, see Jonathan Topham, 'Science and popular education in the 1830s: the role of the *Bridgewater Treatises*', *British Journal for the History of Science* [hereafter *BJHS*], 25 (1992), 397-430 (esp. 405-20); and J.N. Hays, 'Science and Brougham's Society', *Annals of Science*, 20 (1964), 227-41.
47. Y. Cassis, 'Bankers in English Society in the Late Nineteenth Century', 2nd series, *The Economic History Review*, 38 (1985), 210-29 (esp. 215, 219, 225). See Harold Perkin, *The Rise of Professional Society: England Since 1880* (1989; rept. London: Routledge, 1990), p. 73, for his criticisms of Cassis's central thesis.
48. See Timothy L. Alborn, 'Lubbock, John William, third baronet (1803-1865)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edn, October 2007 [<http://www.oxforddnb.com/view/article/17119>, accessed 6 Nov 2013]; idem., 'John Lubbock, first baron Avebury (1834-1913)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edn, January 2012 [<http://www.oxforddnb.com/view/article/34618>, accessed 13 March 2013]; and idem., 'Public Science, Private Finance: The Uneasy Advancement of J.W. Lubbock', unpublished paper presented at BSHS conference, 'Science and British Culture in the 1830s', Trinity College, Cambridge, 6-8 July 1994.
49. Collini, op. cit. (7), pp. 27-28.
50. N.G. Annan, 'The Intellectual Aristocracy', in *Studies in Social History: A Tribute to G.M. Trevelyan*, ed. J.H. Plumb (London: Longmans, Green and Co., 1955), pp. 243-87 (244). For the Lubbock family, see p. 282. In addition, se William Whyte, 'The Intellectual Aristocracy Revisited'. *Journal of Victorian Culture*, 10 (2005),

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- 15-45.
51. Stocking, op. cit. (38), pp. 150-56, 212-18, 253. After the death of his first wife, John Lubbock married Alice Lane Fox Pitt Rivers, the daughter of the renowned evolutionary anthropologist, General A.H. Lane Fox Pitt Rivers.
 52. Frank M. Turner, 'The Victorian Conflict between Science and Religion: A Professional Dimension', *Isis*, 69 (1978), 356-76 (esp. 362-65); idem., 'Public Science in Britain, 1880-1919', op. cit. (38).
 53. Ruth Barton, 'The X Club: Science, Religion, and Social Change in Victorian England', Unpublished Ph.D. Thesis, History and Sociology of Science, University of Pennsylvania, 1976, pp. 69-85; J.P. Parry, *Democracy and Religion: Gladstone and the Liberal Party, 1867-1875* (1986; rept. Cambridge: Cambridge Univ. Press, 1989), pp. 1-149, provides the best analysis of Lubbock's politics in the context of his intellectual circles.
 54. Tuesday, 25 October 1853, Sir John Lubbock, 1st Baron Avebury, Diary, 1853-1863, *SAP*, Add. MSS. 62679, f. 24.
 55. This phrase is from Mill, op. cit. (2), p. 114. Parry, op. cit. (53), p. 5, makes the same general point in terms of the educational priorities of whig-liberals.
 56. Lubbock, op. cit. (38), pp. 488-89.
 57. See Roy M. MacLeod, 'Resources of Science in Victorian England: The Endowment of Science Movement, 1868-1900', in *Science and Society 1600-1900*, ed. Peter Mathias (Cambridge: Cambridge Univ. Press, 1972), pp. 111-66 (esp. 126-60); and D.S.L. Cardwell, *The Organisation of Science in England* (1957; rept. London: Heinemann, 1972), pp. 111-26. Henrika Kuklick, *The Savage Within: The Social History of British Anthropology, 1885-1945* (Cambridge: Cambridge Univ. Press, 1991), pp. 107-08, provides an insightful analysis of Lubbock's educational activities.
 58. Sir John Lubbock, *The Pleasures of Life. Part II*, 2nd ed. (London: Macmillan and Co., 1889), pp. 250-51.
 59. John Lubbock, *The Pleasures of Life* (London: Macmillan & Co., 1887), p. 167.
 60. John Lubbock, 'Richard Jefferies', in his *Essays and Addresses 1900-1903* (London: Macmillan & Co., 1903), p. 73.
 61. 11 April 1884 [Written 5 October 1886], Alice, Lady Avebury, Diary, 1884-1888, *SAP*, Add. MSS. 62691, ff. 61-62.
 62. Wednesday, 7 May 1884, Sir John Lubbock, 1st Lord Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, f. 27.
 63. See Heyck, op. cit. (7), pp. 97-103. In addition, see John R. Durant, 'The Meaning of Evolution: Post-Darwinian Debates on the Significance for Man of the Theory of Evolution, 1858-1908', Unpublished Ph.D. Thesis, University of Cambridge, 1977. See Charles Lyell, *Life Letters and Journals of Sir Charles Lyell, Bart.*, ed. Mrs. Lyell, 2 vols. (London: John Murray, 1881), ii, pp. 361-62; and Michael Bartholomew, 'Lyell and Evolution: An Account of Lyell's Response to the Prospect of the Evolutionary Ancestry of Man', *BJHS*, 6 (1973), 261-303.
 64. Sir John Lubbock, *The Origin of Civilisation and the Primitive Condition of Man. Mental and Social Condition of Savages* (London: Longmans, Green, and Co., 1870), pp. 255-56. See Paul Heelas, 'Intellectualism and the Anthropology of

- Religion', Unpublished D.Phil. Thesis, Anthropology and Geography, University of Oxford, 1974, pp. 1-165.
65. Lubbock, *Pleasures*, p. 162.
 66. John Lubbock, *The Pleasures of Life*, 3rd ed. (London: Macmillan and Co., 1887), pp. 161-62. See Ieuan Ellis, *Seven Against Christ: A Study of 'Essays and Reviews'* (Leiden: E.J. Brill, 1980), pp. 2-3; and Peter Hinchliff, *Benjamin Jowett and the Christian Religion* (Oxford: Clarendon Press, 1987), pp. 69-71.
 67. See [Sir Herbert Stephen], 'Grant Duff, Sir Mountstuart Elphinstone', *DNB*, 2nd supplement, vol. 2 (London, 1912), pp. 150-51. On Grant Duff's connections with the Balliol broad church intelligentsia, see Parry, op. cit. (53), pp. 69-70. On Lubbock's connections with Jowett, see Hutchinson, op. cit. (5), i, p. 174; and Saturday, 8 May 1875, Saturday, 8 March 1879, Sir John Lubbock, 1st Baron Avebury, Diary, 1872-1879, *SAP*, Add. MSS. 62681, ff. 123, 240; Saturday, 4 October 1879, Sir John Lubbock, 1st Baron Avebury, Diary, 1879-1882, *SAP*, Add. MSS. 62682, f. 11; Saturday, 9 May 1885, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, f. 42.
 68. Ellis, op. cit. (66), p. ix. In addition, see Owen Chadwick, *The Victorian Church: Part II 1860-1901* (1970; rept. London: SCM Press, 1972), pp. 75-97; and Mark Francis, 'The Origins of *Essays and Reviews*: An Interpretation of Mark Pattison in the 1850s', *The Historical Journal*, 17(1974), 797-811.
 69. See, *AP*, Add. MSS. 49639, ff. 27-29; and J. Lubbock to J.D. Hooker, 27 February 1861, *J.D. Hooker Correspondence (Letters to)*, vol. xiv, f. 173, Library, Royal Botanic Gardens, Kew.
 70. J.F.W. Herschel to J. Lubbock, 2 March 1861, *AP*, Add. MSS. 49639, ff. 37-38
 71. T.V. Wollaston to J. Lubbock, 7 April 1861, *AP*, Add. MSS. 49639, ff. 53-54.
 72. Charles Kingsley to J. Lubbock, 6 March 1861, *AP*, Add. MSS. 49639, ff. 43-50 (49).
 73. J. Lubbock to George Bentham, 28 February 1861, *Bentham Correspondence*, vol. vi, f. 2541, Library, Royal Botanic Gardens, Kew.
 74. J.D. Hooker to J. Lubbock, 29 February 1861, *J.D. Hooker Correspondence (Letters from)*, vol. x, ff. 240-41, Library, Royal Botanic Gardens, Kew.
 75. J. Lubbock to J.D. Hooker, 2 March 1861, *J.D. Hooker Correspondence (Letters to)*, vol. xiv, f. 174, Library, Royal Botanic Gardens, Kew. For Lubbock's views on Church reform, see J. Lubbock to J.D. Hooker, 5 March 1861, *J.D. Hooker Correspondence (Letters to)*, vol. xiv, f. 175, Library, Royal Botanic Gardens, Kew.
 76. Ruth Barton, op. cit. (53); idem., "'An Influential Set of Chaps": The X-Club and Royal Society Politics 1864-85', *BJHS*, 23(1990), 53-81; and J. Vernon Jensen, 'The X Club: Fraternity of Victorian Scientists', *BJHS*, 5(1970), 63-72. In addition, see Saturday, 9 June 1866. See Sir John Lubbock, 1st Baron Avebury, Diary, 1864- 1882, *SAP*, Add. MSS. 62680, ff. 1,2.
 77. 'Lord Avebury, F.R.S.', *Nature*, 91 (5 June 1913), 350-51 (350).
 78. Hutchinson, op. cit. (5), i, p. 183.
 79. 'Punch's Fancy Portraits. - No. 97', *Punch, or the London Charivari*, 19 August 1882, p. 82.
 80. See Hutchinson, op. cit. (5), i, pp. 119-26; and 'Lord Avebury, F.R.S.', *The*

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- Entomologist's Monthly Magazine*, 2nd series, 24 (1913), 163
81. Lubbock, op. cit. (64), p. 1; Alice B. Kehoe, 'The Invention of Prehistory', *Current Anthropology*, 32 (1991), 467-76; Stocking, op. cit. (38), pp. 154-55; Rivière, op. cit. (12), pp. xxxiv-xxxvi; Idus L. Murphree, 'The Evolutionary Anthropologists: The Progress of Mankind. The Concepts of Progress and Culture in the Thought of John Lubbock, Edward B. Tylor, and Lewis H. Morgan', *Proceedings of the American Philosophical Society*, 105 (1961), 265-300 (esp. 272-82); and Neal C. Gillespie, 'The Duke of Argyll, Evolutionary Anthropology, and the Art of Scientific Controversy', *Isis*, 68 (1977), 40-55. Both Stocking (p. 153), and Gay Weber, 'Science and Society in Nineteenth Century Anthropology', *History of Science*, 12 (1974), 260-83 (281), discern similarities between 'arm-chair anthropology' and some of Lubbock's myrmecological observations.
 82. Clifford Geertz, 'Notions of Primitive Thought: dialogue with Clifford Geertz', in Jonathan Miller, *States of Mind* (Toronto: Methuen, 1983), pp. 192-210 (200). In addition, see Charles Darwin, *Voyage of the Beagle* (1839; rept. London: Penguin Books, 1989), p. 172.
 83. Wednesday, 14 May 1873, Sir John Lubbock, 1st Baron Avebury, Diary, 1872-1879, *SAP*, Add. MSS. 62681, f. 44.
 84. John Lubbock, LUA,12, Royal Society of London [hereafter RSL]; John Lubbock, *Ants, Bees, and Wasps: A Record of Observations on the Habits of the Social Hymenoptera*, 17th ed. (London: Kegan Paul, Trench, Trübner & Co., 1915), pp. 315-16; idem., *Chapters in Popular Natural History* (London: National Societies Depository, 1882), pp. 70-71; Hutchinson, op. cit. (5), i, pp. 141-42; 'A Philosopher's Pet', *Punch, or the London Charivari*, 62-63 (7 September, 1872), 97; 'Notes', *Nature*, 7 (20 March 1873), 391; and Tim Ingold, 'The architect and the bee: reflections on the work of animals and men', in his *The Appropriation of Nature: Essays on Human Ecology and Social Relations* (Manchester: Manchester Univ. Press, 1986), pp. 16-39.
 85. Lubbock, LUA.22, p. 378, RSL.
 86. Lubbock, *Ants, Bees, and Wasps*, op. cit. (84), p. 274; and idem., *Chapters*, op. cit. (84), p. 63. Lubbock, *Ants, Bees, and Wasps*, op. cit. (84), pp. 185-86.
 87. Ibid., pp. 4, 41; and Friday, 29 July 1887, and Thursday, 9 August 1888, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, ff. 72, 82.
 88. Lubbock, *Ants, Bees, and Wasps*, op. cit. (84), p. 2. Auguste Forel, *The Social World of the Ants Compared with that of Man*, trans. C.K. Ogden, 2 vols. (London: G.P. Putnam's Sons, 1928), i, pp. 379-404 (especially, pp. 383-84).
 89. Sir John Lubbock, 'The President's Address', *Journal of the Proceedings of the Entomological Society of London*, 1866, pp. lii-lxv (lxi). See Darwin, op. cit. (31), pp. 139-42. Darwin developed his argument more extensively in his *Various Contrivances by Which Orchids Are Fertilised by Insects*, 2nd ed. revised (1877; rept. Chicago: Univ. of Chicago Press, 1984), especially p. 275; and Jacob Lorch, 'The Discovery of Nectar and Nectaries and Its Relation to Views on Flowers and Insects', *Isis*, 69 (1978), 514-33 (esp. 531).
 90. Lubbock, op. cit. (89), p. lxiv.
 91. See: Robert J. Richards, *Darwin and the Emergence of Evolutionary Theories of*

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- Mind and Behavior* (Chicago: Univ. of Chicago Press, 1987), pp. 169-72; Hearnshaw, op. cit. (29), pp. 56-68; Durant, op. cit. (63), pp. 180-224; and Stocking, op. cit. (38), pp. 92-96.
92. John Lubbock, 'Huxley's Life and Work', in his *Essays and Addresses*, op. cit. (60), p. 30.
93. Lubbock, *Ants, Bees, and Wasps*, op. cit. (84), pp. 182-235, 45; idem., op. cit. (84), pp. 42-62; and idem., 'On the Habits of Ants', *The Fortnightly Review*, new series, 27 (1 March 1877), p. 299. Wednesday, 12 September 1877, Friday, 26 September 1877, Saturday, 27 September 1877, Saturday, 23 February 1878, Saturday, 24 August 1878, Friday, 30 August 1878, Saturday, 31 August 1878, Friday, 6 September 1878, Sunday, 23 February 1879, Sir John Lubbock, 1st Baron Avebury, Diary, 1872-1879, *SAP*, Add. MSS. 62681, ff. 193, 194, 212, 229, 239; and Lubbock, op. cit. (52), p. 200. On Monday, 24 November 1879, Lubbock made 'some experiments on Ants with the telephone, but they had no result'. Sir John Lubbock, 1st Baron Avebury, Diary, 1879-1882, *SAP*, Add. MSS. 62682, f. 14. In addition, see Grant Duff, op. cit. (169), ii, p. 116. Francis Galton, 'Hydrogen Whistles', *Nature*, 27 (22 March 1883), 491-92; and Wednesday, 20 June 1883, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, f. 9.
94. Myers, op. cit. (29), pp. ix-xiv.
95. Lubbock, *Ants, Bees, and Wasps*, op. cit. (84), pp. 181, 273, 291-310 (181). See: J. Arthur Thomson, 'Zoology (Animal Behavior)', and H. St. J.K. Donisthorpe, 'Entomology (Ants)', in *The Life-Work of Lord Avebury*, op. cit. (10), pp. 115-56, 157-67; R.J. Pumphrey, 'The Forgotten Man -- Sir John Lubbock, F.R.S.', *Notes and Records of the Royal Society of London*, 13 (1958), 49-58; G. Richard, 'The Historical Development of Nineteenth and Twentieth Century Studies on the Behavior of Insects', in *History of Entomology*, op. cit. (17), pp. 477-502; and Sir Vincent B. Wigglesworth, 'The Contributions of Sir John Lubbock (Lord Avebury) to Insect Physiology', *Proceedings of the Royal Entomological Society of London*, series c, 29 (1964-1965), 55-60.
96. John Lubbock, *Scientific Lectures*, 2nd ed. (London: Macmillan and Co., 1890), p. v.
97. See Christopher Hamlin, 'Robert Warington and the Moral Economy of the Aquarium', *Journal of the History of Biology*, 19 (Spring 1986), 133-53 (esp. 150-53); and Graeme Gooday, "'Nature" in the laboratory: domestication and discipline with the microscope in Victorian life science', *BJHS*, 24 (1991), 307-41.
98. For contemporary accounts of Lubbock's weekend parties, see Francis Galton, *Memories of My Life* (London: Methuen & Co., 1908), pp. 177-78. And Alfred Russel Wallace, *My Life. A Record of Events and Opinions*, 2 vols. (London: Chapman & Hall, 1905), ii, p. 33. On the March 1877 visit to Darwin, see: Sunday, 11 March 1877, Sir John Lubbock, 1st Baron Avebury, Diary, 1872-1879, *SAP*, Add. MSS. 62681, f. 173; Irvine, op. cit. (5), p. 164; and John Morley, *The Life of William Ewart Gladstone*, 3 vols. (London: Macmillan and Co., 1903), ii, p. 562. Morley notes that Gladstone 'makes no mention of his afternoon call' in his diary. In fact, W.E. Gladstone, *The Gladstone Diaries*, eds. M.R.D. Foot and H.C.G. Matthew (Oxford: Clarendon Press, 1968 sqq.), ix (1986), p. 199, reveals that he

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- did record his visit with ‘Mr. Darwin’.
99. Mountstuart E. Grant Duff, *Notes from a Diary 1886-1888*, 2 vols. (London: John Murray, 1900), i, pp. 178-79.
 100. Friday, 9 December 1881, Sir John Lubbock, 1st Baron Avebury, Diary, 1879-1882, *SAP*, Add. MSS. 62682, f. 108.
 101. Tuesday, 29 November 1881, Sir John Lubbock, 1st Baron Avebury, Diary, 1879-1882, *SAP*, Add. MSS. 62682, F. 106. Tuesday, 3 November 1885; Tuesday, 18 January 1887; and Saturday, 17 October 1885, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, ff. 50, 66, 49.
 102. Thursday, 27 October 1892, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS. 62683, f. 121.
 103. John Lubbock, ‘Teaching Animals to Converse’, *Nature*, 29 (3 Jan 1884), 216.
 104. John Lubbock, *SAP*, Add. MSS 6283, fol. 3; and John Lubbock, *On the Senses, Instincts, and Intelligence of Animals*, 2nd edn (London: Kegan Paul, Trench & Co., 1889), pp. 278, 281.
 105. Thursday, 4 May 1886, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS 6283, fol 55.
 106. Saturday, 7 April 1883, Tuesday, 15 April 1884 and Wednesday, 30 April 1884, Sir John Lubbock, 1st Baron Avebury, Diary, 1883-1894, *SAP*, Add. MSS 6283, fols. 4, 26, 27.
 107. See Jowett to Lubbock, 22 October 1888, *AP*, Add. MSS. 49681B, f. 84.
 108. George J. Romanes, *Animal Intelligence* (London: Kegan Paul, Trench & Co., 1882). In addition, see idem., ‘Intelligence of Ants’, *Nineteenth Century*, 9 (June 1881), 992-1008, and 10 (August 1881), 245-58. Darwin gave Romanes his unpublished notes on instinct. See idem., *Mental Evolution in Animals. With a Posthumous Essay on Instinct by Charles Darwin* (London: Kegan Paul, Trench & Co., 1883), pp. 355-84. C. Lloyd Morgan, *Animal Behaviour* (London: Edward Arnold, 1900), pp. 198, 218-19. For the contributions of Romanes and Morgan, see: Richards, op. cit. (56), pp. 331-408; Hearnshaw, op. cit. (29), pp. 92-100; and Turner, *Between Science and Religion*, op. cit. (38), pp. 134-63. Alan Costall, ‘How Lloyd Morgan’s Canon Backfired’, *Journal of the History of the Behavioral Sciences*, 29 (April 1993), 113-22, presents a very good revisionist examination of Morgan’s canon.
 109. John Lubbock, ‘On the Pleasure of Reading’, *Contemporary Review*, 49 (February 1886), 240-51.
 110. John Lubbock, *The Use of Life* (London, 1894), p. 97, quoted in Kuklick, op. cit. (57), p. 107.
 111. Monstuart E. Grant Duff, *Notes from a Diary 1889-1891*, 2 vols. (London: John Murray, 1901), i, p. 42.