Project MUSE®

The Philosophy of Decapitation: Analysis, Biomedical Reform, and Devolution in London's Body Politic, 1830–1850

JAMES ELWICK

A centipede was happy! Till
    One day a toad in fun
        Said, "Pray which leg
        Moves after which?"
This raised her doubts to such a pitch,
She fell exhausted in the ditch,
    Not knowing how to run.
—qtd. in Lankester 582

On 28 March 1836 one Edward Rigby read an eccentric paper, later published in the *London Medical Gazette*, to the Royal College of Physicians. Entitled the "On the Pathology of Decapitation," it sought to explain the seemingly obvious problem of why decapitation causes a person's death. Rigby presented several strange cases in which facial movements continued after decapitation. He listed anecdotes of blinking and moving eyes, of wrinkled noses, of lips moving up to two minutes after the cut had been made, and because these actions occurred so long after decapitation, Rigby speculated on the possibility of conscious mental activity in the severed head (23–25). The paper was immediately mocked in a rival medical journal's editorial entitled "The Philosophy of Decapitation." Ironically praising Rigby for his "staggering proofs," it proclaimed that the "discourse of decapitation" was an important physiological question (152).

Yet despite this ridicule, a discourse of decapitation did indeed exist in London biomedical researches of the 1830s and 1840s. It was part of a deeper habit of scientific analysis, a belief that one could know an object or system with certainty by separating it into its basic parts or elements. With this reasoning, I follow the large-scale "way of knowing" proposed by historian John Pickstone. According to Pickstone, such analysis took place in the field of chemistry when researchers disintegrated apparently simple substances into their separate elements, breaking down water, for example, into oxygen and hydrogen. Other analytic sciences included geology, analytical technology, botany, morphology, and experimental physiology: all of these fields separated various compounds into their simpler elements (117–18).

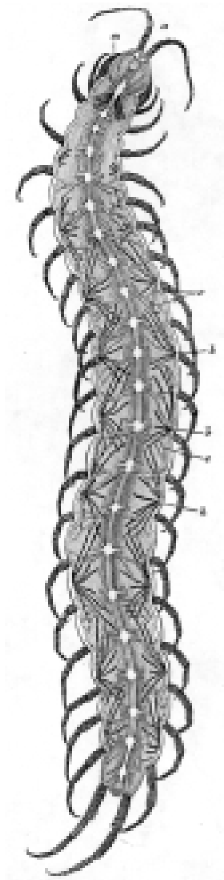
Analysis even existed in the early-Victorian study of politics and legal reform. In 1838 no less a figure than John Stuart Mill argued that Utilitarians such as Jeremy Bentham were analysts—he noted their "method of detail," whereby wholes were investigated by separating them into their constituent parts (48–50). Analysis was thus an important method of investigation in Britain in the first half of the nineteenth century.

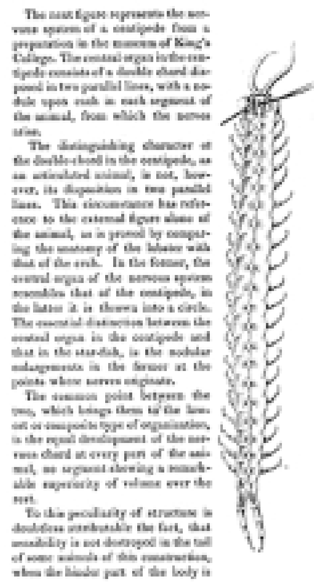
In this paper I consider four cases in which the nervous system and the mind were analyzed into their simplest "elements," in order to explore how the discourse of decapitation was part of a larger discussion about coordination. For the habit of analysis caused a problem: If an organism could be disintegrated into separate parts, then how did these parts act as a group toward common goals?

Victorian biomedical researchers imagined the collective action of body parts in different ways: some likened the relationship among body parts to the exchange among participants in an economic system, while others relied on metaphors that depicted the nervous system as a musical instrument or as a set of telegraph lines.[1] But the most common way to portray the independent parts' goal-oriented activities was to depict them as acting in a political and social system: as participants in a network of influence, authority, and even coercion. For not only could communities be seen as individuals, but individuals, in turn, could be imagined as communities. In this way, any talk about decapitations, even metaphorical ones, also constituted a discussion about the loss of authority that a person might experience over his or her own self. Decapitation meant the loss not only of a head but also of a headship, of a headquarters, of one's nerve center.

Case One: Myriapods (Centipedes and Millipedes)

In the first half of the nineteenth century, simpler organisms such as centipedes and millipedes (which, as myriapods, are related) provided researchers with comparative anatomical models to understand more complex organisms such as humans. The nervous centers





The next figure represents the nervous system of a centipede from a preparation in the museum of King's College. The central organ in the centipede consists of a double chord disposed in two parallel lines, with a nodule upon each in each segment of the animal, from which the nerves arise.

The distinguishing character of the double chord in the centipede, as an articulated animal, is not, however, its disposition in two parallel lines. This circumstance has reference to the external figure alone of the animal, as is proved by comparing the anatomy of the lobster with that of the crab. In the former, the central organ of the nervous system resembles that of the centipede, in the latter it is thrown into a circle. The essential distinction between the central organ in the centipede and that in the star-fish, is the nodular enlargements in the former at the points where nerves originate.

The common point between the two, which brings them to the lowest or composite type of organization, is the equal development of the nervous chord at every part of the animal, no segment showing a remarkable superiority of volume over the rest.

To this peculiarity of structure is doubtless attributable the fact, that sensibility is not destroyed in the tail of some animals of this construction, when the hinder part of the body is

Fig. 1 (left). Centipede, from Thomas Rymer Jones, "Myriapoda," *The Cyclopaedia of Anatomy and Physiology*, ed. Robert Bentley Todd, vol. 1 (London: Sherwood, Gilbert and Piper, 1837) 550.

Fig. 2 (above). Centipede, from Herbert Mayo, *Outlines of Human Physiology*, 4th ed. (London: Burgess and Hill, 1837) 222.

of both animals are diffused throughout their bodies. Two early-nineteenth-century illustrations of centipede physiology show the white node—or ganglion—in each segment of the centipede's nervous column that is responsible, as researchers discovered, for supplying nervous energy (figs. 1 and 2). Efforts to investigate the structure and function of the nervous systems of such simple animals as centipedes facilitated the analytical division of the nervous system into its simplest ganglial elements. This anatomical knowledge was, in turn, used to understand more complex systems, including humans. The human nervous system was seen to be made of the same elements—it merely has a greater number of compounded ganglia, mostly concentrated in the head (Mayo 14–16; Grainger 371–72).

What about comparative physiology, or how the different systems worked? This question returns us to the discourse of decapitation. For although beheading kills a human being in a very short period by removing this critical concentration of ganglia at the front, it takes longer for a decapitated centipede, with its dispersed ganglia, to die.

In a series of millipede vivisections, the entomologist George Newport demonstrated the slowness of a millipede's death as he investigated how certain parts of millipede bodies acted when deprived of cerebral governance. Millipedes are composed of over forty segments (even more than centipedes), each with its own ganglion. With only a small concentration of ganglia in the front, they have little or no "brain" to speak of. In his first gruesome investigation of 1843, Newport used fine scissors to cut off a millipede's "head," or, in other words, the first segment containing its antennae, eyes, and mandibles. Then he placed it upon a table surface and observed it move forward in a straight line. Though it could move over low obstacles, it could not move over higher ones: instead the wounded front part—now oozing fluid—pressed against the barrier as though trying to push it aside. After half an hour it stopped pressing against the obstacle, though the legs moved again when prodded (265). Newport next cut a millipede into three pieces. The front section—retaining its eyes, antennae, and some legs—could touch, avoid, and seek objects, but it moved slowly and balanced uneasily. Meanwhile, the other two sections had no balance at all and rested on their backs; their legs waved in the air when he prodded them (266–67).

Finally, Newport plunged a needle into segments fourteen to twenty, destroying each section's ganglion. The front half of the millipede repeatedly turned, showing "the evidences of perfect volition" (267), as its antennae tapped the wound. But it had other problems. Whereas millipedes usually seem to flow across a surface rather than to walk across it, the legs performing a series of uniform rolling motions from front to back, this disabled millipede was different. When it moved, the leg waves no longer flowed regularly from front to back. Instead these undulations moved from the frontmost legs to those of the fourteenth segment; then the wave stopped as it met the unmoving legs in the wounded section; and in the posterior section the legs moved constantly, but not with the same rhythm as in the front legs. When the front half of the millipede tried to stop moving to examine an object on the table, its legs stopped, but the legs below the wound kept moving as if the rear section were defying the front (247, 265–67). As Newport's research demonstrated, it was difficult to discuss individuality and volition without also discussing the authority of one section over another.

By showing that certain parts could move independently, hideous investigations such as Newport's de-emphasized the importance of a unitary nervous center. This unitary seat of the will or soul was often called the sensorium commune, which one detractor caricatured as the "central apartment for the superintendent of the human panopticon" (Lawrence 87). While the nervous cord was formerly seen as an extension of the brain issuing commands downward to the rest of the body, the finding that separated parts could move independently helped to reverse this understanding. By 1850 the brain was instead seen as an upward extrusion of the nervous cord, with both brain and cord in turn formed out of so many semiautonomous ganglia (Clarke and Jacyna 30–31). In a process of analytical decentralization, then, each ganglion became a source of nervous power for its own local segment or region.

Newport's work was carried out amidst the new doctrine of reflex action, initially formulated to explain the independent movement of separated pieces of an animal (in the first case, a mutilated newt). Formerly seen as "sources" of nervous power, ganglia were reinterpreted as the central point of a reflex arc. Thus when one area of the body was stimulated, as in Newport's prodding of parts of the millipede, this stimulation moved through the nerves, passed through the ganglion mediating that area, and triggered the movement of a different part of that region.

By the late 1840s the reflex arc had become more important. It was now used to explain even the most complex nervous functions: they could be depicted as compounded out of simpler reflexes, just as the most complex nervous structures were depicted as compounds of simpler ganglia. In the same way that the analytical element of neuroanatomy was the ganglion, the analytical element of neurophysiology was the reflex (Jacyna, "Somatic Theories" 235; Jacyna, "Principles" 51). By mid-century, then, complex purposive behavior had been successfully analyzed into simple units instead of being explained through reference to a central directing agency (Roger Smith 83–84). But this once again led to the problem of cooperation: How did these separate parts and independent reflexes combine their activities in order to work toward a common goal?

Case Two: Earthworm Vivisection

Like millipedes and centipedes, earthworms also have ganglia in each segment. Among mid-nineteenth-century researchers, there were disagreements over whether the ganglia in the front of the earthworm were more dominant than those in the back and whether they therefore merited the term "brain." When he cut individual earthworms in half, Oxford's Radcliffe Travelling Fellow Charles David Badham noted that both halves seemed to move with volition, the bottom half eventually making up "*its mind*" as to where to move next. But the problem of the parts' collective action appeared once again, as Badham reflected that if earthworms seemed to have a "*conclave* or *council* of brains in *one being* . . . [wouldn't they] *disintegrate* that creature, and make many individualities out of or within one organization? Are the *pieces* of a worm, then, just *so many worms* . . . and *yet* capable of consolidation *into one existence*?" (590–91).

Grappling with his question, Badham relied upon political imagery:

> [There must be instead] an exact harmony and understanding between these different individualities, else his actions would have no unity, no rhythm, no steadiness of purpose or uniformity of character. In short, has a worm a *will*, or a *chorus of wills*? To *will* is one of the first attributes of *mind*, (and mind is *unity*, is indivisible.) When I walk, I indeed will to walk. I have but *one* brain. When a worm crawls with his *twenty brains*, is it *his* will or *their* wills that govern him? Were every ganglion a *separate brain*, there might come to be an insurrection of the wills! the balance of power in the *ganglionic republic* might be perpetually disturbed! (591)

Others trying to explain why body parts moved harmoniously likened the nervous system to a political organization. As early as 1811, the physiologist Charles Bell considered the possibility of parts being excluded from the "government of the will" (4). Marshall Hall, who devised the reflex arc, spoke of the soul being "enthroned in the cerebrum, receiving the ambassadors . . . *from* without, along the *sentient nerves*; deliberating and willing; and sending forth its emissaries and plenipotentiaries, which convey its sovereign mandates, along the *voluntary nerves*, *to* muscles subdued to volition" (649). Another physiologist called for his colleagues to determine the number of "departments" that made up the "public office" of the brain (Mayo 73).

Simply to point out that this political language is metaphorical is to take an overly literary view of metaphor's role. Such an understanding risks ignoring how metaphors structure concepts and how they are acted upon: metaphors allow one unfamiliar realm to be understood in terms of another, more familiar realm of experience (Lakoff and Johnson 4–6). This is just as true in science and medicine as it is in literature.

Case Three: Phrenological Mental Faculties

Indeed, by discussing nervous centers in terms of their power relations with other centers, different parts of the nervous system were thereby anthropomorphized and described as agents with their own interests. This is best shown in phrenology, perhaps the period's most popular form of mental analysis. Phrenologists tried to understand how the mind functioned by describing the brain's workings as the interaction between discrete mental elements. In their view, the brain, as the organ of the mind, was not a unity but an aggregate wherein each mental faculty served a specific function.

Despite its ill repute today, in the late 1830s and 1840s conventional biomedical researchers paid respectful attention to phrenology. While critical of some of its premises, the physiologist William B. Carpenter granted that it reinforced the important principle that the nervous system was compounded out of simpler ganglia (518–19). And like neuroscientists, phrenologists also rejected the notion of the mind as a unified entity but went even further by granting agency to each mental faculty, arguing that each possessed desires and intentions. A person's mental activity resulted from the interaction of the phrenological faculties with one another. George Combe, Britain's leading phrenological advocate, noted in 1835 that each mental faculty "desired" external objects; furthermore, according to Combe, lower mental faculties sought their own gratification, even if this was opposed by the higher intellectual faculties (55–56, 59). Thus mental faculties even fought one another.

Some criticized phrenology for precisely this disunity, complaining that such a model disintegrated the mind into a chaos of "individual and separate intelligences, . . . breaking up the brain into twenty-seven small brains" ("Phrenology Examined" 105). By its insistence that each person's mind was a plurality of mental faculties, phrenology delegated power to a broader internal constituency. And once again this raised the problem of by which processes these independent mental elements cooperated to attain common goals.

If an individual mind in fact contains twenty-seven brains, how do these entities coordinate their collective action? In an 1838 account, Sidney Smith noted that while a person's consciousness was unified while awake—with the higher faculties firmly in control of the lower ones—it disintegrated when the individual dreamed:

> And so, if there be an organ of Acquisitiveness, which prompts to the exercise of the appropriation *claws* [sic], and another of Conscientiousness, which, in its upper-house, negatives every bill presented by such a party, it is plain how, when a man's entire faculties are awake, and both branches of his intellectual legislature sitting, he may be honest; while, when the Lords alone have adjourned their session, sleep may make him a thief or a rogue, when his organ of integrity slumbers, and his faculty of acquiring ranges uncontrolled through every scene of villainy. (37)

Smith relies here on political imagery to explain the functioning of the mind, likening it not to a unitary Hobbesian sovereign but instead to a fractious parliament. Yet despite this dreaming disunity, the independence of the cerebral faculties did not cause mental chaos when a person was awake. The legislature of the mind offered an alternative to models of central control by showing that faculties attained mental order in a more relaxed hierarchy. It is probably no accident that Smith was soon to become one of the leading publicists of the Anti-Corn Law League (Murphy 308–09), for the League proposed a similar organizational view, this time a hope for an economic order spontaneously formed out of individual free-market interactions. Smith's vision of the way the human mind was structured matched his hope for the way in which the economy ought to be arranged.

Case Four: Wiganism and the Duality of the Mind

In 1836 the phrenologist H. C. Watson noted that like other animals, the human body is double—with two arms, legs, ears, eyes, and so on. And so too is the brain double, with two halves. He suggested that this occurred because these parts often acted "individually," in opposition to one another. The double brain was needed for activities such as the hands' different motions at the same time, for each half of the brain managed its respective hand's activities (Watson 609).

Eight years later, the doctor A. L. Wigan independently suggested that the brain was not a unity, but a duality—that each cerebral half was a distinct whole and every person had not one, but two separate thinking processes occurring in each half of the brain. They could even oppose one another through what Wigan called the "intellectual antagonism" of the dual mind, in which each brain watched over the other (40). Trying to address the problem of internal cooperation that such a model presupposed, Wigan theorized that a person's internal unity was maintained by hierarchy: one cerebrum always had to be stronger than the other, capable of controlling it. If they did become equal through damage or sickness, then delusion or insanity resulted—the collision of two trains of thought (Wigan, "Duality" 40; Wigan, *New View* 20–23).

Wigan was both applauded and criticized in reviews and letters. John Elliotson, the popular surgical lecturer turned phrenologist turned heterodox phrenomesmerist, was the most critical. He ought to have been sympathetic to Wigan's proposal, for only fifteen years before he himself had denied a single "seat of the soul" (360). Perhaps he was angry at his declining fortunes and the assertion of the disunity of the body and mind by increasingly respectable people. Hadn't Charles Bell pointed out in 1826 that the nervous system was dual, with each cerebral half being a "DISTINCT BRAIN . . . acting with perfect sympathy?" And hadn't this been taken in turn from J. F. Gall's analytical anatomy of the brain, that fountainhead of phrenology's certainty (Elliotson 211–12)? Others, meanwhile, applauded Wigan but encouraged him to go further. James Davey, surgeon at the Hanwell Lunatic Asylum and phrenological enthusiast, claimed that the mind was not dual but plural. Insanity wasn't the result of two equal warring brains, but instead occurred when warring coalitions of mental faculties were too evenly matched (Davey 377–78).

Conclusion

Mental and nervous analysis in Victorian biomedical research highlighted the problem of unity. In the examples addressed here, hierarchical organization resolved the problem. While Wigan maintained that one half of the brain had to be stronger than the other, phrenologists insisted instead on temporary coalitions of mental faculties outmaneuvering others in a brain-legislature divided into upper and lower houses. Still others, proponents of the reflex theory, insisted upon a hierarchy of nervous systems. This continuous rejection of the idea of equality among mental elements is revealing. The very unthinkability of such equality was rooted in a fear of confusion, an anxiety about internal anarchy showing itself as insanity. Unity of thought, volition, and voluntary control all rested upon the assumption of some sort of internal agreement through a chain of command. It was seen as important that certain nervous centers influenced and acted upon others more than they themselves could be influenced and acted upon in turn.

Yet because ganglia and mental faculties were shown themselves to act autonomously, a new recognition of this agency appeared. By 1862, a generation later, one popularizer of the neurosciences was sanguine about the disunity of the organism, regarding it as a mixed political system. In its disunity, he argued, the structure of an organism clearly resembled the stable hierarchy of the reformed constitutional monarchy:

> Every part of the nervous system makes its influence felt by all the rest. A sort of constitutional monarchy exists within us; no power in this small state is absolute, or can escape the checks and limitations which the other powers impose. Doubtless the brain is King; but Lords and Commons have their seats below, and guard their privilege with jealous zeal. If the "constitution" of our personal realm is to be preserved intact, it must be by the efforts of each part, lawfully directed to a common end. ([Hinton] 166)

Significantly, this celebration of the organism's inner constitutional monarchy was pronounced in the *Cornhill Magazine*, a nascent Liberal journal. The author then deployed a picture of the similarities between centipede and human nervous systems (fig. 3), showing that neither organism required a central governing agency. While it had previously been understood that volition, the mind, or the soul ordered the body to carry out certain actions, bodily activities were now seen as guided and regulated by higher nervous centers, which constituted a form of leadership. The disunity and agency of subordinate nervous centers had become accepted as a fact; now the pressing issue was to explain their joint efforts. The energy of each nominally independent and potentially unruly nervous agent could be properly moderated and channeled by this adaptable hierarchy, ensuring their harmonious collective activity.

Alison Winter notes that Victorian social commentators used the term "consensus" to depict the agreement of individuals in a group: the concept conveyed a state in which members retained their individuality while acting as a team. Terms like "consensus," she argues, first

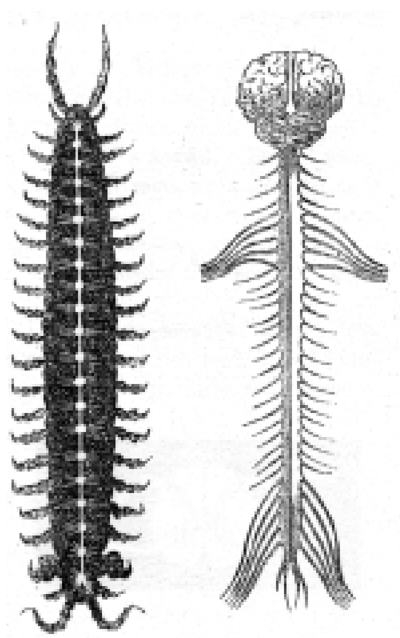


Fig. 3. Comparison of centipede and vertebrate nervous systems, from [James Hinton], "What Are the Nerves?" *Cornhill Magazine* 5 (1862): 166.

emerged in the neurosciences to portray a flexible hierarchy of authorities (308, 341–43). This paper has additionally shown that the emergence of this term was a response to problems of individuality. And in turn the philosopher-sociologist Herbert Spencer appropriated "consensus" from the neurosciences to describe social integration (Cooter 87); in so doing he moved from a description of the individual as a community to a description of the community as an individual.[2]

Though written later than these Victorian investigations, the early-twentieth-century poem that began this paper can be read not only as an endearing statement about nervous coordination in centipedes but also as a question about collective action, normally a problem for social theorists trying to understand how individuals form groups and work jointly toward a common goal. I have proposed that in the Victorian neurosciences, the problem of collective action could also be applied to various body parts. Decapitation removed the central coordinator of these parts—the component enabling them to act harmoniously—thereby disrupting their traditional hierarchy.

From here one can note parallels between technical investigations into the nervous system and the larger Victorian political context. Traditional hierarchies were quite clearly disrupted in both. Between 1820 and 1840 there was a movement away from a unitary sensorium commune as researchers tried to establish the basic mental and nervous elements. But too much disunity raised the specter of anarchic bodily activities, even insanity. Meanwhile, in politics before and after 1832, British democratic reformers tried to bring new legitimacy to the formal political system. They did this explicitly by including new groups in that system, devising, for instance, a new definition of who was entitled to the franchise with the ten-pounds rule. Informing their attempts was the desire to establish a more representative element of political authority. Yet this delegation might also go too far—confronting reformers with the possibility of rule by the mob, a truly Jacobin social pathology of decapitation.[3]

But rather than seeing the natural order as a passive reflection of the social order, it's possible to view both moves to delegate authority as expressions of a deeper habit of analysis. By understanding the British democratic Reform movement in this context, one can see how shared kinds of knowledge supported and were supported by shared images of authority and fears of anarchy. By questioning the seemingly obvious status of biological individuality on the one hand and political individualism on the other—by seeing individuals as collectives—we can better link technical issues in Victorian neurosciences with the larger cultural context. Individuals could now be understood as organizations, by their parts' collective action and relations of internal authority. The habit of analysis allowed agency to be delegated to increasingly localized segments of political bodies and the body politic.

York University

NOTES

[1]The classic article on bodily economies is still Cross's "John Hunter." For pointing out the common Victorian image of the nervous system as a musical instrument and for their insightful comments in general, I thank Katey Anderson and Bernie Lightman.

[2]For Spencer's formulation of a nonauthoritarian and disunified social organism, see Elwick, "Herbert Spencer."

[3]For a discussion of this interpretation of the 1832 Reform Bill as the inclusion (and exclusion) of new members within a formal political system, see Price and Vernon.

WORKS CITED

[Badham, David]. "On the Supposed Sensibility and Intelligence of Insects." *Blackwood's* 43 (1838): 589-606.

Bell, Charles. *Idea of a New Anatomy of the Brain.* 1811. London: Dawson's, 1966.

Carpenter, William B. "Noble on the Brain and Its Physiology." *British and Foreign Medical Review* 22 (1846): 488–544.

Clarke, Edwin, and L. S. Jacyna. *Nineteenth-Century Origins of Neuroscientific Concepts.* Berkeley: U of California P, 1987.

Combe, George. *The Constitution of Man Considered in Relation to External Objects.* 1828. 5th ed. Boston: Marsh, 1835.

Cooter, Roger. "The Power of the Body: The Early 19th Century." *Natural Order: Historical Studies of Scientific Culture.* Ed. B. Barnes and S. Shapin. Beverly Hills: Sage, 1979. 73–92.

Cross, Stephen J. "John Hunter, the Animal Oeconomy, and Late Eighteenth-Century Physiological Discourse." *Studies in History of Biology* 5 (1981): 1–110.

Davey, James. "The Duality of the Mind Known to the Early Writers on Medicine." *Lancet* 1 (1844): 377–78.

Elliotson, John. Rev. of *A New View of Insanity,* by A. L. Wigan. *The Zoist* 5 (1847–1848): 209–34.

Elwick, James. "Herbert Spencer and the Disunity of the Social Organism." *History of Science* 41 (2003): 35–72.

Grainger, R. D. "Ganglion." *Cyclopaedia of Anatomy and Physiology.* Vol. 2. 1839. 371–77. 5 vols. 1836–59.

Hall, Marshall. "Lectures on the Theory and Practice of Medicine." *Lancet* 1 (1837): 649–57.

[Hinton, James]. "What Are the Nerves?" *Cornhill Magazine* 5 (1862): 153–66.

Jacyna, L. S. "Principles of General Physiology: The Comparative Dimension to British Neuroscience in the 1830s and 1840s." *Studies in History of Biology* 7 (1984): 47–92.

———. "Somatic Theories of Mind and the Interests of Medicine in Britain, 1850–1879." *Medical History* 26 (1982): 233–58.

Lakoff, George, and Mark Johnson. *Metaphors We Live By.* 1980. 2nd ed. Chicago: U of Chicago P, 2003.

Lankester, E. Ray. "The Structure and Classification of the Arthropoda." *Quarterly Journal of the Microscopic Sciences* 47 (1912): 523–82.

Lawrence, William. *Lectures on Physiology, Zoology, and the Natural History of Man.* London: J. Callow, 1819.

Mayo, Herbert. *The Nervous System and Its Functions.* London: John W. Parker, 1842.

Mill, John Stuart. "Bentham." 1838. *Mill on Bentham and Coleridge.* Ed. F. R. Leavis. Cambridge: Cambridge UP, 1980. 39–98.

Murphy, G. Martin. "Sidney Smith (1805–1881)." *Oxford Dictionary of National Biography.* Ed. H. C. G. Matthew and Brian Harrison. Vol. 51. Oxford: Oxford UP, 2004. 308–09.

Newport, George. "On the Structure, Relations, and Development of the Nervous and Circulatory Systems, and on the Existence of a Complete Circulation of the Blood in Vessels, in Myriopoda and Macrourous Arachnida." *Philosophical Transactions of the Royal Society* 133 (1843): 243–302.

"The Philosophy of Decapitation." *Medico-Chirurgical Review* 25 (1836): 151–52.

"Phrenology Examined." *Medical Times* 7 (1842): 104–05. Rpt. from *Gaz. med. de Paris.*

Pickstone, John V. "Museological Science: The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology and Medicine." *History of Science* 32 (1994): 111–38.

Price, Richard. *British Society, 1680–1880: Dynamism, Containment and Change*. Cambridge: Cambridge UP, 1999.

Rigby, Edward. "On the Pathology of Decapitation." *London Medical Gazette* 18 (1836): 21–26.

Smith, Roger. "The Background of Physiological Psychology in Natural Philosophy." *History of Science* 11 (1973): 75–123.

Smith, Sidney. *The Principles of Phrenology*. Edinburgh: William Tait, 1838.

Vernon, James. *Politics and the People: A Study in English Political Culture, c. 1815–1867*. Cambridge: Cambridge UP, 1993.

Watson, Hewett. "What Is the Use of the Double Brain?" *Phrenological Journal* 9 (1834–1836): 608–11.

Wigan, A. L. "The Duality of the Mind, Proved by the Structure, Function, and Diseases of the Brain." *Lancet* 1 (1844): 39–41.

———. *A New View of Insanity: The Duality of the Mind Proved by the Structure, Functions, and Diseases of the Brain*. 1844. Malibu: Simon, 1985.

Winter, Alison. *Mesmerized: Powers of Mind in Victorian Britain*. Chicago: U of Chicago P, 1998.