

**Species of Compassion: Aesthetics, Anaesthetics, and Pain in the Physiological
Laboratory**
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I

Reflections on the feelings aroused by the sight and by the idea of the surgically opened, living body command the attention of the historian of emotions. This essay reconstructs the controversy over vivisection in the last quarter of the nineteenth century as a history of the emotions to explore how reflexive emotional pain — compassion or sympathy — was idealized, contested, and applied. It deals in part with physiologists' reflections on emotional conditioning as preparation for the aesthetics of the opened body. It also deals with the change in those preparations wrought by the knowledge and application of anaesthetics. The article explores the ways in which the *sight* of suffering — the aesthetics of pain — were mitigated, justified, rationalized, and subjected to emotional control. It argues that a diminution of the aesthetic response to the sight of blood, in conjunction with knowledge of anaesthesia, allowed physiologists to conform to a moral code that abstracted compassion to suffering on a wide scale, removed from the immediacy of the laboratory, and in the name of 'humanity'. This in turn was connected to a newly developed notion of compassion or sympathy at the level of the whole community, of the whole species, or even of all sentient life, that had emerged from the moral philosophy of the theory of evolution. In this context, physiologists' reflections on their emotional equanimity in the laboratory can be connected to the operating callousness of the physician, and both are located in a secular, Darwinian context of the evolution of the emotions. This stands in contrast with antivivisectionist charges of callousness and their own aesthetics of compassion — their own emotional pain — that endured the rise of anaesthetics in physiological experiments.¹

Historians have found late nineteenth-century physiologists' equanimity difficult to imagine in practice. Patrizia Guarnieri has opined that 'the activity of the vivisectionist did not necessarily preclude a caring attitude towards animals, or a reciprocal relationship of good-will', but the two things were nevertheless incompatible:

On the one hand, the white-collared scientist who tied down an etherised dog on the operating table who [...] opened its skull and removed the cranial lobes.

On the other, the gentleman who always had some delicacy in his pockets for the animals, and made sure that they lacked neither food nor affection. A sort of Dr Jekyll and Mr Hyde perhaps.²

She is not the only one to have drawn such a conclusion. Stewart Richards critiqued the physiologists of the 1870s and 1880s thus:

Whatever their ethical imperatives as private citizens (when they were evidently no less humane than other men), they were able as professional scientists, temporarily but repeatedly, to suspend ‘normal’ sensibilities in a way that we may recognize as more widely familiar throughout history than the singular case of Dr Jekyll and Mr. Hyde.

He went on to wonder whether John Burdon-Sanderson, about whom more below, had fallen, ‘like Dr. Moreau [...] under the spell of research’, which was the ‘source of a psychological commitment to specific instrumental norms that overwhelmed or obscured any more broadly based ethical misgivings’.³ Paul White has similarly pointed to a process whereby practitioners underwent a ‘reversion’ in the laboratory, wherein ‘bestial instincts were unleashed through the repeated and prolonged infliction of pain on helpless creatures’. This destabilized the ‘boundaries between the animal and the human’ in the name of clarifying them. Physiologists represented a ‘divided self’, ‘struggling [...] to overcome instinctual sympathies for other creatures in order to fulfill commitments to a higher good’.⁴

With regard to the latter struggle, White is correct, but I want to develop that argument in terms of the history of sympathy itself. Indeed, I want to explore an idea that White himself has suggested with regard to vivisection, but which is as yet undeveloped: the ‘crux of the late-Victorian debates was not just whether particular feelings were present in the experimenter or the animal, but the nature of emotion itself; its role in science and medicine — and in human society generally — seemed open to question’.⁵ Testing the historiographical credence given to the hardened heart of the late-Victorian scientist requires an investigation into what physiologists thought about causing (or avoiding causing) pain in animals.⁶ It is necessary to ask what changed after the use of anaesthetics became widespread — whether it matters that the vivisected dog in Guarnieri’s imagined scene was ‘etherised’. If one chooses not to set out to find Edward Hyde or Dr Moreau, one may encounter instead a complex individual who managed a logical consistency in his ethics and practice, and who did not exemplify a Victorian caricature of personality disorder. If we wish to leave literary fantasies behind, we need to

inquire anew about the ways in which pain in the laboratory was conceptualized, reflexively experienced, and ethically handled.⁷

II

The controversy over vivisection that began with the publication of the *Handbook for the Physiological Laboratory* in 1873, in the context of a prolific development of physiological specialism imported from Continental Europe, has a well-established historical narrative.⁸ Public attention was focussed by a Royal Commission on the Practice of Subjecting Live Animals to Experiments for Scientific Purposes, followed by the Cruelty to Animals Act of 1876, by which animal experimentation became subject to a government licensing system. The public inquiry of the mid-1870s encompassed the following questions: the utility of experimental research; the ‘humanity’ of physiologists at home and abroad; and the degree to which animals could, or should, suffer pain. In general within medical science, there was little dissension with regard to the benefits already derived, and the wealth of humanitarian relief to follow, from physiological research. The difficulty lay in the moral price at which those benefits were purchased. The Royal Commission proceeded to assess this difficulty, paying considerable attention to the moral consequences of animal pain and the use of anaesthetics. I will deal with these two things in turn.

To what extent were experimental animals thought to feel pain? Where did that pain weigh in the balance of comparative suffering? The answers to these questions allowed medical scientists to rationalize their own feelings in response to the experience of (inflicting) animal pain. G. M. Humphrey, Professor of Anatomy at the University of Cambridge, told the Royal Commission that the comparative smallness of animal nervous systems indicated that they could not possibly suffer so acutely as humans. Moreover, signs of a struggle were not construed as reliable indicators of pain. The ‘violent contortions of the worm’ on a hook did not necessarily indicate pain, ‘for there may be violent contortions and no suffering whatever’. So much, Humphrey said, had been learnt from the painless muscular excitations of men under chloroform, which looked like pain but were not, as well as from the painless convulsions of epileptics.⁹

This commonly stated opinion captured physiologists’ distrust of the outward signs of pain, which might otherwise have led to unwanted or inappropriate emotional responses

to it.¹⁰ Such reactions were deemed part of a culture of sentimentalism against which physiology aligned itself. It was exemplified by the secretary of the Royal Society for the Prevention of Cruelty to Animals, John Colam, who told the Royal Commission of his attendance at a lecture in the Spring of 1875 at the London Institution, given by Sir David Ferrier. It was probably a version of Ferrier's Croonian Lecture, given in May of that year, on 'Experiments on the Brain of Monkeys'.¹¹ Ferrier described in great detail his methods of removing parts of the brains of various monkeys, and his observations of their altered states thereafter. The audience, which was comprised of the general public, including 'several young people' and 'several young ladies too', laughed throughout at Ferrier's descriptions of the monkeys' grotesque movements and facial contortions. Colam thought the lecture 'was a long way out of good taste', and was 'sensational'. He was not alluding to the aesthetic qualities of monkeys, who were 'incapable of suffering' during the operations, but rather to it being 'a case of levity, likely to produce a bad effect'. These important investigations were objectionable because they were pitched at the level of 'what is called popular'. There was, Colam thought, 'scarcely that decorum which you would expect [...] in a man who was describing the condition of animals which had been mutilated by himself'. The grotesque nature of the subject, coupled with the audience's response to it, caused Colam and his companions pain. Indeed, one of his accompanying gentlemen 'left the room in consequence of the pain with which he saw the laughter of the young people' (Royal Commission on Vivisection, pp. 82–83).

Physiologists believed that the lack of pain in the animal removed any objections on the grounds of taste, and saw the emotional pain of antivivisectionists under such conditions as nothing more than a sentimental (feminine) reaction. James Crichton-Browne, the eminent alienist, had defended Ferrier, with whom he worked at the West Riding Asylum, in precisely these terms. The outward signs of pain could be achieved in animals without a brain, 'or in the deepest state of anaesthesia' by a simple 'stimulation of the motor centre'. The apparent 'intense and protracted agony' was 'not greater than that of a pianoforte when its keys are struck'.¹²

According to George Burrows, who was President of the Royal College of Physicians, only a 'very limited number of experiments [...] will cause a degree of pain to the animal', and under those circumstances it would be 'painful to the operator and to everybody else to contemplate'.¹³ Compassion in the immediate setting of the laboratory was therefore rationally limited. The pathologist James Paget, trusting in the 'general

humanity of scientific men', thought they could be 'left to be fair judges' of the 'amount of pain it is reasonable to inflict for the sake of attaining some useful knowledge'.¹⁴ The common concern that vivisection tended to brutalize the operator could be dismissed on the basis that animals' exposure to pain was minimized, for some of them by their lowly nervous systems, and for others by the use of anaesthetics. The anatomist William Sharpey was convinced that experimentation did not have 'the effect of blunting the feelings' or 'hardening the nature' of physiologists, but most agreed that this had to do with the superior qualities of the men involved.¹⁵ As Darwin's principal disciple George Romanes, who was himself a practising physiologist, later pointed out, 'our physiologists as a class are not less English gentlemen because they are highly cultured men of science'.¹⁶

Even after the use of anaesthetics was prevalent, comparative capacities of sensitivity to pain were continually used to justify experimentation, perhaps because anaesthesia was not deemed appropriate for every experiment.¹⁷ 'The sole means', according to the psychologist Edmund Gurney, of arriving at a 'conscientious estimate of others' suffering [...] lie in imagining it as one's own'. The anthropomorphism of this cross-species compassion raised the suspicion that animals were commonly allocated a greater capacity for experiencing pain than their physiologies warranted. Gurney argued for a 'close relation of suffering to intelligence'.¹⁸ Intellect was the key factor that enhanced suffering, and humans — even to the ardent utilitarian — were thought to have the largest share. Some animals shared the physiological systems of humans, but their brains were 'in proportion to the rest of the body, very much smaller than in the case of man' (Collier, p. 624). Given the likely benefits derived from physiology, vivisection could thus be justified.

These utilitarians had a good precedent for proceeding in this manner, for J. S. Mill had long since said that a 'being of higher faculties requires more to make him happy, is capable probably of more acute suffering, and certainly accessible to it at more points, than one of an inferior type'. It was, after all, worse to be a human being in pain than a pig in pain; worse to be Socrates in pain than a fool in pain.¹⁹ The twist was to say, with one eye on the antivivisection movement, that if anybody thought differently about the pig or the fool on behalf of the pig or the fool, they were guilty of a category error, for in fact these advocates only knew their own side of the equation.

At the International Medical Congress (IMC) held in London in 1881, John Simon gave a widely heralded speech defending medical science. He particularly denounced the

aesthetic sensibilities of antivivisectionists: ‘In certain circles of society’, he said, ‘aesthetics count for all in all; and an emotion against what they are pleased to call “vivisection” answers their purpose of the moment as well as any other little emotion.’ The medical profession could not seriously argue with such people, for they did not share a moral standard, or a world view:

Our own verb of life is *εργαζεσθαι* [to work], not *αισθανεσθαι* [to feel]. We have to think of usefulness to man. And to us, according to our standard of right and wrong, perhaps those lackadaisical aesthetics may seem but a feeble form of sensuality.

But that was not to say that he felt nothing with regard to his work. On the contrary, he thought of inflicting pain ‘with true compunction’, but he did it nonetheless because of the ‘end which it subserves’: the promotion of ‘the cure or prevention of disease in the race to which the animal belongs, or in the animal kingdom generally, or (above all) in the race of man’. Under such conditions he would not ‘flinch’ from this ‘professional duty, though a painful one’. Simon was referring to his own pain.²⁰

British medical scientists in the 1870s and 1880s were therefore acutely aware of the reflexive problems of causing pain. At worst, it might adversely affect their own ‘nerve’, and prevent them from following through their inquiries to the fullest extent. The infliction of pain on an animal, where unnecessary, might betray a callousness that could affect society at large. Physiologists generally concluded that vivisection without anaesthetic was difficult because animal suffering was, however mitigated, real. But, all things considered, it was worth it, nonetheless.

III

Physiologists thought that concerns about causing pain should have been put to rest by the widespread use of anaesthetics, which were employed in the vast majority of experiments. The primary benefit of anaesthetics was not that the experimental animal no longer suffered, but that the major concerns of the physiologist were alleviated: the greater good could be sought unhindered, the operator would not lose his nerve, and he would safeguard his ‘feeling’ heart. On a practical level, it also meant that the animal would keep still, though this fact was seldom mentioned.²¹ Anaesthesia objectified the experimental subject, allowing physiologists methodically to remove emotions, not *from* themselves,

but *to* more distant, abstract objects. Without anaesthetic, the experimental animal's status as a sensitive being could involve it in a reciprocity of aesthesia, of physical pain in the animal and the reflection of that pain — compassion — in the operator. This might inhibit the researcher in beginning, or in pursuing the ultimate ends of his research. As Carolyn Burdett has recently argued:

Aesthetic response belongs in the relation between viewer and object, as a consequence of what the object precipitates or excites in the body of the viewer. What the viewer then experiences (the consequent feelings or emotions), they then project back and experience anew, as if located in the object.²²

Indeed, not to feel this sympathetic pain might be a sign of brutality, giving rise to the 'general accusation of hardness' to which medical science was accustomed.²³ Chloroform and ether were safe ways to cut this reciprocal aesthesia, replacing it with a similar but opposite reciprocity of *anaesthesia* that could preserve both the nerve and the tenderness of the operator.²⁴ The benumbed object excited nothing in the viewer (operator), eliminating the possibility of projecting sensation back into the object. As such, William Carpenter averred that 'removing' pain had become a 'matter of duty' for physiologists, who could project their sympathetic gaze outside of the laboratory (Royal Commission on Vivisection, p. 282). By rendering the experimental subject as object, emotions were removed from the physiological procedure, in the name of a more abstract 'humanity'.²⁵

There is a wealth of evidence to demonstrate that physiologists knew that they were doing exactly this, even though they may have thought it possible without anaesthetics.²⁶ John Burdon-Sanderson, co-author and editor of the *Handbook for the Physiological Laboratory* (1873), averred his belief in a certain capacity inherent in the highly evolved civilized male. A man, much more so than a woman, was capable of 'directing mental effort to a recognized purpose' without succumbing to the 'greatest enemies', those 'emotional or sentimental states', including sympathy, which so often 'handicapped' women in their endeavours. A scientific man was singularly well equipped for a 'life directed to the fulfilment of a recognized purpose to which others must yield'.²⁷ Burdon-Sanderson famously neglected the subject of anaesthetics in the *Handbook*, and was repeatedly asked to justify the infliction of pain in the physiological laboratory, which he did by reference to 'the circumstance that we are working for an important and good object' (Royal Commission on Vivisection, p. 142). But if the infliction of pain could be

justified if there was ‘a certainty that the human race would be benefited by it’, how much more easily could an experiment be justified under anaesthesia? (Royal Commission on Vivisection, p. 146.) Burdon-Sanderson acknowledged that he ‘should condemn the non-employment of anaesthesia’ wherever anaesthesia could be used, and indeed acknowledged that he had failed in not making this clear in the *Handbook* (Royal Commission on Vivisection, pp. 115, 119, 126.) Yet he remained convinced that responsibility for ensuring the ‘greatest possible result’, ‘at the expense of as little suffering as possible’, lay with the scientist himself (Lady Burdon Sanderson, pp. 101, 103). It might even be argued that the failure of the *Handbook*’s authors to make humanitarian overtures towards those whom Burdon-Sanderson would have adjudged to have succumbed to their ‘emotional or sentimental states’ was consistent with an imperturbable direction of mental effort. The *Handbook*’s diagrammatical gaze into the bodies of the frog, the rabbit, and the dog was imagined in such a way as to avoid the aesthetic sensibilities associated with the bloody wound. Rather, furry-edged incisions were simply windows, abstracted from the animal body as a whole, displaying veins, arteries, nerves, ganglions, and glands [*Fig. 1*].²⁸

Another of the *Handbook*’s authors, the noted Scottish physician Thomas Lauder Brunton, also expatiated on the special qualities of the scientist, making the distinction between two types of compassion. Both medical scientists and antivivisectionists were ‘anxious to lessen the amount of pain and suffering in the world’, but where one looked to ‘the immediate and designed suffering of a few score of animals’, the other looked to ‘the ultimate relief of the undesigned pains of disease in animals and in men’. To civilized people, Lauder Brunton admitted, the ‘mere sight of suffering is painful’. This ‘painful impression’ causes some immediately to turn away and thus ‘be rid of the disagreeable feeling’. For others, ‘it excites a desire to relieve the pain of the sufferer, however disagreeable, disgusting, or trying the task may be.’ He put physiologists in the latter group. Such a ‘power of controlling one’s own emotions, of disregarding one’s own feelings at the sight of suffering’ varied from person to person, but it could be trained. It involved subordinating emotion to judgement, and it was aided in the case of physiology by practice, knowledge, and anaesthetics. The daily experience of experiment would, in itself, help with the process of putting judgement before feeling, allowing these ‘humane men’ to ‘purchase future good at the expense of present pain’.²⁹ E. Ray Lankester had made the same point in 1873, pleading that the ‘experimenter often suffers most acutely

from his sympathy with the animal, but controls his emotion and endures his pain in companionship with the dumb animal for the sake of science'.³⁰ But since the 'great majority' of experiments were 'rendered painless by means of anaesthetic agents', physiologists could, with measured judgement, learn 'to disregard their own feelings, and to concentrate their attention on the interests of the [human] patient' (Lauder Brunton, p. 480).

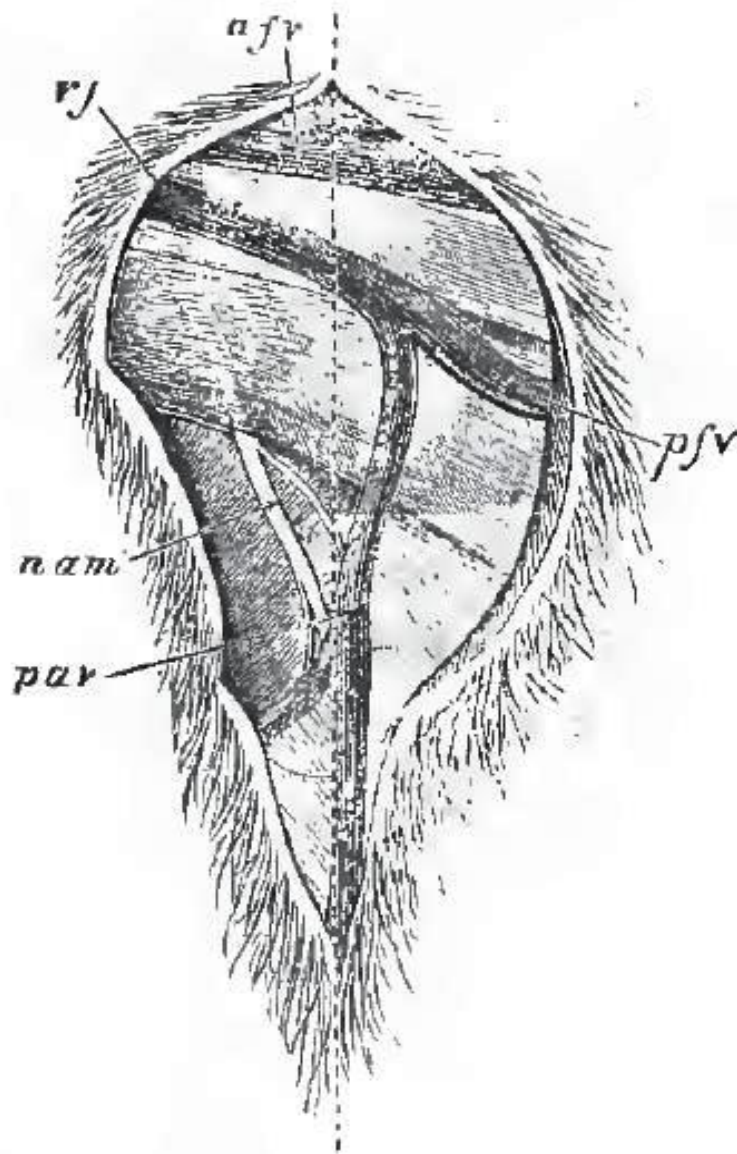


Fig. 1: 'Parts exposed in the rabbit by an incision extending from the thyroid cartilage to the root of the left ear. *vj*. Bifurcation of the jugular vein; *pfv*, posterior facial vein; *pav*, posterior auricular vein; *afv*, anterior facial vein; *nam*, great auricular nerve, where it emerges at the posterior edge of the sterno-mastoid muscle.' *Handbook for the Physiological Laboratory*, II, Plate LXXXIX, fig. 226.

It was to this measured judgement that the physician and great supporter of vivisection, William Osler, referred in 1889, before a class of new graduates in medicine at the University of Pennsylvania. Osler, whose experience defending vivisection was transatlantic in scope, saw the essential connection between vivisection and surgery, and felt that the qualities of the ‘imperturbable’ surgeon were kindred with the laboratory physiologist.³¹ The practitioner was lost if he felt his patient’s pain.³² He urged his new young colleagues to have their ‘nerves well in hand’ and to avoid the slightest facial expression of ‘anxiety or fear’ even under ‘the most serious circumstances’. To fail in this regard betrayed an inability to put one’s ‘medullary centres under the highest control’, and would lead to disaster. ‘Imperturbability’ was a ‘bodily endowment’ that ensured ‘coolness’, ‘calmness’, and ‘clearness of judgment in moments of grave peril’. It was character defined by ‘*phlegm*’:

Now a certain measure of insensibility is not only an advantage, but a positive necessity in the exercise of a calm judgment, and in carrying out delicate operations. Keen sensibility is doubtless a virtue of high order, when it does not interfere with steadiness of hand or coolness of nerve; but for the practitioner in his working-day world, a callousness which thinks only of the good to be effected, and goes ahead regardless of smaller considerations, is the preferable quality.

He urged his young charges to ‘cultivate [...] such a judicious measure of obtuseness’ that would ‘meet the exigencies of practice with firmness and courage, without, at the same time, hardening “the human heart by which we live”’.³³

For Osler, physiologists had the additional quality of an ‘experimental spirit in medicine’, with which there was ‘nothing else in human endeavour to compare from the standpoint of humanity’. He agreed with his colleague Harvey Cushing that there was a ‘feeling of regret [...] that animals, particularly dogs, should thus be subjected to operations, even though the object be a most desirable one and accomplished without the infliction of pain’, but his conclusion was clear: the ‘humanity of the physiologists’ could be trusted implicitly. This humanity — compassion in the broadest sense — had been adhered to through ‘lives of devotion and self-sacrifice’, through a useful callousness, and carried to an ‘incalculable’ extent.³⁴

Osler affirmed this in 1907, but it had been forcefully asserted by the institution of medicine at large as early as 1881. The IMC in London, the largest ever assemblage of eminent medical men from around the world to that date, unanimously passed a resolution

that had been drawn up under the auspices of the Physiological Society. It recorded the latter's 'conviction that experiments on living animals have proved of the utmost service to medicine in the past, and are indispensable to its future progress'. It strongly deprecated the infliction of 'unnecessary pain', but demanded 'in the interest of man and of animals' that 'competent persons' should not be restricted in their experiments.³⁵ In addition, many of the age's most prominent medical scientists and physicians came forth with their own similar defences. Gerald Yeo, professor of physiology at King's College London, underscored the profession's abhorrence at the infliction of pain by laying before the public an extended analysis of the prevalence of anaesthetic usage, setting out to prove that there was no 'want of tenderness amongst English physiologists' and that 'Pain forms [...] but a rare incident in the work of a practical physiologist'. William Gull emphasized the 'moral duty' of investigating 'problems of the highest importance to mankind' when the 'solution of these problems is within the scope of the human intellect'. This course by no means made physiologists 'indifferent to or careless of inflicting pain'. Their character had already been safeguarded by the 1871 resolutions of the British Association, the first of which read: 'No experiment which can be performed under the influence of an anaesthetic ought to be done without it.' It was with happiness that he noted that the 'great majority' of experiments on the nervous system 'are performed on decapitated frogs, or on other animals under the influence of anaesthetics'.³⁶

Physiologists, as a body, were pain-aware, mindful of the freedom given to them by anaesthetics and focussed on what they perceived to be the higher moral ends of their operations. Those moral ends, understood as the alleviation of all human suffering, were embedded within the moral theories of Darwin and his contemporaries, who sought to explain the evolution of compassion as the mainspring of moral action. To better appreciate those moral ends, as well as to understand the grounds upon which antivivisection could be rejected, we must turn to the evolutionary ethics that informed physiological practice.

IV

The link between physiology and evolutionary ethics is abundantly clear, and Darwin himself worked behind the scenes in collaboration with John Burdon-Sanderson, John Simon, T. H. Huxley, and others to ensure protective legislation for physiologists.³⁷

George Romanes, one of Darwin's most ardent supporters, was a principal agitator in the defence of physiology, and even suggested that Darwin write a pro-vivisection article for the monthly literary journal, the *Nineteenth Century*, entitled 'Mistaken Humanity of the Agitation: Real Humanity of Vivisection'. Thomas Huxley served as the most notable defender of vivisection on the committee of the Royal Commission on Vivisection, while elsewhere publicly denouncing 'the venomous sentim[ent]ality & inhuman tenderness of the members of the Society for the infliction of cruelty on Man — who are ready to let disease torture hecatombs of men as long as poodles are happy'. Herbert Spencer is reputed to have regarded vivisection to have been 'so justified by utility to be legitimate, expedient, and right', on the condition of State supervision.³⁸ In their defence of physiology, evolutionary ethicists offered a new interpretation of the meaning and implications of sympathy and compassion.

Robert J. Richards has clearly demonstrated that Darwin's evolutionary ethics was 'a morality of intentions'. This meant judging moral action not on what was done, in abstraction, but on the intended outcome. To better do this, according to Darwin, 'we must look *far forward* & to the *general action* — certainly because it is the result of what has *generally* been best for our good *far back*.'³⁹ The loose body of evolutionary scientists characterized antivivisectionists as adherents to a 'false' or 'mistaken' humanity because they allowed their conduct to be led by an immediate reaction to what they saw, or sensed, as wrong, without due consideration for what was actually good for humanity. Sympathy in an advanced civilization was extended beyond the confines of the family through its connection to the evolution of the intellect. 'The highest possible stage in moral culture', Darwin wrote, 'is when we recognise that we ought to control our thoughts'. Sympathy, by a process of reason, could therefore be extended to all, including animals.⁴⁰ But that also meant that an immediate sympathetic reaction could be suppressed for the sake of a greater good. The application of Darwin's own moral theory to the matter of vivisection is startlingly clear. In his most famous contribution on the subject Darwin wrote of the

incalculable benefits which will hereafter be derived from physiology, not only by man, but by the lower animals [...]. In the future every one will be astonished at the ingratitude shown, at least in England, to these benefactors of mankind.⁴¹

For Darwin, anaesthetics were morally desirable, but once used there could be no remaining objection to vivisection, a term he wished to replace with 'anaes-section' to

clear up any moral doubts (*Life and Letters of Charles Darwin*, III, 202). Even without anaesthetics, an operation could be justified ‘by an increase in our knowledge’, and could give the operator protection against the ‘remorse’ that would otherwise arise from his procedures (*Descent of Man*, p. 90). The evolution of sympathy allowed the ‘surgeon to harden himself whilst performing an operation, for he knows that he is acting for the good of his patient’ (*Descent of Man*, p. 159).

Darwin’s work on the moral sense was complemented by Herbert Spencer’s *Principles of Psychology* (1855).⁴² Put succinctly, the more evolved the emotional being, the more considered, and the less impulsive, would be the conduct of that being. It would be better equipped to see the long-term consequences of its actions, and to decide on the best overall moral action. ‘An emotional nature not well developed’, Spencer said, ‘will be relatively impulsive — the liability will be for each passion to display itself quickly and strongly, without check from the rest.’ With a higher development of the emotions, ‘there will be little liability to sudden outbursts of feeling.’ The resulting conduct, derived from a more complex and ‘a greater number of feelings severally less excited’, was likely to be ‘more persistent’. Spencer was outlining the contrast between civilized and ‘savage’, but, as was typical, he averred that an illustration of his theory was ‘furnished by the contrast between men and women’ (*Principles of Psychology*, I, 583). The overwhelming characterization of antivivisection as a women’s cause allowed antivivisectionist arguments to be dismissed in these Spencerian terms.⁴³ The demand for the abolition, or severe curtailment, of vivisection arose from impulsive responses to emotional stimuli. At the apogee of evolution, the white, male physiologists, who were all well versed in Darwinian morals, could claim their greater equanimity.⁴⁴ All things considered, what they were doing was for the greater good. They could bury their immediate sympathies and carry on.⁴⁵

Compassion for Spencer was styled the ‘tender emotion’ or ‘pity’. Simply put, pity implies [...] the representation of pain, sensational or emotional, experienced by another; and its function as so constituted, appears to be merely that of preventing the infliction of pain, or prompting efforts to assuage pain when it has been inflicted.

This description adequately describes both the objection of antivivisectionists when anaesthetic was not thought to be in use, and physiologists’ doubts when anaesthetics were not available, reliable, or preferable for certain experiments. But how did the evolutionists

explain the continued presence and persistence of pity even where there was no pain? Spencer drew attention to a ‘certain phase of pity’ in which ‘the pain has a pleasurable accompaniment; and the pleasurable pain, or painful pleasure, continues even where nothing is done, or can be done, towards mitigating the suffering’, or even when there is no actual suffering at all. Linking this tendency to the ‘parental instinct’, which in Spencer tends to indicate the ‘maternal instinct’, he asked what was the ‘common trait of the objects which excite’ the feeling. He found that this common trait was

always relative weakness or helplessness. Equally in the little girl with her doll, in the lady with her lap-dog, in the cat that has adopted a puppy, and in the hen that is anxious about the ducklings she has hatched, the feeling arises in presence of something feeble and dependent to be taken care of.

Naturally, this extended to ‘weakly creatures in general, and creatures that have been made weakly by accident, disease, or by ill-treatment’ (*Principles of Psychology*, II, 688–92). This feeling, a tender sympathy, was a self-serving pleasure, compassion *de haut en bas*, that did not serve any far-reaching good.⁴⁶ It accounted for what Gertrude Himmelfarb has called ‘the corrupt version of the gift as practised by a lady bountiful’.⁴⁷ Spencer called this ‘ego-altruism’.⁴⁸ New knowledge of the natural causes of the moral sentiments would bring this to an end and ‘call in question the authority of those ego-altruistic sentiments which once ruled unchallenged’. The moral sentiments, once fully evolved, were to ‘prompt resistance to laws that do not fulfil the conception of justice, [and] encourage men to brave the frowns of their fellows by pursuing a course at variance with customs that are perceived to be socially injurious’.⁴⁹ For physiologists and their supporters, antivivisectionist sympathy was deemed socially injurious in evolutionary terms and the pursuit of physiology was thought to be worth the frowns of (the less-evolved representatives of) society. Huxley perhaps said it most clearly when he wrote of the need of ‘putting natural sympathy aside, to try to get to the rights and wrongs of the business from a higher point of view, namely, that of humanity, which is often very different from that of emotional sentiment’.⁵⁰

Putting the moral good of vivisection in these terms, it now becomes clear that the utilitarian argument put forward in the defence of physiology — that vivisection was justified by its humanitarian ends — was precisely aimed at addressing the antivivisection claim that physiology had blunted the compassion of its practitioners. In fact it asserted a superiority of compassion apparently beyond the grasp of antivivisectionists.⁵¹ The

argument was already strong without having recourse to the additional safety of anaesthetics, which, after the 1876 Bill to regulate their usage had passed into law, implicitly undergirded the majority of humanitarian claims put forward in favour of physiology.⁵²

V

If the last quarter of the nineteenth century underwent a significant and general shift in the meaning and practical applications of compassion, as Gertrude Himmelfarb has convincingly argued in *Poverty and Compassion*, this article demonstrates that the adoption of a ‘Religion of Humanity’ was by no means uncontested. The intellectual and social impetus that drove ‘humanitarians’ to their ‘Religion of Humanity’ depended both upon the construction and direction of compassion, or sympathy more generally, and the degree to which ‘natural-law’ reconfigurations of moral action were set against prevailing notions of moral sentiments and aesthetic sensibilities. The encounter between compassion driven by an emotional/aesthetic response and compassion as an abstract judgement manifested two coeval and entangled ‘moral economies’: distinct webs of ‘affect-saturated values’ with their own systematized and normalized notions of right conduct.⁵³

The analysis of this encounter allows us to understand why antivivisection agitation actually increased in the period after anaesthetic usage had been legislated, regulated, and monitored. Despite physiologists’ untiring and consistent pleas that anaesthetics were used and were wholly effective in eliminating pain, antivivisectionists continued to protest in any case.⁵⁴ These protests centred on the perceived moral danger of the image of the opened body and of the sight of blood, irrespective of the presence of pain. Stewart Richards has shown that even after 1876, antivivisectionists found laboratory activities distasteful or repulsive, styling this as an ‘aesthetic objection’. He explains that, even after anaesthetics had seemingly robbed antivivisectionists of their moral cause, the cause nevertheless continued on the basis of ‘revulsion generated by the supposed aura of the laboratory as a hybrid product, as it were, of the operating room and the slaughterhouse’. Vivisection ‘had become indelibly associated with ideas of ruthless interrogation, offensive air and, above all, with blood’.⁵⁵ Antivivisectionists considered scientists to be just as brutalized by repeated exposure to the sight of blood as by their infliction of pain. This was a dulling of the aesthetic sense, of an instinctive sympathy, in

societal leaders and public men, that might precipitate a general spread of brutality throughout society. The most ardent of antivivisectionists therefore saw the advance of physiology as the corrupt offshoot of Darwinian morals.⁵⁶ Frances Power Cobbe famously asked if

the principles of the evolution philosophy require us to believe that the advancement of the ‘noble science of physiology’ is so supreme an object of human effort that the corresponding retreat and disappearance of the sentiments of compassion and sympathy must be accounted as of no consequence in the balance.⁵⁷

Richard Hutton (editor of the *Spectator* and a leading antivivisectionist) thought that ‘common compassion’, the very thing that evolutionary ethicists had disavowed, had collided with ‘the pursuit of scientific truth’. For him, ‘the ends of civilization, no less than of morality’ required that this common compassion, the aesthetic sense of sympathy, be followed.⁵⁸ Indeed, the brutalized scientist himself, inured to the commission of painful acts and/or to the sight of blood, was the principal cause of antivivisectionist fear. Antivivisection’s ‘sentiment of distaste’ — an ‘aesthetic judgement’ — was completely consistent with a judgement ‘in universal (moral) terms’.⁵⁹ An unfeeling man, judged by his insensitive eye, was an immoral man.

The antivivisectionist argument was sophisticated on this point. In allowing for a great expansion of animal experimentation, the legally enforced use of anaesthesia after 1876 was thought to have accelerated the numbing of the physiologists’ own aesthetic sense. This risked their own, and ultimately everyone else’s, moral sense. The first proof of this was, perhaps self-fulfillingly, in antivivisectionists’ own treatment at the hands of medical scientists, which might be classified as disregard at best and hostile dismissal at worst. As a body claiming to represent public opinion, antivivisectionist fears were not activated principally by physiology’s lack of feeling for animals, but by physiologists’ apparent lack of regard for *them*, or for public feeling at large. Frances Power Cobbe feared that without instinctive disgust, hearts ‘curarized’ by ‘science teaching’ ‘beat no more with any emotion of indignation or pity’. The institutional *raison d’être* of the Victoria Street Society, the principal organization opposed to vivisection, was to

preserve the whole community [...] from the deadliest possible injury, namely, the suppression of compassion, and the fostering of selfishness and cruelty, in the high places of education from whence those vices must permeate the whole character of the nation.⁶⁰

Antivivisectionist outrage fits into a view, consistently held since Adam Smith's *Theory of Moral Sentiments* (1790), on what happens when compassion, or sympathy, is thought to have failed. It signalled the breakdown of civilization.⁶¹

Adam Smith, at any rate, would have understood antivivisectionist rage at physiologists' 'cold insensibility and want of feeling', but he would have also drawn the physiologists as 'confounded' at the antivivisectionists' 'violence and passion'. Indeed, the two camps had 'become intolerable to one another'.⁶² This failure was precipitated by the perception of science's increasing distance from public opinion, a novelty perceived in some quarters as the dangerous and immoral drift of society toward specialization and professionalization.⁶³ Antivivisectionist 'pain' in the form of an aesthetics of compassion may have been irrational in utilitarian terms, but science's cold response was styled as inhuman. Civilization was risked not by vivisection, but by the character of the men who carried it out.

Physiologists departed from this position with the conviction, first, that aesthetically based moral sentiments could be flawed, and second, that evolutionary scientists better understood the highest ends of moral action. Compassion was projected to suffering humanity in the abstract and was out of place with regard to the sight/site of suffering in the laboratory, especially if there was actually no physical suffering. Those men who had already given preference to the cause of science over scruples about the infliction of pain, and the self-infliction of emotional pain, undoubtedly felt a greater release from the immediate aesthetic impulse of compassion, pity, humanity, or tenderness, through the use of anaesthetics. Moreover, anaesthetics allowed a great many further scientists to swell the ranks of physiology without the need to scruple about pain in the laboratory. This was considered to be an enrichment of the action of 'humanity', for it had humanity as a species as its object. Through this conception of humanity, the historian can more readily identify the imperturbable scientist, anaesthetized to the sight of blood, and callous for the sake of what he deemed a greater compassion.

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¹ Cf. Jed Mayer, 'The Expression of the Emotions in Man and Laboratory Animals', *Victorian Studies*, 50 (2008), 399–417.

² Patrizia Guarnieri, 'Moritz Schiff (1823–96): Experimental Physiology and Noble Sentiment in Florence', in *Vivisection in Historical Perspective*, ed. by Nicolaas A. Rupke (London: Croom Helm, 1987), pp. 105–24 (p. 106).

³ Stewart Richards, 'Drawing the Life-Blood of Physiology: Vivisection and the Physiologists' Dilemma, 1870–1900', *Annals of Science*, 43 (1996), 27–56 (pp. 31, 47–48). See also Hilda Kean, "'The Smooth Cool Men of Science': The Feminist and Socialist Response to Vivisection", *History Workshop Journal*, 40 (1995), 16–38 (pp. 19, 23).

⁴ Paul S. White, 'The Experimental Animal in Victorian Britain', in *Thinking with Animals: New Perspectives on Anthropomorphism*, ed. by Lorraine Daston and Gregg Mitman (New York: Columbia University Press, 2005), pp. 59–82 (pp. 62, 74). White's appraisal of the emotional control of physiologists is given richer treatment in 'Sympathy under the Knife: Experimentation and Emotion in Late Victorian Medicine', in *Medicine, Emotion and Disease, 1700–1950*, ed. by Fay Bound Alberti (Basingstoke: Palgrave, 2006), pp. 100–24. See also Donald Fleming, 'Charles Darwin, the Anaesthetic Man', *Victorian Studies*, 4 (1961), 219–36.

⁵ Paul White, 'Introduction', *Isis*, 100 (2009), 792–97 (p. 796).

⁶ For nineteenth-century attitudes towards vivisection, see Stewart Richards, 'Anaesthetics, Ethics and Aesthetics: Vivisection in the Late Nineteenth-Century British Laboratory', in *The Laboratory Revolution in Medicine*, ed. by Andrew Cunningham and Perry Williams (Cambridge: Cambridge University Press, 1992), pp. 142–69. For a positive account of how 'saving pain' was 'consonant with the very essence of modern civilization', see Stephanie J. Snow, *Blessed Days of Anaesthesia: How Anaesthetics Changed the World* (Oxford: Oxford University Press, 2008), pp. 155–58 (p. 164).

⁷ The generic physiologist in this period was always represented as male. I shall preserve that prejudice as inherent to the story. The monstrous character of Dr Moreau gains his verisimilitude from the complexity with which he approaches the problem of pain and sympathetic pain. Some of Moreau's explanations reflect contemporary physiology's well-intentioned justifications for vivisection. See H. G. Wells, *The Island of Dr. Moreau* (London: Heinemann, 1921), pp. 92, 94. For a compelling contextualization of the Victorian mad scientist in literature, see Anne Stiles, *Popular Fiction and Brain Science in the Late Nineteenth Century* (Cambridge: Cambridge University Press, 2012), esp. chapter 4.

⁸ E. Klein and others, *Handbook for the Physiological Laboratory*, ed. by John Burdon-Sanderson, 2 vols (London: Churchill, 1873). See also Richard D. French, *Antivivisection and Medical Science in Victorian Society* (Princeton: Princeton University Press, 1975); and *Vivisection in Historical Perspective*, ed. by Rupke.

⁹ UK Parliament, Report of the Royal Commission on the Practice of Subjecting Live Animals to Experiments for Scientific Purposes, C. 1397 (1876), pp. 32–34, 36. Subsequent references are to the Royal Commission on Vivisection.

¹⁰ See Royal Commission on Vivisection, testimony of Thomas Watson, p. 4; William Sharpey, pp. 25–26; and Alfred Swaine Taylor, p. 60.

¹¹ David Ferrier, ‘The Croonian Lecture — Experiments on the Brain of Monkeys’, *Philosophical Transactions of the Royal Society of London*, 165 (1875), 433–88.

¹² *The Times*, 4 August 1875, p. 7.

¹³ Royal Commission on Vivisection, p. 12. The quotation is from the question put to Burrows by Viscount Cardwell.

¹⁴ Royal Commission on Vivisection, p. 17. The point was echoed by Alfred Swaine Taylor of Guy’s Hospital, p. 57. A fuller statement to the same effect was made by John Simon, p. 75.

¹⁵ Royal Commission on Vivisection, p. 29. The point was reinforced by John Simon, p. 75, and Phillip Henry Pye-Smith, p. 109. The major dissension from this view came from Arthur de Noé Walker, who had witnessed vivisection predominantly without the presence of anaesthetics, and mainly outside of Britain, esp. p. 246.

¹⁶ *The Times*, 25 April 1881, p. 10. For Romanes’s exemplary qualifications as a vivisector, and Darwin’s involvement in pro-vivisection, see Rob Boddice, ‘Vivisection Major: A Victorian Gentleman Scientist Defends Animal Experimentation, 1876–85’, *Isis*, 102 (2011), 215–37.

¹⁷ See George John Romanes, *Jelly-fish, Star-fish, and Sea-urchins: Being a Research on Primitive Nervous Systems* (London: Kegan Paul, Trench, 1885), pp. 6–9.

¹⁸ Edmund Gurney, ‘A Chapter in the Ethics of Pain’, *Fortnightly Review*, n.s., 30 (1881), 778–96 (pp. 780, 783, 786–87). Charles Darwin was largely in agreement with Gurney: see *The Life and Letters of Charles Darwin*, ed. by Francis Darwin, 3 vols (London: Murray, 1887), III, 210. See also W. Collier, ‘The Comparative Insensibility of Animals to Pain’, *Nineteenth Century*, 26 (1889), 622–27 (p. 622).

¹⁹ John Stuart Mill, ‘Utilitarianism (1863)’, in *Utilitarianism, Liberty, Representative Government*, ed. by H. B. Acton (London: Dent, 1972), pp. 7–9; Cf. Collier, p. 623.

²⁰ John Simon, ‘An Address delivered at the opening of the Section of Public Medicine’, *British Medical Journal*, 6 August 1881, pp. 219–23 (p. 223). See also William B. Carpenter, ‘The Ethics of Vivisection’, *Fortnightly Review*, n.s., 31 (1882), 237–46 (p. 246).

²¹ Emanuel Edward Klein was the most famous example of one who asserted that this was the only reason he used anaesthetics, although he later recanted that assertion. See Royal Commission on Vivisection, pp. 183–85, 328. See also Richards, ‘Drawing the Life-Blood of Physiology’, p. 41; and Bruno Atalic and Stella Fatovic-Ferencic, ‘Emanuel Edward Klein — The Father of British Microbiology and the Case of the Animal Vivisection Controversy of 1875’, *Toxicologic Pathology*, 37 (2009), 708–13.

²² Carolyn Burdett, ‘Is Empathy the End of Sentimentality?’, *Journal of Victorian Culture*, 16 (2011), 259–74 (pp. 269–70).

²³ William Osler, ‘Aequanimitas’, in *Aequanimitas: With Other Addresses to Medical Students and Practitioners of Medicine*, 2nd edn (Philadelphia: Blakiston’s, 1925), pp. 3–11 (pp. 3–6).

²⁴ The rise of physiology came late enough to adopt the post-mesmeric simplicity and objectification of chloroform. See Alison Winter, *Mesmerized: Powers of Mind in Victorian Britain* (Chicago: Chicago University Press, 1998), p. 184.

²⁵ Cf. White, 'Sympathy under the Knife', pp. 112–14.

²⁶ In addition to the examples given, see also George Fleming, 'Vivisection and the Diseases of Animals', *Nineteenth Century*, 11 (1882), 468–78, on the importance of vivisection to veterinary medicine; James Paget, Richard Owen, and Samuel Wilks, 'Vivisection: Its Pains and Its Uses', *Nineteenth Century*, 10 (1881), 920–48.

²⁷ Lady Burdon Sanderson, *Sir John Burdon-Sanderson: A Memoir* (Oxford: Clarendon Press, 1911), p. 157.

²⁸ Klein and others, *Handbook for the Physiological Laboratory*, II, plate LXXXIX, fig. 226; XCII, fig. 237; XCIII, fig. 242; CXII, fig. 308; CXIV, fig. 310; CXV, fig. 316.

²⁹ Thomas Lauder Brunton, 'Vivisection and the Use of Remedies', *Nineteenth Century*, 11 (1882), 479–87 (pp. 479–80).

³⁰ *Spectator*, 47 (1874), 13–14.

³¹ Osler testified before the second Royal Commission on Vivisection in 1907. See UK Parliament, Appendix to the Fourth Report of the Commissioners, C. 3955 (1907), pp. 160, 163.

³² For Osler see the seminal biography by Harvey Cushing, *The Life of Sir William Osler*, 2 vols (Oxford: Clarendon Press, 1926); and the more recent treatment by Michael Bliss, *William Osler: A Life in Medicine* (Oxford: Oxford University Press, 2007).

³³ Osler, 'Aequanimitas', pp. 3–6. For Osler's support of vivisection, see Cushing, II, 794–95; Bliss, p. 248.

³⁴ UK Parliament, Appendix to the Fourth Report of the Commissioners, pp. 158, 160–61, 163.

³⁵ 'The International Medical Congress', *British Medical Journal*, 13 August 1881, pp. 300–04 (p. 301).

³⁶ Gerald F. Yeo, 'The Practice of Vivisection in England', *Fortnightly Review*, n.s., 31 (1882), 352–68 (pp. 358, 360); William W. Gull, 'The Ethics of Vivisection', *Nineteenth Century*, 11 (1882), 456–67 (pp. 458, 462, 466).

³⁷ *Life and Letters of Charles Darwin*, III, 204. See also *More Letters of Charles Darwin*, ed. by Francis Darwin, 2 vols (London: Murray, 1903), II, 435–41; *Life and Letters of Thomas Henry Huxley*, ed. by Leonard Huxley, 2 vols (London: Macmillan, 1900), I, 436–41.

³⁸ On Romanes, Darwin, and Burdon-Sanderson, see Boddice, 'Vivisection Major', esp. p. 14; for Huxley, see Stephen Catlett, 'Huxley, Hutton and the "White Rage": A Debate on Vivisection at the Metaphysical Society', *Archives of Natural History*, 11 (1983), 181–89 (p. 185); Spencer was thus quoted in Albert Leffingwell, *An Ethical Problem; or, Sidelights upon Scientific Experimentation on Man and Animals* (London: Bell, 1916), p. 9.

³⁹ Robert J. Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1987), pp. 121, 239.

⁴⁰ Charles Darwin, *The Descent of Man, and Selection in Relation to Sex*, intr. by James Moore and Adrian Desmond (London: Penguin, 2004), pp. 147–49.

⁴¹ *The Times*, 18 April 1881, p. 10.

⁴² Darwin, *Descent of Man*, pp. 119–72; Herbert Spencer, *Principles of Psychology*, 3rd edn, 2 vols (London: Williams and Norgate, 1890; repr. Osnabrück: Zeller, 1966). For Spencer, see Thomas Dixon, *From Passions to Emotions: The Creation of a Secular Psychological Category* (Cambridge: Cambridge University Press, 2003), pp. 135–79; and *The Invention of Altruism: Making Moral Meanings in Victorian Britain* (Oxford: Oxford University Press, 2008), pp. 181–221.

⁴³ For antivivisection as feminist movement, see Coral Lansbury, *The Old Brown Dog: Women, Workers, and Vivisection in Edwardian England* (Madison: University of Wisconsin Press, 1985); Mary Ann Elston, ‘Women and Anti-vivisection in Victorian England, 1870–1900’, in *Vivisection in Historical Perspective*, ed. by Rupke, pp. 259–94; Ian Miller, ‘Necessary Torture? Vivisection, Suffragette Force-Feeding, and Responses to Scientific Medicine in Britain c. 1870–1920’, *Journal of the History of Medicine and Allied Sciences*, 64 (2009), 333–72. For the problematic association of women (as emotional creatures) with the antivivisection movement, see Joanna Bourke, *What It Means to be Human: Reflections from 1791 to the Present* (London: Virago, 2011), pp. 95–96, 103, 106–07, 168.

⁴⁴ See Rob Boddice, ‘The Manly Mind: Re-visiting the Victorian “Sex in Brain” Debate’, *Gender and History*, 23 (2011), 321–40.

⁴⁵ Paul White has given an effective critique of the ‘late-Victorian denigration of sentimentality’ and its relation to an ‘assertion of scientific and social dominion of feeling’ in his article, ‘Darwin Wept: Science and the Sentimental Subject’, *Journal of Victorian Culture*, 16 (2011), 195–213 (p. 212).

⁴⁶ David Konstan, *Pity Transformed* (London: Duckworth, 2001), p. 12.

⁴⁷ Gertrude Himmelfarb, *Poverty and Compassion: The Moral Imagination of the Late Victorians* (New York: Vintage, 1991), pp. 197–98.

⁴⁸ See Dixon, *The Invention of Altruism*, pp. 196–97.

⁴⁹ Herbert Spencer, ‘Morals and Moral Sentiments’, *Fortnightly Review*, n.s., 9 (1871), 419–32 (p. 432).

⁵⁰ *Life and Letters of Thomas Henry Huxley*, I, 436 [letter of 1890].

⁵¹ Cf. Richards, ‘Anaesthetics, Ethics and Aesthetics’, pp. 143–44, 148.

⁵² 39 & 40 Vic. c.77 (1876).

⁵³ Lorraine Daston, ‘The Moral Economy of Science’, *Osiris*, 2nd ser., 10 (1995), 2–24 (pp. 4–5).

⁵⁴ Anaesthetics were referenced thirty-eight times in the fifteen pages of the Report of the Royal Commission on Vivisection. Its recommendations depended on anaesthetics.

⁵⁵ Richards, ‘Anaesthetics, Ethics and Aesthetics’, p. 165.

⁵⁶ Frances Power Cobbe, ‘Darwinism in Morals’, in *Darwinism in Morals and Other Essays* (London: Williams and Norgate, 1872); *The Times*, 19 April 1881, p. 8.

⁵⁷ *The Times*, 19 April 1881, p. 8.

⁵⁸ Hutton was the sole dissenter from the Royal Commission’s final report. The quotation is from his ‘Minority Report’, Royal Commission on Vivisection, p. xxii.

⁵⁹ Richards, ‘Anaesthetics, Ethics and Aesthetics’, pp. 165–68.

⁶⁰ Frances Power Cobbe, ‘The New Benefactor of Humanity’, *Zoophilist*, 4, n.s., 3 (July 1884); *Zoophilist*, 7, n.s., 2 (June 1887).

⁶¹ Adam Smith, *The Theory of Moral Sentiments*, ed. by Ryan Patrick Hanley, 250th anniversary edn (New York: Penguin, 2009).

⁶² Smith, p. 27; see also Michael L. Frazer, *The Enlightenment of Sympathy: Justice and the Moral Sentiments in the Eighteenth Century and Today* (Oxford: Oxford University Press, 2010).

⁶³ George Weisz, *Divide and Conquer: A Comparative History of Medical Specialization* (Oxford: Oxford University Press, 2006); Frank Miller Turner, 'The Victorian Conflict between Science and Religion: A Professional Dimension', in *Contesting Cultural Authority: Essays in Victorian Intellectual Life*, ed. by Frank Miller Turner (Cambridge: Cambridge University Press, 1993), pp. 171–200; J. C. Waller, 'Gentlemanly Men of Science: Sir Francis Galton and the Professionalization of the British Life-sciences', *Journal of the History of Biology*, 34 (2001), 83–114; Richard Bellon, 'Joseph Dalton Hooker's Ideals for a Professional Man of Science', *Journal of the History of Biology*, 34 (2001), 51–82; Ruth Barton, 'Men of Science: Language, Identity and Professionalization in the Mid-Victorian Scientific Community', *History of Science*, 41 (2003), 73–119. William Clark has referred to the 'modern schizophrenia' of the 'metaphysics of research' in his *Academic Charisma and the Origins of the Research University* (Chicago: University of Chicago Press, 2006), p. 7.