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HERBERT SPENCER AND THE DISUNITY OF THE SOCIAL ORGANISM

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This paper presents two different visions of how one might portray the interaction of an organism's body parts and thus how a society might be likened to an organism. In the case of Herbert Spencer (1820–1903) there was a *democratic* vision of an organism, often portrayed as a political assembly of body parts, each one acting in its own 'interest'. Spencer learned about certain organisms whose very status as unitary individuals was questioned in the 1840s and '50s. Many of these invertebrate animals were seen as *compound organisms*, as aggregations of harmoniously-interacting parts. In these organisms, each part had a surprising amount of independence, often having its own simple 'brain', the ganglion. And the principles demonstrated by these simple invertebrates were thought to hold for more complex organisms like humans too. This democratic vision of an organism linked nicely with Spencer's distaste for *dirigiste* authorities, and the young Spencer grew up amidst three excellent examples of organizations that defied or did not require central authorities — religious Dissent, radical politics, and phrenology. Spencer therefore believed that societies and organisms were guided by the same principles of specialization and harmonious interaction encountered in comparative anatomy, Dissent, radical politics, and phrenology; and so he saw no apparent contradiction when he likened a society to an organism in 1860.

On the other hand there is an *authoritarian* view of the organism, where each part is beholden to a *dirigiste* authority like the will or the brain. Spencer's friend, Thomas Henry Huxley, held this view. He began his scientific career examining the same invertebrates that Spencer used for his examples, but where Spencer saw republican assemblies of emotions, Huxley saw instead a body ruled by the Hobbesian authority of the brain. He denied that compound organisms were even possible. Huxley's early biology matched his later professional interests too: he used his version of the social organism to legitimize a new clericalism represented by his own group, the scientific naturalists. This was particularly useful in areas like justifications for greater government funding for science, which Spencer hotly opposed. Huxley's *dirigiste* version of the social organism won out, and Spencer's alternative view of a disunified social organism was forgotten. As the disunified organism was forgotten over the next century, many historians and commentators attacked Spencer's "contradictory" stance in which he likened each free individual in a liberal society to a body part of an organism. They were aware only of a unitary organism, and so these analysts were aware only of organic imagery that justified a strong State. They used Huxley's definition of a biological individual without being aware of his own reasons for doing this.

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OUTLINE OF HERBERT SPENCER'S WORK

We begin with a potted Spencerian history. A popular image of Herbert Spencer is that he was Charles Darwin's "John the Baptist".[1] For evolution was his *explanans* — a name by which he sought to depict a universal change from the 'homogeneous' to 'heterogeneous', an epigenetic process by which an undifferentiated organization became a differentiated and functionally specialized one. The terms were borrowed second-hand from Karl Ernst von Baer, via the physiologist William Benjamin Carpenter, as von Baer's description of the embryo's development appeared to be relevant to a great many things besides embryos. Thus for Spencer this process guided all phenomena, and *evolution* could be used to describe not only an embryo's development or the descent of a species, but also processes like the emergence of planets and stars from nebulae, or the emergence of more structurally complex and functionally differentiated societies from simpler ones. Spencer even saw his own forty-year project — the massive evolutionist *System of synthetic philosophy* — reflexively, as itself the product of an evolutionary process.[2] The mechanism of Spencerian evolutionary change was supposed to occur through the inheritance of functionally acquired characteristics, allowing even ethical improvement to be transmitted from parent to child as society progressed towards a peaceful and supremely ethical resting-point.

Spencer is known not only for this Lamarckism but also for his emphasis on voluntarism, competition and an opposition to any form of support for the 'undeserving'. The most succinct phrase given by Spencer to this effect: "The ultimate result of shielding men from the effects of folly, is to fill the world with fools."[3] It was a sentiment that emerged from the evangelical background described by Boyd Hilton, in which free-trade economics was closely wedded to the improvement of public morality. Spencer's work and sentiments were thus close to writers like Thomas Chalmers and phrenologists like George Combe. This evangelical worldview held competition to be educational — sufferings tended to be brought upon oneself, and usually occurred when natural laws were violated. Suffering was beneficial, for it instilled a conscience in each person, and the operations of the market would tempt and test this conscience.[4] Though Spencer eventually renounced the religious thought behind this he continued to speak of the beneficence of natural laws, writing of "spontaneous order" and "the incompetence of my intellect to prescribe for society".[5]

Yet Spencer did prescribe for society. Indeed this was *mostly* what he did as he sought a living as a writer, philosopher of evolution, scientific naturalist and proponent of the new field of sociology. His 1873 *Study of sociology* was perhaps his single greatest success, reaching eight editions by 1880; increasingly he was lionized as the greatest philosopher of the age.[6] Spencer and his explanations grew popular, perhaps because his *System of synthetic philosophy* and his evolutionary terminology allowed the reader to synthesize many things in society and in nature. It served as a sort of crib-sheet by which one could understand the world. Jack London's 1913 novel *Martin Eden* shows the thrill that Spencer's work had on the curious, dramatically shown when the eponymous working-class character first read the *System*: "And here was the man Spencer, organizing all knowledge for him, reducing everything

to unity, elaborating ultimate realities, and presenting to his startled gaze a universe so concrete of realization that it was like the model of a ship such as sailors make and put into glass bottles."[7]

But in the 1870s and onwards Spencer's work was increasingly attacked. The rise of the New Liberalism that supported government intervention forced Spencer to associate with the hated Conservatives in support of property rights.[8] A recession in the early 1880s showed the possibility of economic decline as well as progress. August Weismann's attempt to demonstrate the all-sufficiency of natural selection and the germ–soma distinction implied that acquired functions could not be transferred from parent to child, and hence that ethical improvement might not be inevitable. Moreover, the growth of British imperialism and militarism hinted at future violence. Spencer's stubborn refusal to accept honours, or even academic postings — something inherited from his Dissenting revulsion for ceremony — meant a dearth of followers to continue his work. This increased his marginalization, and he died in 1903, believing he had become largely irrelevant.[9] By 1933 Crane Brinton unkindly dismissed Spencer's work with the line "Who now reads Spencer?", a phrase taken up and made famous as the opening section of Talcott Parsons's 1937 *Structure of social action*, Parsons adding that "Spencer is dead".[10]

Spencer's was a strange sort of intellectual death, however, as much of Parsons's own work relied heavily on analogies between the units of a system and the harmoniously interacting parts of organisms.[11] More recently, Spencer's work has enjoyed a slight resurgence. Michael W. Taylor has written a nuanced account of Spencer's later political thought, and historians of science like Jan Sapp have examined Spencer's biology as a key episode in the emergence of theories of symbiosis.[12] Robert G. Perrin's massive Spencer bibliography will go far in helping researchers to link Spencer's extraordinarily wide range of interests.[13]

THE LIBERAL SOCIAL ORGANISM: AN HISTORICAL PROBLEM EMERGES

Much of Spencer's fame and popularity came with his characterization of society as an organism, allowing him to craft a new language of social analysis.[14] But this also led to his decline. One reason for this was an apparent contradiction, which one historian of political thought summarized as follows:

> An organism is a unity with a nerve-centre; that nerve centre regulates the whole body; and thus of a sudden the 'growing' organism which should not be regulated becomes a bureaucratic or socialistic state under control of the central brain. Starting with a conception of organic growth intended to justify individualism, Spencer ends with a conception of organic unity which tends to justify socialism. Huxley, with his keen eye, fixed on this inward contradiction in his essay on *Administrative Nihilism* (1870)....[15]

By this reading, unity implies a strong nerve centre, which is equated with more central control. Thus Thomas Henry Huxley pointed out that Spencer's organic analogy worked against Spencer's political interests by calling for *more*, not less,

government control of an economy.[16]

Huxley's critique provided later commentators with an appealing story, running along the lines of his 1860 triumph over Samuel Wilberforce at Oxford: the heroic sceptic deftly overturning the plodding, pompous dogmatist. So, like the Huxley–Wilberforce exchange, this story was also taken up and retold by many analysts. Robert C. Bannister notes that Huxley's criticism of the Spencerian social organism became a "beacon for Spencer's critics for several decades", reinforcing calls for state activism. Thus in 1898 Lester Frank Ward echoed that centralization and a strong state were logical outcomes of the social organism analogy (a sentiment uncritically echoed by Richard Hofstadter in at least four editions of his *Social Darwinism in American thought*, ranging from 1944 to 1965). In 1904 this accusation was repeated by John Dewey; in 1929 by Ivor Brown; in 1933 by F. J. C. Hearnshaw; in 1957 by J. W. Gough; in 1961 by Werner Stark; and in 1964 by Stanislav Andreski. In 1978 David Wiltshire concluded that the political and scientific components of Spencerism were not merely incompatible, but helped legitimize Fascism, for any social organism would have to be firmly controlled. In 1983 and 1989 Ellen Frankel Paul noted this contradiction.[17] In 2000 John Burrow argued that the Spencerian organic analogy implied *dirigisme*, "as the brain is a highly peremptory organ and the motor nerves, and the limbs they control, on the whole carry out orders; the model seems to be one for a strong, centralized government, with discussion allowed only in a kind of cerebral cabinet".[18] Mike Hawkins's wide-ranging 1997 account of Social Darwinism has correctly linked Spencer's social organism with the dispersed nervous system of invertebrates, but still mentions that this association was "arbitrary", and notes Huxley's role in pointing out this incoherence.[19] In another discipline (political philosophy), Tim S. Gray has performed the most comprehensive work on resolving this problem, devoting a 1985 article and 1996 monograph[20] to reconciling individualism and organicism in Spencer's thought. Additional analysts who have pointed out this contradiction in Spencer's thought are, for brevity, noted in our endnotes.[21]

Much of this activity was caused by disciplinary boundaries or past styles of doing history. This creates easy targets for criticism. Certain analysts, for instance, have imposed their own notion of an 'organism' and 'individual' onto Spencer — my favourite is Sir Ernest Barker, who gave us three conditions of what we ought to mean when "we speak of an organism", and then assailed Spencer for not adhering to his definition.[22] But this is too comfortable a complaint, and an old one, made almost thirty years ago when Robert M. Young noted that contemporary commentaries on Spencer discussed *either* Spencer's social theory, *or* Spencer's views on organisms, but never both; and so they were therefore "symptomatic of the study of the history of science and the study of social theory, while their subject is someone who never made that distinction".[23]

My historiographic criticism is more basic. It was prompted by Robert Mackintosh, who over 100 years ago characterized Spencer's social organism as an "ornamental excrescence". He followed this up with the observation that in Spencer's image "The individual cells are asserting themselves, and the unity of the organism is coming

off second best. If Comte tells us, 'Be parts; be mere parts, living for the sake of the whole', Spencer thinks such advice the very worst possible".[24] This disunity is in no way ornamental to Spencer's thought. It is instead *fundamental* to his thought.

Thus my approach is a simple one. Rather than discuss the internal consistency of Spencer's vision, I want to understand the context that made Spencer's social organism a possible tool that he could use to depict both organisms and societies. Most of the accounts I have listed here have never tried to understand *why* Spencer's device was one possible image for him to convey his liberalism. So my approach is reversed: I begin with Spencer's early context and move forwards instead of backwards. Spencer's social organism became implausible simply because his context changed. Much of this change occurred because Huxley redefined what an individual organism was — an ironic point because most of the works listed above unquestioningly borrowed Huxley's own definition of an organism in order to criticize Spencer.

If we turn to Spencer's immediate and early context we discover that one major theme recurring throughout his work, in both his social thought and his biology, was the problem of authority and the source of order in any organization. When he proudly declared his Dissenting ancestry, he was also proclaiming the anti-authoritarian context out of which he emerged. Thus Spencer was concerned with what can be portrayed as a (too-) rough dualism: as co-ordination versus control; as diffused sources of order versus unitary sources of order; as bottom-up versus top-down organization.

In turn this problem of authority is intimately related not to political *individualism* but to the problem of biological *individuality*. Consequently: did an individual's unity result from the subordination of those elements to an all-powerful governing agency, or from the harmonious interaction of its constituent elements? The analysts who repeat that there is a contradiction in Spencer's work are correct only if they believe the first option, of the organism kept in thrall to a nervous centre that firmly commanded the rest of the body. But Spencer always believed in the second option, so for him the sources of nervous authority were as diffused as he believed the sources of political authority ought to be.

Thus, instead of a creature with a unitary will, Spencer spoke of assemblies of annelid segments, of republics of emotions, using a biology with democratic, not *dirigiste*, implications. And in understanding order as diffused, as emanating from 'below', he granted a sort of agency to these smaller parts and units — units that became, in their strange Spencerian way, independent individuals themselves, unbeholden to a central authority (see Figure 1). In religious questions — of Dissent, of priestless Quakers and Derby Methodist secessions — this problem of order was shown in discussions over how to resist priestly authorities controlling the enthusiasms of worshippers. When he joined Joseph Sturge's Complete Suffrage Union, Spencer spoke of a two-class model of British society, the people versus the aristocracy — of those who ought to hold power and those who wrongly excluded others from it. In phrenology he subscribed to the belief that the brain was not a unity but a compound, a congeries of mental organs in which each organ was responsible for a particular mental faculty; instead

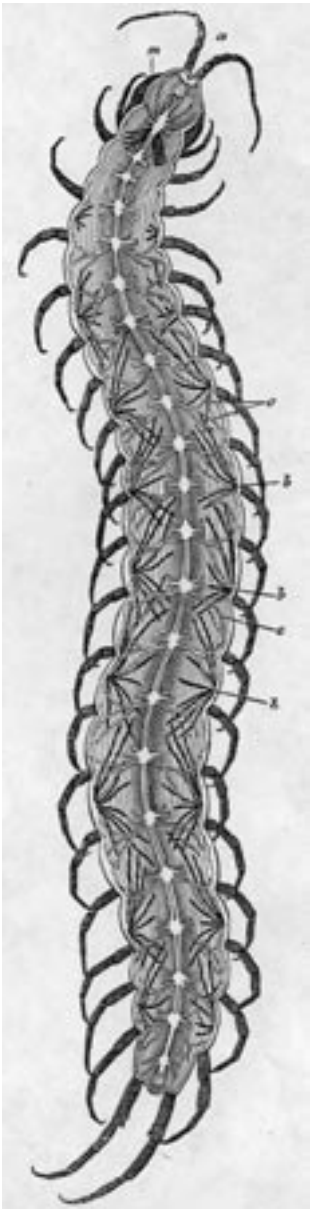

FIG. 1. A picture of the "centres of the nervous system" of the *Scolopendra* (centipede), with one ganglia per segment. From Thomas Rymer Jones, "Myriapoda", in *The cyclopaedia of anatomy and physiology*, ed. by Robert B. Todd (London, 1836–47), ii, 550.

of a controlling will there was consciousness resulting from the interaction of these specialized faculties. In psychology and neurophysiology Spencer insisted upon the independence of each *ganglion*, a nervous node that coordinated sensory inputs and reflex responses. As distributed nervous centres, these ganglia refuted a belief in a unitary controlling nervous centre, and helped diffuse agency throughout the body. In invertebrate biology, Spencer learned about the confusing nature of invertebrate morphology, physiology and reproduction. This caused him to question the blurry line dividing an individual invertebrate from a colony of those invertebrates.

Indeed, it was over the question of the individuality of the lowly sea squirt — an organism that can exist either in a solitary or in a colonial form — that Spencer first met his future antagonist, Huxley. And significantly, while Spencer used one set of political images to explain his biology, Huxley used a different, more authoritarian, set of images that never questioned the status of the individual. Huxley's images not only made the question of biological individuality and nervous authority unproblematic, but they gave a new legitimacy to *dirigiste* arguments, and gave new support for the authority of Victorian scientists too.

METHODISM AND QUAKERISM

We begin with religion, the earliest influence in Spencer's life. There was always an element of anti-clericalism in Spencer's work, be those clerics religious or scientific, for Wesleyan Methodism and Quakerism had influenced his earliest opinions on organization. Instead of associating with other boys his age he lingered in the company of grown-ups, watching earnest debates between his father and various uncles on political, religious, and scientific questions. Other traces of a religious upbringing can be found — by age nine, for example, Spencer had memorized *Hymns for infant minds* and *Divine and moral songs*.[25]

In Spencer's childhood town of Derby the Tories were in the minority and the Radicals were dominant. Thus politics was not really distinguished by class, but by religion (the Strutts, the town's first family, were not Anglicans, but Unitarians). Spencer's family was also religious. His grandparents were all Wesleyan Methodists — some were lay preachers, and his grandmother Catherine Spencer (who lived until Spencer was 23) knew John Wesley personally and met with him frequently.[26] The Spencers were also quite rebellious. Immediate family members were also involved in various uprisings against religious authorities. Spencer's uncle, Thomas Spencer, was a rogue Anglican Minister who issued tracts calling for the right of local parishes to elect their minister.[27] Spencer's uncle, John Spencer, led a secession from the main Wesleyan Church, an event that will be examined in more detail below. And his father, William George Spencer, deserted the discipline of the Derby Wesleyan Methodist chapel for the Quaker meeting house — for the Quakers had no priests, a sentiment so well described in Voltaire's *Letters concerning the English*.[28] Indeed, Spencer directly experienced this because he was caught in the middle of a parental split. To placate his mother, still a devout Wesleyan Methodist aghast at William

George Spencer's desertion of the chapel, the boy worshipped at the Quaker meeting house on Sunday mornings with his father; in the evenings he went with his mother to the Wesleyan service and presumably a class-meeting. Spencer did this from age ten to thirteen.[29]

In going to the Wesleyan chapel, Spencer would have experienced a loose religious community emphasizing class-meetings, where small groups of the faithful would gather under the guidance of a class-leader. There, "full inquiry was made into the behaviour of every person.... Advice or reproof was given as need required, quarrels made up, misunderstandings removed; and after an hour or two spent in this labour of love, they concluded with prayer and thanksgiving". The class meeting was the most important part of Wesleyan Methodism, "essential to the integrity, consistency, working order, and existence of the Methodist Connexion".[30] Wesleyanism's extraordinary growth between 1791 and 1850 (in England and Wales it went from 57,139 to 354,178 members)[31] was in part driven by a perception of the local chapel as an *association* — as a form of community that served not only religious, but also other social functions.[32] Their communal spirit distinguished many of the Methodist societies — John Wesley likened its society to a family — and the favoured language spoken at Methodist meetings was of brotherhood and fellowship.[33]

But Wesley himself recognized the tenuous nature of his charismatic leadership near the end of his life. Watching over the preachers assembled before him, he once exclaimed, "They obey me; but when I am gone, who shall govern this unwieldy body — so many wills? this unwieldy body!"[34] After Wesley died in 1791, the leadership of Methodism passed on to a hundred itinerant preachers who met in an annual Conference. Conference held supreme legislative power over Wesleyanism, and controlled the appointment and stationing of preachers to local districts.[35] But without Wesley's dominant personality, the movement encountered a growing disagreement common to many Christian movements. Some Methodists interpreted Christian life in authoritarian terms — about how to agree with, and make others agree with, common denominational and Christian principles. But others interpreted Christian life in terms of the autonomy of individual believers gathered in local communities, in which the members remained loyal to that immediate group.[36]

Wesleyan Methodism in the first half of the nineteenth century experienced constant secessions because of this disagreement. The first secessions followed spontaneous religious outbursts, in which groups of revivalists left Wesleyanism after censure by Conference.[37] In a popular religious movement emphasizing the feelings of the humble, the unity of the movement was seen to be in jeopardy.[38] By the 1820s, however, Jabez Bunting extended his control over the members of Conference, first as its Secretary and then its President. As his power extended he sought to transform Wesleyanism from a movement defined mostly by its class-meetings into a full-fledged denomination like the Church of England, in a way that would suit Bunting's Tory politics and cultivate Wesleyanism's respectability in the eyes of Anglican Tories anxious to ensure loyalty to the Crown.[39] To Methodist democrats, however, Bunting was the "evil genius", the preacher seeking to establish his power over "all the body",

destroying the local independence of the societies in order to establish a centralized hierarchy. For them, the major struggle of Methodism was "*Priestly* rule or *church* government, a modified Popery or Christianity".[40]

The extension of Bunting's authority prompted a second round of secessions as local chapel decisions were overturned by Conference. In 1827, for example, nine hundred Leeds members left Wesleyanism after their opposition to place an organ in their chapel was overruled by Conference.[41] By the late 1820s the phrase "pastoral prerogative" had become fashionable amongst Bunting's men, whilst many of the lay members felt excluded from the operations of Wesleyanism.[42] By 1844 this organizational dispute became uncomfortably public when anonymous *Flysheets* attacked Bunting's system of government as contrary to the provincial and communal nature of Methodism. They noted ominously that Bunting was replacing Wesleyanism's true character with a London bureaucracy.[43]

In 1831 Spencer's uncle John Spencer, a solicitor, played a leading role in a Derby secession. John Spencer was quite active in the Derby chapel, leading three Bible classes and preaching to rural congregations.[44] But in 1831, citing the "despotic acts of superintendents", he and a number of other community leaders announced their secession from the main Wesleyan Church. There are different accounts for this event's causes. One historian argues that it was a theological dispute — the secessionists held that faith was not a gift from God but was simply the exercise of powers inherent in human nature. But it was also a political dispute. When young women were encouraged to preach and the District Superintendent tried to stop this practice, he was vehemently opposed.[45] In another display of rebellion, when the Reverend William Davis attempted to stop the "various gymnastic exercises" of the Derby Wesleyans in a Band Meeting, the members immediately told him "this is the People's Meeting, this is our time for speaking".[46]

Early in 1832 the district authority, appointed by Conference, expelled four Derby preachers; to protest against this, six hundred local members withdrew. Soon afterwards, on 6 February 1832, a large group of trustees, stewards, local preachers and class leaders met at John Spencer's house, forming the Arminian Methodist Society. While the Arminian Methodists used Wesley's form of worship, they distinguished themselves from Wesleyanism by their revivalism. In making decisions, they insisted upon majority rule, linking themselves with local political reformers.[47] Ultimately, thirteen of the fifty-three local preachers seceded from Wesleyan Methodism, and seven hundred out of 1900 members — with over half coming from John Spencer's bible classes — left the Derby Wesleyans. The Derby secession even made its way into literature in the form of Dinah Morris, the heroine of George Eliot's *Adam Bede* — for she was modelled on Eliot's aunt Elizabeth Evans, herself a Derby Arminian Methodist for several years.[48] George Eliot and Spencer were excellent friends and there were rumours that they would marry in the early 1850s; but they did not.[49]

In 1833, at age 13, Spencer was sent to live with his uncle Thomas Spencer, the parson of Hinton Charterhouse, for his education. Spencer's father would send him letters of "religious exhortation", appealing to Spencer's religious feelings. But

Spencer gradually moved away from Methodism, claiming that going to twice the number of religious services — along with the hymn-memorization and his general repugnance to any form of priestly rule and ceremony — had made him unsympathetic to formal worship. Yet Spencer's religious upbringing had affected his views of the temporal world. He was obviously part of the evangelical sentiment that supported the free market — at age 16 he wrote a letter to *The Bath and West of England magazine* defending the New Poor Law, for Scripture noted that if a man did not work, then neither should he eat.[50] Spencer's "Nonconformist instincts and training" also enhanced his distaste for authority: it gave him an instinctive revulsion against the Church of England, for example, and he commented on the secession of the Free Church of Scotland from the established Church of Scotland in 1843.[51]

Much of the evidence I have presented here is circumstantial. In the case of the Derby secession led by John Spencer, Spencer would have only been eleven when the secession occurred. Further complicating this is the disappearance of much of Spencer's early correspondence with his relatives. But I believe that the various pieces of evidence indicating Spencer's relations with Dissent indicate a larger pattern. (In his study of Spencer's work, Peel thought that the affinities of Spencer with his Radical, Dissenting Derby context required an entire chapter, the marvellous "Enthusiasts and lunaticks".[52])

For the young Spencer, the ideas and practices of anticlericalism were not vaguely 'in the air' but were an omnipresent feature of life. They included a number of rejections of priestly authority that were wrenching Wesleyanism apart, particularly a local episode that involved an uncle; another uncle, responsible for Spencer's teenage education, called for the democratic selection of ministers of the Church of England. More generally, Spencer attended two different religious services on Sunday; he became involved with the Quaker Joseph Sturge (discussed below); and he was continually questioned by his father over religious matters. All must undoubtedly have played a strong role in shaping Spencer's later outlook. Further research is needed that will better reveal Spencer's early religious upbringing, strengthening or weakening my claim.

SUFFRAGE AND RADICALISM

Spencer's next anti-authoritarian encounter occurred between 1842 and 1844 when he participated in the Complete Suffrage Union (CSU). Led by the Birmingham Quaker, Joseph Sturge, who had previously pushed to abolish slavery in Britain, Spencer followed his uncle Thomas Spencer into this group. The CSU was formed at a March 1842 conference of middle- and working-class Chartist reformers in Bath; Thomas Spencer and others argued that all advocates of suffrage should unite into a national association (while rejecting the Chartist label so frightening to the middle classes). They noted that every committed Briton "must deplore the estrangement of feeling between the middle and working classes".[53] Middle-class radicalism and working-class Chartism, then, can be seen as a common movement to overcome political exclusion; the CSU was a group identifying with the 'people' and 'nation',

believing that they held real political power.[54] In this polarized account of society, the natural source of order was the people.

This group then met in Birmingham with "a view to union" with the moral force (non-violent) faction of the Chartists;[55] its main argument was that "the people" were the true source of political power.[56] After Sturge visited the Spencer household in Derby, Spencer — then 22 — became Derby Secretary of the CSU.[57] At first it grew rapidly, helping to elect some middle-class councillors, clergy and chartists.[58] When a popular CSU lecturer came to speak in Derby, the local magistrates — thought to be working on orders from the Home Secretary — made several attempts to stop the speech, prompting Spencer to pen a letter of protest.[59] He even took to wearing a cloth cap about Derby, secretly thrilled by the prospect of being mistaken for a Chartist leader.[60]

Though the fortunes of the CSU declined thereafter,[61] Sturge and the two Spencers did their best to revive it.[62] The energetic Thomas Spencer lectured in twenty towns.[63] Spencer, for his part, wrote articles in Edward Miall's *Nonconformist*,[64] a journal mixing Radical politics with Dissent and the occasional organic analogy to justify its Christianity.[65] Spencer's strategy, like the others, was to emphasize common interests between middle and working class democrats. This rhetoric emphasized the gap between the people and aristocracy. His "Effervescence — Rebecca and her daughters", examining the Welsh Rebeccaite rebellions, was one example. Spencer noted that not only had formerly contented and quiet agriculturalists started to riot, but that these disturbances were quickly spreading into other groups in "adjacent ranks" of society. He characteristically drew larger conclusions: the rioting had occurred because the two great antagonistic elements of social existence, the democratic and aristocratic spirits, were in contact. Spencer used examples from magnetism and chemistry — that like "antipodean masses", one pole or the other would soon influence every "neutral particle".[66] Just as iron filings were drawn to a magnet, all the disparate groups with democratic interests were gradually coalescing, making common cause with each other in their rioting.

Spencer not only used scientific rhetoric to articulate his political vision, but he also shared the assumptions of Thomas Spencer and others in the CSU. On the one hand there was a hierarchical vision of society, with vertical lines of affiliation, of patronage and deference, subscribed to by the purported anti-democrats. On the other, there was a vision of two classes, where an interest in democracy united members of the unrepresented class. Peel correctly notes that this vision saw society as horizontally stratified, governed by contract and voluntary association; for Spencer this ought to become the basis for political action.[67] This sentiment later developed into Spencer's dichotomy between the "militant" form of organization and the "industrial" one, in which regimentation and coercion characterized the militant society; contract and free association, the industrial society.[68]

PHRENOLOGY

Spencer's period of political activism coincided with his phrenologizing. In 1843, in a series of letters to the *Nonconformist* that were later reissued as *The proper sphere of government*, Spencer mentioned the "social organism" for the first time, albeit in an offhand way. This was likely brought on with Spencer's involvement with phrenology — for Spencer cited a phrenological text alongside Adam Smith's *Wealth of nations* in these letters.[69]

Historians of phrenology have noted its congruence with Spencer's *laissez-faire* views, and its ability to act as a vehicle for social advancement for ambitious early Victorians.[70] Here, however, we are concerned simply with phrenology's view of organization, which shared many of the assumptions of Spencer's politics. As the child of J. F. Gall's "craniology",[71] phrenology held that the brain, as the organ of mind, was not a unity but an aggregate, a collection of organs each serving a specific mental function. The size of each organ determined each function's relative power. Since the skull hardened over the various organs of the brain in infancy, an external observer could use this knowledge to determine a person's mental abilities and character.[72] Gall was devoted to the principle that different organs not only exercised a particular function, but also tended to work in harmony with the other mental organs. Some organs were far stronger than others. Indeed, the phrenologist saw the head as having a hierarchy of spaces with specialized functions, analogous to the factory of Andrew Ure's *Philosophy of manufactures* (see Figure 2).[73]

Gall sought to abandon the notion of a single seat of consciousness — "the me" — for it was only imaginary. Instead, he argued that the various nominally independent nervous systems were connected with each other, and that the resulting activity was called life.[74] Craniology was renamed *phrenology* by Gall's assistant, Johann Gaspar Spurzheim. He, too, held a similar view of the compound nature of the brain — desire was not a primary mental power, but instead resulted from the combination of individual faculties. Pain and pleasure also depended on these interactions.[75] Thus one was not in control of one's mind; instead, mental activity emanated from the interaction of one's mental organs.

Spencer first experienced phrenology at age eleven, when Spurzheim lectured in Derby. Eleven years later another phrenologist examined Spencer's head, and he became curious about the practice. For him, "like many of the chemical bodies that were at one time believed to be simple elements, [the mental attribute of conscientiousness] is fated to undergo decomposition". Conscientiousness was not caused by one mental faculty, but was, like Benevolence, a "compound feeling" composed of simpler feelings like sympathy.[76]

The phrenological text Spencer cited in the *Proper sphere of government* is Sidney Smith's *Principles of phrenology*.[77] In it there is much discussion of mental plurality. In Section 3, "Plurality of organs and faculties", Smith used the brain's disunity to explain states of consciousness, likening each mental faculty to an individual. The sleeping person had a brain that was formerly a "combined army of operations". But upon slumber the mental faculties began to act like guests in the travellers' room

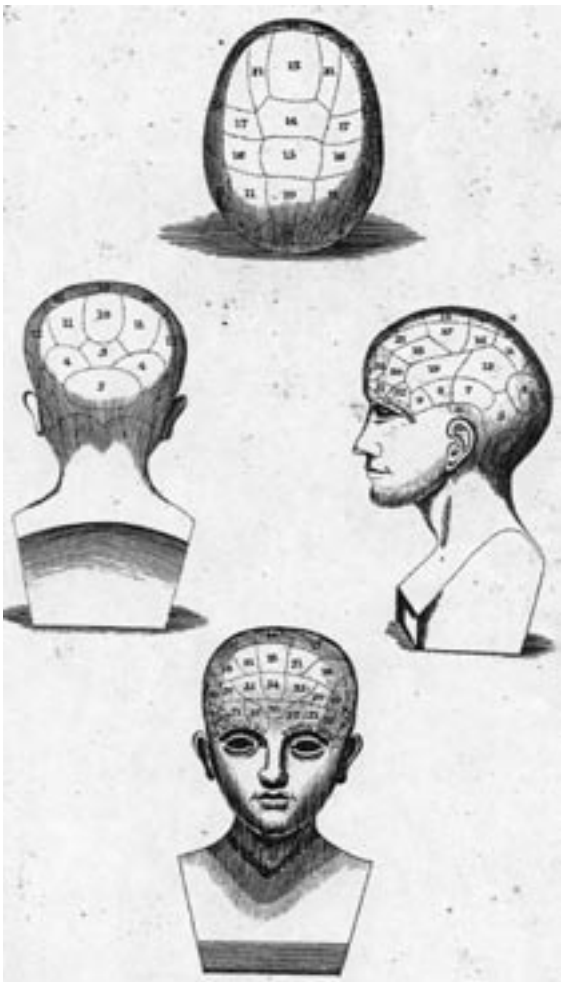

FIG. 2. From *A manual of phrenology* (Philadelphia, 1835), Plate v.

at an inn, "one reading, another writing, a third eating, while a fourth, having just arrived after a long journey, is snoring, with his legs across a chair, unconscious of the presence of the rest, who are hurrying in and out, each upon his own peculiar business".

Moreover, Smith used the image of a political assembly to explain the interaction of these different faculties. Assume

> a sentiment in the mind which makes a man fear, and a passion which spurs him on to fight, and we can perfectly understand how he whose life is passed

> in days of prudence, should spend his nights in dreams of rash adventure. His organ of Cautiousness may then be asleep, and that of Combativeness, hitherto an incarcerated slave, may celebrate its jubilee of emancipation in awakened activity. And so, if there be an organ of Acquisitiveness, which prompts to [*sic*] the exercise of the appropriation *claws*, 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.[78]

By substituting the phrase 'mental faculty' for 'person', one can quickly see how Spencer's phrenological arguments were transferred so easily from politics, and why he referred to a phrenology book while writing his political arguments. Spencer's earliest view of natural rights was that each person ought to be able to work freely and not have this work interfered with by any other person. Injustice was a violation of this freedom,[79] a doctrine of rights imitating the phrenologist George Combe's belief that all of the mental faculties should be permitted free exercise. If we persist in speaking about the role of rights in Spencer's political thought,[80] then mental faculties can be said to have certain rights too.

In January, April and June of 1844, Spencer's interest in phrenology was itself freely exercised. Three of his phrenological articles had appeared in *The zoist*. In one article he spoke of the "common phrenological principle" that "organs are prone to action in proportion to their size", meaning that imaginative people had large mental organs of "reviviscence". In another, Spencer mentioned that any active part of the brain "tends to arouse the organs located in its neighbourhood". And the organ of Amativeness (what we would now call sexual attraction) tended to "awaken the adjacent propensities" when activated.[81]

SPENCER AND THE NATURALISTS

In December 1850 Spencer's first book, *Social statics*, was released. In it, Spencer drew parallels between a society formed of individuals and an animal formed of living cells or units.[82] Borrowing from phrenology and using the notion of the division of labour, Spencer argued that "Man ... consists of a congeries of faculties, qualifying him for surrounding conditions. Each of these faculties, if normally developed, yields to him, when exercised, a gratification constituting part of his happiness...".[83] Congeries was placed in opposition to a conscious will, and any organism was not a unity. The body could be seen instead "as a commonwealth of monads, each of which has independent powers of life, growth and reproduction; each of which unites with a number of others to perform some function needful for supporting itself and all the rest".[84]

Many of Spencer's examples were drawn from invertebrate zoology, from Thomas

Rymer Jones's *General outline of the animal kingdom* and Richard Owen's "Hunterian Lectures" (likely his 1849 *On parthenogenesis*). There, organisms were classified by their level of integration — annelids were an extended series of rings; myriapods (meaning 'many feet', like centipedes) had less numerous but denser rings; in insects this condensation was even more pronounced.[85] Spencer took this up, discussing simple creatures and simple societies as aggregations of like parts. "Every portion of the community performs the same duties with every other portion; much as each portion of the polyp's body is alike stomach, skin, and lungs." Thus every person in a simple society, like each segment in a simple organism, was warrior, toolmaker, fisherman, builder:

> Between creatures of the lowest type, and creatures of the highest type, we similarly find the essential difference to be, that in the one the vital actions are carried on by a few simple agents, whist in the other the vital actions are severally decomposed into their component parts, and each of these parts has an agent to itself.... [86]

Agency and the division of labour were distributed throughout the body.

Significantly, Spencer had social contact with one of his naturalist sources, knowing Rymer Jones as early as 1834. For William George Spencer was Rymer Jones's tutor in Derby. When Spencer and his father visited London in 1834, Rymer Jones took them to the Zoological Gardens, which was open only to Fellows of the Zoological Society and their guests.[87] After this visit, Rymer Jones moved on to become Professor of Comparative Anatomy at King's College London in 1836, and his *General outline of the animal kingdom* became the standard conservative textbook on comparative anatomy for ten years after its introduction.[88]

Jones dedicated the work to his friend, the famous comparative anatomist Richard Owen.[89] And it also appears that both Spencers — father and son — had links with Owen too, perhaps through Rymer Jones as intermediary. When the two Spencers went on a holiday to the Isle of Wight in the summer of 1841, William George Spencer saw some fishermen haul in a sun-fish, and, "Knowing Prof. Owen ... wrote to him telling of the fact", thinking that the fish could be dissected. When Spencer finished *Social statics* he moved from merely citing Owen's work to attending Owen's courses, attending his comparative osteology lectures in the spring of 1851. They were in contact even to the mid-1850s: in February 1855 Spencer had dinner at some friends "in company with Professor Owen and his wife", after which the group proceeded to the Royal Institution to hear Owen lecture.[90]

In the autumn of 1851, after the publication of *Social statics*, Spencer read Carpenter's *Principles of general and comparative physiology* to review it for the *Westminster review.* Spencer noted that it was here that he learned about Karl Ernst von Baer's principle of embryological development — the "change from homogeneity to heterogeneity", a phrase that monotonously peppered Spencer's writings thereafter. Spencer also read Henri Milne Edwards's "recent" book discussing the principle of the physiological division of labour,[91] but Spencer was already aware of this, if not

from phrenology, then from reading Harriet Martineau's *Illustrations of political economy* as a boy.[92]

Spencer's anti-authoritarian organizational views made him receptive to a number of then-fashionable morphological and reproductive doctrines. We can see this in his 1852 "Theory of population, deduced from the general law of animal fertility". Dealing with the problems of sexual reproduction, it reviewed Owen's 1849 *On parthenogenesis*, Robert Bentley Todd's *Cyclopaedia of anatomy and physiology*, and Johannes Japetus von Steenstrup's *Alternation of generations*, translated from German into English by the Ray Society in 1845.[93]

NATURAL HISTORY AND THE DISUNITY OF THE ORGANISM

A digression into these books is necessary because all three of these works contradict our familiar view of the organism as a unified whole, and help set the context for Spencer's view of an organism. In the 1830s naturalists like John Dalyell had observed strange transformations of certain marine invertebrates — one type of organism, the sessile hydra tuba, budded not into another hydra tuba but instead into a medusoid (jellyfish) form.[94] This was especially disconcerting for naturalists, for these organisms contradicted von Baerian embryology's promise to describe the ordered development of organisms. In short, each form produced young that did not resemble themselves.[95]

Steenstrup's proposal — that these generations alternated — was the first attempt at an explanation. He argued that certain invertebrates did not exist as one individual, but instead as a *series* of reproducing individuals. Marine invertebrates such as hydroids/medusoids or oceanic Hydrozoa (which include siphonophores, like the Portuguese Man-o'-War) could be represented by two types of individuals throughout their life cycle: the polypoid-type and the medusae-type. Polypoid-types reproduced asexually, and the medusae-type budded from it. In turn, the medusae-type reproduced sexually, generating the polypoid type. Therefore two different individuals alternated, and a child resembled its grandparent.[96]

Steenstrup held that species in which generations alternated were represented both by full-grown, fertile individuals and "supplementary individuals" nursing those full-grown individuals to their full development. He even proposed the word *amme*, or nurse, to designate the function of these supplementary individuals.[97] This principle was extended to cover other invertebrates. Steenstrup used the analogy of social insects: *amme* were akin to the worker class of insect colonies, organisms that never developed their reproductive organs. Instead they took on the role of feeding or nursing the young.[98] John Farley notes that Steenstrup's discussion led to a complex and lengthy discussion amongst European naturalists about the relation between alternating generations and plant metamorphosis, all revolving around the problem of individuality. He claims that Steenstrup's alternation of generations might have been better named the "alternation of individuals".[99] Part of this was because Steenstrup portrayed the alternation of generations as a morphological problem rather than a developmental one, despite using the word 'generations'.[100]

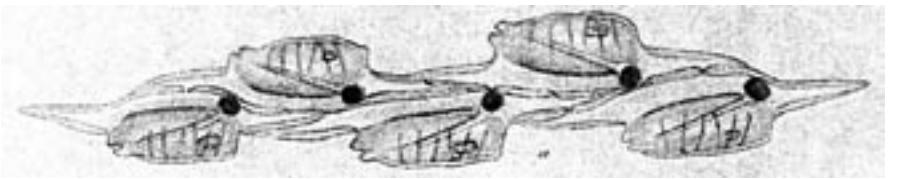

FIG. 3. Associated salp, M. Sars, *Fauna littoralis Norvegiae* (Christiania, 1846), figure 44, table 8.

Steenstrup used the example of the salp, a marine invertebrate related to sea squirts. The salp swam freely but alternated generations. One form was the solitary salp; the other form was the associated salp, in which twenty, forty, or more salps were united into long chains that moved like serpents just below the water's surface. All salps, whether solitary or associated, kept the same form. But a solitary salp produced a chain of salps, and each link on the salp-chain produced a solitary one in turn (see Figure 3).[101]

The second book reviewed by Spencer, Owen's *On parthenogenesis, or, the successive production of procreating individuals from a single ovum*, was written in response to Steenstrup. "Parthenogenesis" was Owen's explanation for the phenomenon of the alternation of generations. He claimed that the alternation of generations was caused by "spermatic force" — after sexual reproduction, the germ cell was impregnated and divided further, creating a germ-mass. However, not all of the germ-mass was used up in an individual's development; some was saved and used in subsequent asexual reproduction.[102] The germ-mass had its "spermatic force" gradually consumed during development, implying that the same process governed buds, ova and spermatozoa. All forms of reproduction were thus forms of growth — the multiplication, or gemmation, of cells, was not qualitatively different from reproduction from an ovum (see Figure 4).[103]

Parthenogenesis not only explained sexual and asexual reproduction, but also regeneration (at the time the words seem to have been used interchangeably). Owen used parthenogenesis to explain why a polyp could be cut in two and each part become a new polyp: because not all the germ-mass or spermatic force had been used up. More complex organisms like lobsters had only a small amount of germ-mass left — explaining why they could only regenerate parts like new claws, and only from certain points where the germ-mass still remained.[104] The simpler the organism, the more germ-masses that could "retain their individuality" and which were not metamorphosed into tissues and organs during development.[105]

Owen tried to avoid complex questions about the nature of individuality, alluding to Theseus's ship, whose identity was fruitlessly debated after it had undergone such repair that no part of the original wood remained.[106] Yet a sampling of *Parthenogenesis* shows that despite this stated intent, Owen could not avoid this discussion. In various places he speaks of the "composite plant or the composite zoophyte", that the "polypes [are] the digestive organs of an individual compound organism", that a

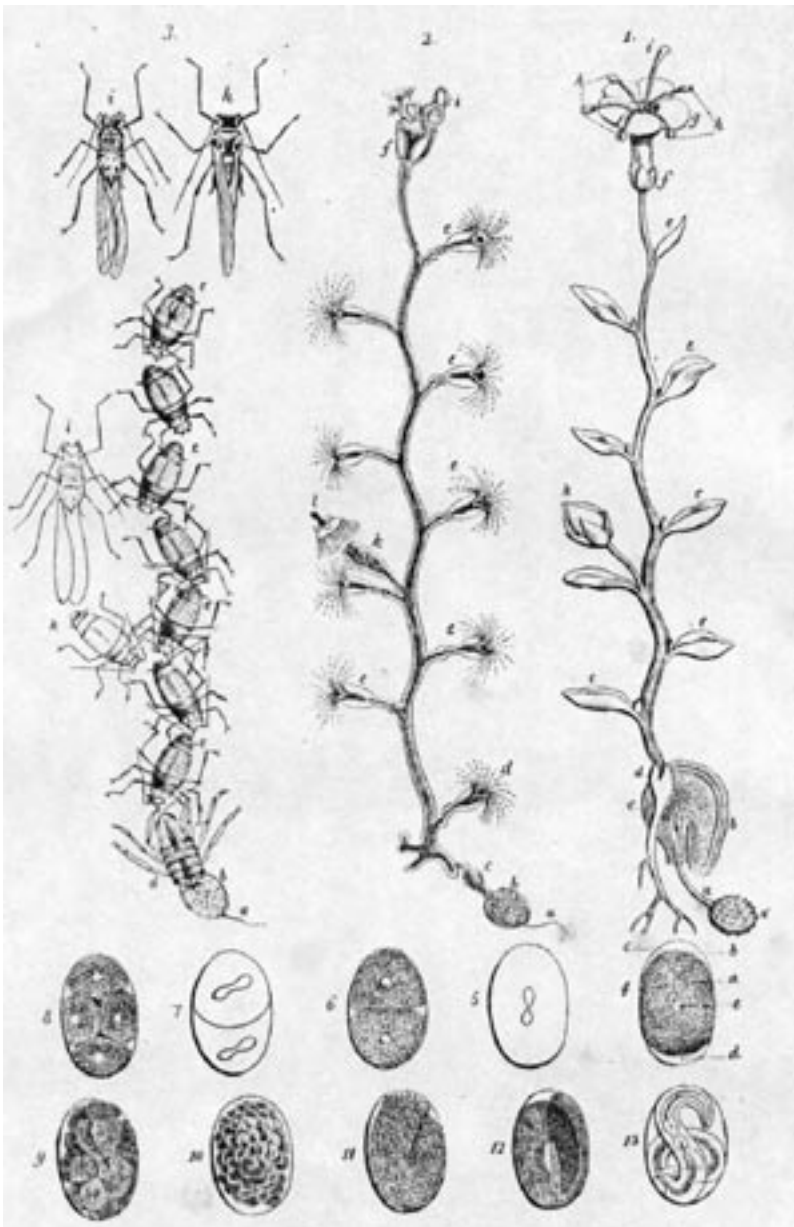

FIG. 4. "[In the Aphid] (fig. 3) ... we have, in fact, at length 'male (h) and female (i) individuals', preceded by reproductive individuals (e,e) of a lower or arrested grade of organization, analogous to the gemmiparous polypes of the zoophyte (e,e, fig. 2) and the leaves (e, e, fig. 1) of the plant." Richard Owen, *On parthenogenesis, or, the successive production of procreating individuals from a single ovum* (London, 1849), 59–60.

flowerless plant was an "associated colony of simple organized individuals", that a tree was a "compound whole".[107]

Finally, Todd's *Cyclopaedia* — also reviewed by Spencer — contained articles on invertebrates by Rymer Jones, Owen and Milne Edwards. Milne Edwards wrote of earthworms as each having separate, nominally independent physiological systems repeated in each segment. Why else, asked Milne Edwards, could an earthworm be cut into two, and each half develop into two new earthworms?[108] Owen, for his part, attempted to rename and reclassify articulates (which included insects) according to the centralization or decentralization of their nervous systems. The distribution of nervous centres in their bodies was a sign of their divisibility, revealing how much independent vitality each fragment possessed. The higher the animal, the more concentrated its nervous system became. In Owenian nomenclature, the articulates were renamed the "homogangliata", meaning one ganglion per segment.[109]

In a second article Owen called molluscs "heterogangliata" because nervous centres were dispersed throughout their body.[110] Rymer Jones followed Owen, referring approvingly to this classification scheme, for in the heterogangliata, "Each ganglion … is a distinct brain".[111] This classification also helped to organize the content of Rymer Jones's *General outline* textbook as he moved from animals with no nervous system, to those with the most complex systems. Thus the *Homogangliata* had a series of repetitive brains, "belonging apparently to the individual segments of which the animal is composed".[112]

Spencer's "Theory of population" article took up this style of classification too, dutifully placing invertebrates into groups like *Nematoneura*, *Homogangliata* and *Heterogangliata*, because of the development "of the internuncial or co-ordinating apparatus" that allowed "intercommunication between parts". Spencer saw Owen's method as a continuation of John Hunter's analysis of the nervous system: in order for the separate parts of an organism to act in concert, they had to be able to communicate.[113] Nerves, then, were the intermediaries between nominally independent systems, helping to integrate more complex systems. Indeed, nerves were qualitatively different from any other body part — since organic life was the "co-ordination of actions", then we could divide an organism into the parts co-ordinated and the parts co-ordinating them. Spencer argued that an organism consisted of the muscular, digestive or vascular and other systems on the one hand, and the nervous co-ordinating system on the other. The amount of nervous tissue and activity in the organism made individuality, consciousness and purposive action possible. Since the nervous system was different from the rest of the bodily systems, vital energy was directed either to nervous tissue or to any other type of system. For Spencer, "Individuation and Reproduction are antagonistic".[114]

Spencer had extended Owen's notion of parthenogenesis. Recall that Owen proposed a spermatic force responsible for the formation of simple individuals or the growth of complex parts, a force that also explained the alternation of generations, and why simple organisms could regenerate and reproduce far more easily than more complex ones. Spencer believed that reproduction was merely another form

of growth. Growth could take place in an integrated way, leading to more complexity, or it could lead to the separation of similar parts. Growth could be portrayed as a continuum, where at one end sat the procreation of simple individuals, and at the other the growth of parts of more complex organisms. For example, yeast was little more than a collection of cells that reproduced in enormous numbers because it was so simple. Conversely, the far more complex oak tree used up its vital energy in developing its parts, so it could not procreate nearly as much as yeast. "This combination of parts that are tending to separate and become distinct beings — this union of many incipient minor individualities into one large individuality — is an arrest of reproduction — a diminution in the number produced."[115]

This paper helped burnish Spencer's reputation amongst the leading British naturalists of 1852. One of the most important of them, Edward Forbes, wanted to meet Spencer and discuss it, telling him he had read it twice and was about to read it a third time.[116] For Spencer had helped answer some questions on invertebrate peculiarities for Forbes — in an 1844 paper read to the British Association, Forbes had argued that many lower invertebrates were compound — hence "composite beings of plant-like forms [were] constituted of numerous *nutritive* individuals". They resembled the flower, which was an "assemblage of respiratory individuals".[117]

It was also over this question of biological individuality that Spencer met a young naturalist, Thomas Henry Huxley. He heard Huxley's 1852 talk on ascidians (sea squirts), a marine invertebrate that can exist either alone or in colonies of associated individuals. Interested, Spencer sent Huxley a copy of his "Theory of population" with a letter seeking to discuss "the production of composite animals by the union of simpler ones".[118] They became friends, with Huxley using the grim biological metaphor that when he refuted many of Spencer's speculations, they were left "choking in an embryonic state".[119] For while Spencer believed in the possibility of compound organisms, Huxley was firmly against it. This sentiment dated back to his days on HMS *Rattlesnake* when Huxley was faced with Australian seas crowded with salps. Recall that these were the very same marine invertebrates that Steenstrup used to illustrate compound individuality. The strange creatures that alternated between solitary and colonial form, between asexual and sexual reproduction, moved Huxley to meditate on the problem of zoological individuality — what stood for the individual? what stood for a part? what stood for a colony?[120]

In an 1851 paper on salps and other related colonial marine invertebrates, Huxley proposed new words that would overcome the confused view of compound individuality. The various parts of the salp-chain that sometimes existed together, sometimes existed independently, were less than individuals, but were more than organs. Huxley proposed that they be called *zoöids*:

> In strictness both *Salpa B* and *Salpa A* are only parts of individuals, — are organs; but as we are unaccustomed to associate so much independence and completeness of organization with a mere organ, to give them such a name would sound paradoxical. It is proposed, therefore, to call them, and all pseudo-individual forms resembling them, 'zoöids', bearing in mind always while the

> distinction between zoöid and individual is real, and founded upon the surest zoological basis, — a fact of development, — that between zoöid and organ is purely conventional, and established for the sake of convenience merely. In the *Salpae*, then, the parent and the offspring are not dissimilar, but the individual is composed of two zoöids.[121]

Individuality could no longer be defined as having an independent existence, for by this definition even sperm- or cancer-cells would be individuals.[122] Huxley was also hostile to another fashionable belief, the German cell-theory, in which it was thought that each cell had its own independent life-power. If this view were true then the organism would be little more than a collection of independent vital units.[123]

Huxley again attacked the notion of compound individuality in his famous "On animal individuality" of 1852, criticizing fashionable theories like Owen's parthenogenesis. Instead he changed the criterion for an individual: it was the entire product of a sexually fertilized ovum.[124] Huxley sought to protect his field by limiting its inquiries. He thought that studies of marine invertebrates should be restricted to the laws of animal form, not chase after metaphysical problems of "psychical individuality";[125] the possibility of compound animals and polymorphism, while conceptually interesting, would not lead to fruitful research. Twenty years later he would publicly air this difference of opinion with Spencer.

PRINCIPLES OF PSYCHOLOGY AND *PRINCIPLES OF BIOLOGY*

In the years after 1852 Spencer turned his attention to psychology, culminating in his second book, the 1855 *Principles of psychology*, in which he articulated a vision of evolutionary psychology. Just as Spencer believed that the phrenological feeling of "conscientiousness" could be broken down into smaller units of sympathy, he later thought that all nervous activity could also be broken down into smaller units — thus instinct was "compound reflex action".[126] And many of these smaller reflex actions combined to form activity of which we were not conscious — after learning to walk, for example, one became unaware of it. Much of the muscular tension, the combinations of sensation and contraction involved in maintaining our balance, formed an independent series of changes occurring alongside our consciousness, forming a secondary awareness. In the lowest animals each part of the organism performed all of the vital functions independently.[127]

Similarities abounded between the quasi-independent nervous ganglion and the quasi-independent phrenological faculty. Though Spencer eventually repudiated phrenology, a later writer — stung by Spencer's rejection — noted just how much he had borrowed from it. For Spencer spoke consistently of the independence of each mental faculty, which the writer concluded could have come only from phrenology.[128] The phrenologist was overstating his case, for at the time similar disunifying assumptions were held in neurophysiology too: for example, many believed that the encephalon and spinal cord were a congeries of nervous centres, each one partly independent. To repeat, the organ responsible for maintaining independent vital

functions was the *ganglion*, a node of nervous tissue held to be a source of nervous power. Thus, instead of a single unitary brain, there were thought to be many tiny brains comprising the entire cerebrospinal nervous system, and nervous power was distributed among these centres.[129]

To illustrate these principles Spencer turned once again to simple organisms like the invertebrates, using examples from W. B. Carpenter's *Principles of comparative physiology*. Following Carpenter, Spencer argued that these lower invertebrates served as models for basic nervous structure and physiology, and the principles found there could be extended to an understanding of human neurophysiology too. Extensively quoting Carpenter, Spencer pointed out that since ganglia were responsible for governing their own part of the body, many of the lower invertebrates were not really unitary organisms at all. Instead, they showed a "dispersion of the psychical life" — if the head of a praying mantis was removed one would still see that the rest of its body remained balanced, even recovering when pushed over. Because a centipede was made up of a series of repeated segments, each with its own ganglia, a decapitated centipede would continue to walk forward. A centipede with a severed nervous cord showed that the part of the body below the injury was still influenced by its own ganglia, and that it could move in opposition to the part above the injury. The power of independent nervous centres was even shown in the human body: infants born without a cerebrum and cerebellum were an example of this ganglionic power, for they could perform reflex activities like crying, breathing or sucking.[130]

Just as in phrenology, Spencer believed that neurophysiology indicated the independence of each brain-part: "that particular portion of the cerebrum in which a particular faculty is said to be located, must be regarded as an agency by which the various actions going on in other parts of the cerebrum are combined in a particular way."[131] Spencer used the word *agency* in a way quite strange to us, for by this term Spencer did not imply choice, or activity, or even the control of the surrounding body-part, but instead a localized office where manifold impressions were joined and reacted to through simple or compound reflex activity.

Therefore Spencer could extend the term 'individual' to any part following this definition. *Principles of biology* (1864–67) continued Spencer's fascination with compound individuality, and the biological individual became any organization continuously maintaining equilibrium with its surroundings, from polyps, to aphids, to buds or shoots of flowering plants.[132] Spencer examined each organism as an aggregate of smaller individuals. To demonstrate this he introduced an example from the marketplace. Even if the "ultimate units" were the same we could still group those units together. Units could be added to a group one at a time; or ten at a time; or more.

> Articles which the consumer recognizes as single, the retailer keeps wrapped up in dozens, the wholesaler sends the gross, and the manufacturer supplies in packages of a hundred gross — that is, they severally increase their stocks by units of simple, of compound, and of doubly-compound kinds.
>
> Similarly result those differences of morphological composition which we have

> first to consider. An organism consists of units. These units may be aggregated into a mass by the addition of unit to unit. Or they may be united into groups, and the groups joined together. Or these groups of groups may be so combined as to form a doubly-compound aggregate. Hence there arise respecting each organic form, the question — is its composition of the first, second, third, or fourth order? — does it exhibit units of a singly-compounded kind only; or are these consolidated into units of a doubly-compounded kind, or a triply-compounded kind?[133]

There is a hierarchy of individuality here. If life began with simple and small forms, out of which all individual organisms arose, and if these smaller forms coalesced, then it would be "impossible to say where the lower individualities ceased, and the higher individualities commenced".[134] For his example, Spencer noted that annelids had repeated segments — in some of the lower annelids, each successive segment not only had its own legs and internal organs, but also its own eyes and reproductive organs. Each segment was therefore a "physiological whole",[135] an individual.

Displaying Huxley's lecture diagrams, and quoting him on how the insect head and body were quite obviously fashioned out of repeating segments, Spencer proposed that these segments *were originally independent individuals themselves*.[136] This was also the case for all articulates, but we could not see this easily because these segments had gradually integrated and hidden this primordial individuality.[137] In 1870 Spencer applied this to human neurophysiology. The

> spinal cord may be regarded as a continuous nervous centre; and, in another sense, as a series of partially-independent nervous centres. Each pair of trunk nerves with its segment of the spinal cord, has a certain degree of individuality; and those segments into which enter the pairs of massive nerves from the limbs, have individualities considerably pronounced; since it is experimentally proved that when severed from the rest they are not incapacitated.

Nerve-tubes and nerve-cells formed a "net-work", each net-work existing as an "independent agent", with some widely scattered, others clustered as closely "as maintenance of their individualities will allow".[138]

Therefore, in even the most complex vertebrate nervous system — the human one — order resulted from the combination of the units that composed it. This helps show why Spencer was repulsed by Thomas Carlyle's doctrine of a unitary *will* overseeing one's emotions. Where Carlyle saw the feelings as part of "an assembly under the autocratic control of the 'will'"; Spencer instead believed that the feelings

> constitute an assembly over which there reigns no established autocrat, but of which now one member and now another gets possession of the presidential chair (then temporarily acquiring the title of 'the will') and rules the rest for a time: being frequently, if not strong, ejected by combinations of others, and occasionally, if strong, effectually resisting their efforts.[139]

Note how close this image is to the one used by phrenologist Sidney Smith in 1838.

Spencer used a political metaphor here because he saw the same principles of authority and order at work both in neurophysiology and in politics.

"THE SOCIAL ORGANISM"

In his famous 1860 paper "The social organism", Spencer drew out the comparison between an organism and a society systematically, equating simple societies with segmented ones. Complex organizations formed out of the coalescence of several independent and uniform segments. Thus in the simpler segmented animals, like annelids, the body had numerous, almost-identical segments each with equal portions of the digestive and circulatory system, and each with its own ganglion that combined impressions. In the more complex segmented animals like the crab, the segments were fused together and the internal organs no longer repeated in each segment. Spencer claimed that this was the same in nations: they lost their separate external and internal structures in a similar way. In the feudal era various small communities gradually lost their independence and integrated into a larger organization. Just as the musculature and exoskeletons of the highest segmented animals showed traces of a primitive segmentation, in societies old divisions like counties and parishes still existed. But conversely, just as in these segmented animals the "sustaining" organizations, such as the internal organs, became integrated, so too did this occur in society. In England the cotton-manufacture spread from its original district of Lancashire into North Derbyshire; and the stocking-trade had spread into the segments of both Leicestershire and Nottinghamshire.[140]

Spencer used salps, Hydrozoa and sea squirts. In common hydra, after the young emerged from the parent body, they often detached and became independent. But in higher members of this class (like siphonophores), the young emerged but stayed attached, forming a compound animal. Sea squirts and salps lived together in various degrees of aggregation, similar to simpler tribes that at first lived apart, but which then integrated into a single unit. Conversely a simple tribe — like hydra — also multiplied by detaching a part of itself and sending it off to live apart from the parent tribe.[141]

Spencer also used neurophysiology to justify his version of the social organism. In segmented animals, each segment's ganglion was nominally independent, showing parallels with societies with a number of small and independent kingdoms. The process of evolution, however, saw a king or other figure collecting around himself advisors that communicated information to him; in place of a solitary governing unit there grew up a group of governing units. In nature one saw more complex segmented animals possessing a chief ganglion helped by a few minor ganglia, and the immediate independence of each ganglion was given up. However, the advising ministers/ganglia exercised their own control over the ruler, and over time the ruler became an automatic centre, eventually becoming content with merely reflecting sense impressions.[142] Spencer noted that those previous social theorists who compared society with an exemplar organism, like Hobbes, used for their exemplar organism the human body; but that it was this example that doomed the analogy to failure. For Hobbes thought of the human body not as an organism, but as an artificial machine;

and by extension he also thought of a society as created by a social contract.[143]

While Spencer granted that there were differences between an organism and a society, he sought to minimize them. Societies did not have external forms, and simple organisms were indefinitely shaped too. Societies were not continuous masses, but other organisms were also like this — a Hydrozoon, for example, had its living parts distributed through a gelatinous inert substance, just as people in a society lived in places covered by simpler forms of life, like vegetation. "Hence the members of the body-politic are not to be regarded as separated by intervals of dead space, but as diffused through a space occupied by life of a lower order." Another criticism was that all members of a society had feelings — and did not an animal body only feel in its nervous tissue? In answer, Spencer pointed out that in the simplest animals all parts had an equal degree of sensitivity.[144]

THE CONTRADICTION BEGINS

The winter of 1871–72 marked one high point for Spencerian explanations of compound individuality. In his 1872 Presidential Address to the Entomological Society of London, Alfred Russel Wallace, co-discoverer of the principle of natural selection, nominated Spencer's theories on compound individuality as a way to solve the problem of why insects had repeating segments. Wallace noted that an insect might be "a compound, representing as many individuals as there are true segments in the body, these individuals having become severally differentiated and specialized to perform certain definite functions for the good of the whole compound animal". Proposing that each segment was originally a separate individual that had integrated into a larger "individual" over time might solve the origin of insects, and by extension serial homology,[145] Wallace even noted the similarity between Owen's 1843 *Lectures on invertebrates* and Spencer's views.[146] Wallace's own past is noteworthy here and might explain his receptiveness to Spencer's views. A committed phrenologist who read Combe's *Constitution of man* in 1844, Wallace was so interested in phrenology and phreno-mesmerism that he conducted his own phrenological experiments.[147]

However, the only written response to Wallace's speech was a letter one month later denying the compound individuality of insects, arguing that "the conception of segmentation is erroneous which leads to ascribing to insects peculiar physiological or physical properties on account of their being composed of 'a number of individualities fused into one'".[148] The author of this was the young Edwin Ray Lankester, who began his career studying marine invertebrates, and who was the protégé of none other than T. H. Huxley.

Since proposing the word 'zoöid' to avoid referring to independent marine invertebrate parts as individuals, Huxley had retained this definition in his later presentations on colonial marine invertebrates. "A whole tree of Sertularia, a Pennatula, a Pyrosoma, a mass of Botrylli, must no longer be considered as an aggregation of individuals, but as an individual developed into many zooids."[149] And Huxley had proposed new words to denote quasi-independent parts, like 'polypite' (a part of Hydrozoa that acted largely as a stomach, but which for Huxley seemed more independent than a

mere organ).[150] Lankester served his teacher well, for not only did he publicly attack notions of compound individuality, but he also adopted Huxley's new terminology. George Allman, who also examined colonial marine invertebrates, increasingly used this term too (he took up the word 'zoöid' almost immediately after Huxley's public introduction of it) and the term 'compound' seems to have disappeared from their vocabulary.[151]

Thus what was thought of as a compound organism became, instead, a collection of *zoöids*. In order for Huxley to refer to these troublesome, seemingly-independent parts without granting them undue independence, he coined new words for them. Just as he had invented the word 'agnosticism', thereby controlling any ensuing debate by defining not only his own position but also his enemies',[152] he may have closed off the very possibility of expressing certain organisms as compound. Perhaps this was a sort of "dynamic nominalism", for as new descriptions for these organisms appeared, new possible interactions with them appeared as well.[153] But this also means that certain possible interactions with these humble invertebrates were closed off by the adoption and increasing popularity of Huxley's terms. When faced with a *Nereis* (shown in Figure 5), contrast the research possibilities implicit when one sees it as a *compound organism*, as a member of the repeating-brained group *homogangliata* that buds off new *individuals*; or, conversely, as an invertebrate that is a collection of *zoöids* exhibiting the phenomenon of *metamerism* (see also Figure 1). In this way Huxley may have helped render the problem of biological individuality — to borrow Nicholas Jardine's language — an "unreal" question; in other words, it seems to have become an irrelevant problem that ambitious young scientists like Lankester no longer troubled themselves with.[154]

The discussion of the incoherence of the Spencerian social organism also began in the winter of 1871, in T. H. Huxley's paper, "Administrative nihilism". Devoted to understanding "upon what foundation does the authority of the State rest", Huxley's paper was directed partly against Spencerian *laissez-faire* political doctrines. Huxley attacked Spencer by undermining the notion of compound individuality. Instead of portraying the nervous system as made up of quasi-independent ganglia that co-ordinated sense impressions, Huxley now characterized it as the "governing power of the body".[155] Like his friend Spencer, he too used political imagery, but of a darker type.

> The fact is that the sovereign power of the body thinks for the physiological organism, acts for it, and rules the individual components with a rod of iron. Even the blood-corpuscles can't hold a public meeting without being accused of 'congestion' — and the brain, like other despots whom we have known, calls out at once for the use of sharp steel against them. As in Hobbes's 'Leviathan', the representative of the sovereign authority in the living organism, through he derives all his powers from the mass which he rules, is above the law.

Huxley noted that the analogy of the social organism suggested a greater level of governmental interference.[156] By citing Hobbes, Huxley asserted not only that central

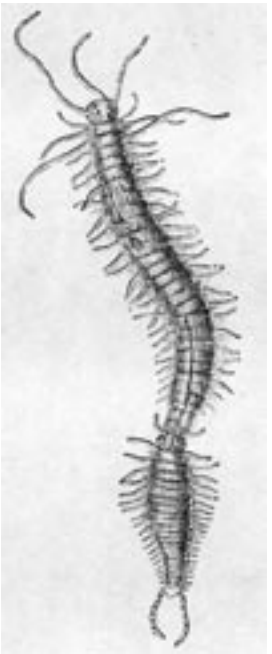

FIG. 5. Reproduction of *Nereis* occurred by spontaneous division. The hind part of the body, about 17 segments, gradually separated from the anterior portion; at the separation point a new head with eyes and tentacles formed. "The tail of the original *Nereis* is still the tail of its offspring, and, however often the body may divide, still the same tail remains attached to the hinder portion, so that this part of the animal may be said to enjoy a kind of immunity from death." Thomas Rymer Jones, *A general outline of the animal kingdom, and manual of comparative anatomy* (London, 1841), 221.

control was obvious, but that it was also *necessary* because anarchy would occur in its absence.

Spencer responded to this charge in the very next issue of the *Fortnightly review.* He distinguished between two forms of order in the social organism: an external one in which the different external organs were directed by a government "capable of directing their combined actions", like a strong nervous system; and an internal form of "visceral co-operation" in which local ganglia, through connection with other ganglia, regulated the largely automatic functions like nutrition or respiration. Both systems influenced one another. But Spencer moved quickly to emphasize the independence of the parts making up the organism, noting that this internal, visceral cooperation was far more important to the life of the organism: "Digestion and circulation go on very well in lunatics and idiots, though the higher nervous centres are either deranged or partly absent."[157]

To support this, Spencer brought up, once again, the example of the lower inverte-

brates, using the Hydrozoa. He may have chosen this particular animal as his example to make a private point with Huxley, for Huxley had himself written an early treatise on them.[158] The Hydrozoa, Spencer noted, lacked any nervous centre, yet they seemed to flourish. Indeed, each one of these animals was composed of many different parts, and each part was made up of very dissimilar cells, like thread-cells or ciliated cells. But each group of units pursued their "individual" lives (Spencer called these their "respective 'interests'") without any direction by a nervous system or nervous centre, and they nonetheless tended to cooperate for the good of the whole. If this were true for this type of organism, then surely this would be true for the vital parts of a higher animal too, like its digestive or circulatory system;[159] this was why lunatics and idiots could still live. Thus Spencer saw no reason to abandon his analogy.

CONCLUSION: 'POPE' HUXLEY

Political views supported, and were supported by, visions of biological individuality. The anarchist Petr Kropotkin wrote *Mutual aid* not only against Huxley's view of nature as a competitive 'gladiator show' but also against the individualist view of nature. Like Spencer, Kropotkin saw associations of animal units as the key to the evolutionary process. And he noted a kinship between his own views, those of Spencer, and French zoologist Edmond Perrier (author of *Les colonies animales*, who, interestingly, provided many of the biological examples for Émile Durkheim in his *De la division du travail social*).[160]

Meanwhile, when Huxley and Spencer were both invited to join the London Liberty League, Huxley turned them down because he concluded that either he or Spencer would end up in a "false position" because of their political differences.[161] Huxley had different political goals from Spencer, particularly in the role that government ought to take in funding science and education. It is noteworthy that Huxley ended his speech on "Administrative nihilism" by calling for the British Government to give more funds to museums, or research monies to the Royal Society to distribute.[162] Against Spencer, Huxley supported a view of élite scientists, and attempted to appropriate the messages of evolutionary biology for his own politics.[163]

Indeed, the model profession for the scientist and scientific naturalists as they struggled for cultural leadership was not medicine, or the law, but the Church of England.[164] Huxley the scientist, after all, wrote the book *Lay sermons*, a title implying sermons made from a "scientific altar" to supplant those sermons made by the Church.[165] By seeing Huxley as a new sort of cleric we better understand not only Spencer's opposition, but Huxley's drive to acquire greater prestige, cultural leadership, and government funding for science, and various strategies he (and others) took to ensure the acquiescence of non-scientists to this push.[166]

Huxley's "Administrative nihilism" appeared before a number of changes in Victorian science. In 1872 the Liberals appointed the Devonshire Commission, raising the expectations of many Victorian scientific naturalists that state funding for science would increase. The perceived failure of this commission to give more money to British scientists was irritating to them, and scientists still found themselves

with little influence despite their claims to hold socially useful knowledge.[167] This may have brought on a rhetorical shift. Frank Turner has noted that after 1875 the spokesmen for British science shifted their language from peace, cosmopolitanism, self-improvement and progress, to nationalism, patriotism and political élitism. From this perspective science was no longer a way to improve the moral condition of the student and of humanity in general, but as a way to create better British citizens and a more productive economy. In the late 1870s various attacks were made on the incompetence and scientific illiteracy of British political leaders. It was charged that the British political system lacked scientific procedures and that science was the only way to rescue the national interest from partisan politics. Huxley claimed that he sought merely to reinforce British liberalism while at the same time calling for citizens to avoid partisan prejudice. In this way he, like other scientists, proposed that politics should be seen not as a power battle, but instead as a mode of rational administration.[168]

Adrian Desmond has called for a better understanding of how Victorian scientists 'professionalized', by having historians examine how scientific specialists made various claims to authority, and how they called attention to the value and utility of their work for society in order to obtain more government funding.[169] An excellent vehicle for advancing these claims would be the image of the centralized social organism that Huxley implicitly proposed, with scientists presumably sitting in its cortex. The use of this picture by those who sit, or more importantly who *want* to sit, in society's nerve centre not only validates these élites and would-be élites. It also strengthens their will to act in ways that they deem to be society's interests, even if they have to compel others to act in those ways; for these new experts claim to know others' interests better than the non-experts themselves know. James Scott has already noted the appearance of this image in two twentieth-century contexts, that of revolutionary politics and architecture. In both, a small group is portrayed as sitting in the 'centre' and issuing directives to those on the 'peripheries'; Scott notes that this image justified the claims of this small group to give these orders, and allowed them to ignore or overrule outsiders' objections.[170]

Scott has additionally linked these small élites with what he has called "high modernists", people who were faithful and confident in scientific progress and dismissive of other sources of judgement.[171] Perhaps we can link the assumptions of this group with the Victorian scientific naturalists: Huxley's martial style of training new biologists and biology teachers at South Kensington immediately comes to mind.[172] This is a far cry from Spencer's approach to education: late in life Spencer complained about the "mania everywhere for uniformity", exemplified in the centralized teaching of teachers, for variety tended "to life", but uniformity and centralization of instruction tended to death. Moreover, training, even scientific training, often sacrificed originality. It meant "a forcing of the mind into shapes it would not otherwise have taken — implies a binding of the shoots out of their lines of spontaneous growth into conformity with a pattern".[173]

Spencer was faced with the problem of ascendant clerics who had appropriated

his image for their own ends. For set against Spencer's disunified social organism, Huxley's centralized social organism would not only legitimate those seated in its controlling 'brain', but might also ensure that students and citizens would quietly, deferentially, accept the lessons taught by their scientist-teachers. Indeed, it would only seem natural, for what other image so successfully associates greater knowledge with greater power?

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3. Spencer, *Autobiography* (ref. 2), ii, 5.
4. Boyd Hilton, *The age of atonement: The influence of evangelicalism on social and economic thought, 1795–1865* (Oxford, 1988), viii, 69.
5. Herbert Spencer, "Over-legislation", *Westminster review*, iv (1853), 51–84, pp. 69, 52. This brings to mind F. A. von Hayek, who was later to use the conception of spontaneous order. While denying the simplistic image of a succession of pantheonic libertarian thinkers from Spencer to Hayek, Michael W. Taylor has nevertheless called for a study relating the links between Spencer and Hayek, in his *Men versus the state: Herbert Spencer and late Victorian individualism* (Oxford, 1992), p. ix. For more work on "spontaneous order" from a libertarian on the right, inspired by Hayek and briefly examining Spencer, see John Gray, *Hayek on liberty* (Oxford, 1984). Conversely, for work on spontaneous order from a libertarian on the left, inspired by the anarchist theorist Petr Kropotkin, see James Scott's *Seeing like a state: How certain schemes to improve the human condition have failed* (New Haven, 1998); see also Jon Agar, review of Scott in *The British journal for the history of science*, xxxiv (2001), 114–15.
6. Hugh Elliot, *Herbert Spencer* (London, 1917), 305.
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32. D. A. Gowland, *Methodist secessions: The origins of Free Methodism in three Lancashire towns, Manchester, Rochdale, Liverpool* (Manchester, 1979), 165.
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40. Everett, *'Methodism as it is'* (ref. 34), i, 21, 23.
41. John Kent, "The Wesleyan Methodists to 1849", in *A history of the Methodist Church in Great Britain*, ed. by Rupert Davies, A. Raymond George and Gordon Rupp (3 vols, London, 1978), ii, 269; Watts, *The Dissenters* (ref. 31), ii, 33–34. This group became the Protestant Methodists.
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43. These Flysheets were distributed until 1848. Gowland, *Methodist secessions* (ref. 32), 16–17, 167.
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61. This was mostly because the members of the CSU refused to call their proposals a "Charter" because they feared it would alienate their middle-class supporters. But many Chartists, particularly Feargus O'Connor's physical-force faction, refused to abandon this name. Wilson, "The suffrage movement" (ref. 58), 88. Spencer, *Autobiography* (ref. 2), i, 218–21; Peel, *Herbert Spencer* (ref. 14), 12.
62. Watts, *The Dissenters* (ref. 31), ii, 564.
63. Wilson, "The suffrage movement" (ref. 58), 91.
64. Spencer, *Autobiography* (ref. 2), i, 218; Miall, *Life of Miall* (ref. 56), 86.
65. "Mechanism — Natural and artificial", *The Nonconformist*, 21 September 1842, 633. In one article, the Christian religion was like an organism, an "elephant" compared with a steam engine. The elephant was capable of growth, having interior energy vastly superior to any apparatus created by "external authority".
66. Herbert Spencer, "Effervescence — Rebecca and her daughters", *The Nonconformist*, 28 June 1843, 457.
67. Peel, *Herbert Spencer* (ref. 14), 61.
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70. Robert J. Richards, *Darwin and the emergence of evolutionary theories of mind and behavior* (Chicago, 1987), 251; Roger Cooter, *The cultural meaning of popular science: Phrenology and the organization of consent in nineteenth-century Britain* (Cambridge, 1984), 43–47.
71. Frances Hedderly, *Phrenology: A study of mind* (London, 1970), 120–1. The foreword is written by none other than R. M. Young.
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74. James C. L. Carson, *The fundamental principles of phrenology* (London, 1868), 309; Anon., *Manual of phrenology: being an analytical summary of the system of Doctor Gall* [transl. unknown] (Philadelphia, 1835), 85–86, 95–96.
75. George Spurzheim, *Outlines of phrenology* (3rd edn, Boston, 1834), 82–83.
76. Spencer, *Autobiography* (ref. 2), i, 200, 228–9.
77. Spencer, *Proper sphere of government* (ref. 69), 5, cites Sidney Smith, *The principles of phrenology* (Edinburgh, 1838). I believe that this is the only phrenological text that Spencer actually cites in any of his publications. Sidney Smith is not to be confused with the clergyman Sydney Smith.
78. Smith, *The principles of phrenology* (ref. 77), 31, 36–37. On p. 33 Smith also has an evolutionary message, noting that Vimont, Serres, Tiedemann and Vicq d'Azyr have all observed that every rise of intelligence in the animal kingdom is accompanied by a greater number of cerebral parts, both as adults and in the foetal brain. This may have influenced Spencer.
79. Spencer, *Proper sphere of government* (ref. 69), 6.
80. David Stack denies that Spencer was as deeply influenced by Thomas Hodgskin (colleague during

Spencer's four-year term at *The economist*) as previous historians, beginning with Elie Halévy, have implied. Spencer, therefore, cannot be seen as standing in a long, individualist, natural rights tradition stretching to Godwin. Instead, Stack notes that Spencer mainly shared the common Combean technique of drawing analogies between societies and organisms. David Stack, *Nature and artifice: The life and thought of Thomas Hodgskin* (London, 1998), 189–93.

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82. Duncan, *Life and letters of Herbert Spencer* (ref. 2), 540.
83. Herbert Spencer, *Social statics: or, the conditions essential to human happiness specified and the first of them developed* (London, 1851), 280.
84. Spencer, *Social statics* (ref. 83), 451.
85. Spencer, *Social statics* (ref. 83), 451–3.
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87. Spencer, *Autobiography* (ref. 2), i, 106.
88. Adrian Desmond, *The politics of evolution: Morphology, medicine, and reform in radical London* (Chicago, 1989), 274.
89. Thomas Rymer Jones, *A general outline of the animal kingdom, and manual of comparative anatomy* (1st edn, London, 1841), 8–9.
90. Spencer, *Autobiography* (ref. 2), i, 194, 368, 462.
91. Spencer, *Autobiography* (ref. 2), i, 384–5, ii, 166; Duncan, *Life and letters of Herbert Spencer* (ref. 2), 542. Spencer does not mention the title, but both Robert J. Richards and Robert M. Young speculate that it was Milne Edwards's *Outlines of anatomy and physiology*, or possibly his *Introduction à la zoologie générale* (1851). Robert M. Young, *Mind, brain, and adaptation in the nineteenth century: Cerebral localization and its biological context from Gall to Ferrier* (Oxford, 1990), 168; Richards, *Darwin and the emergence of evolutionary theories* (ref. 70), 268.
92. Robert M. Young argues that phrenology, with its notion of specialized mental faculties, emphasized the role of the division of labour to Spencer. Young, *Mind, brain and adaptation* (ref. 91), 159–60. But at age 15, Spencer read aloud from Harriet Martineau's *Illustrations of political economy* and admits it had "an effect of a solid kind" on him. Spencer, *Autobiography* (ref. 2), i, 110–11; Richards, *Darwin and the emergence of evolutionary theories* (ref. 70), 249, n. 25. This is an understatement. Martineau's first parable is titled "Life in the wilds", in which a group of British settlers are attacked and set back "from a state of advanced civilization to a primitive condition of society". They rebuild the colony by using the division of labour. Harriet Martineau, *Illustrations of political economy* (9 vols, London, 1834), i, 22.
93. Herbert Spencer, "A theory of population, deduced from the general law of animal fertility", *Westminster review*, lvii (1852), 468–501, p. 468.
94. Dalyell, too, was interested in problems of individuality from an early period, in the light of his gruesomely fascinating experiments on planarians. By cutting into their bodies in various places, Dalyell was able to make the planarians grow two heads *that often duelled over which direction the body was to take.* Thus in one specimen Dalyell observed that "the inclinations of the superfluous head were not always in unison with those of the remainder of the animal; that it preferred quiescence, when they chose motion; and that it would willingly have traversed its element [slithering along the bottom of the jar] could its strength have predominated over the inactivity of the major parts". John G. Dalyell, *Observations on some interesting phenomena in animal physiology, exhibited by several species of Planariae* (Edinburgh, 1814), 64.
95. Mary P. Winsor, *Starfish, jellyfish and the order of life* (New Haven, 1976), 53.
96. Mary P. Winsor, "A historical consideration of the siphonophores", *Proceedings of the Royal Society*

of Edinburgh, lxxiii (1971–72), 315–23, p. 316.

97. Johannes Japetus Steenstrup, *On the alternation of generations*, transl. by George Busk (London, 1845), 106–7, 4; Winsor, *Starfish, jellyfish and the order of life* (ref. 95), 56.
98. John Farley, *Gametes and spores: Ideas about sexual reproduction, 1750–1914* (Baltimore, 1982), 74.
99. Farley, *Gametes and spores* (ref. 98), 80.
100. Farley, *Gametes and spores* (ref. 98), 75.
101. Steenstrup, *On the alternation of generations* (ref. 97), 38–39. One could just as well set Goethe and transcendental arguments aside, focusing instead on Steenstrup's vision of compound individuality. Steenstrup's emphasis on morphology suggested parallels between the alternation of generations in plants and animals not simply because it was idealist, but because it played into the habit of plant morphologists to see a plant as compounded, with leaves or shoots as its elementary individuals. Farley, *Gametes and spores* (ref. 98), 78–80. This was not an idea that can be said to have originated with the German idealists — the gardener or farmer knows through brute experience that propagation can be performed not only through seeds, but also through cuttings. This implies equivalence between seed and cutting, equivalence becoming complete if plant sexuality is ignored. One can further infer similarities between plants and polyps since they can both reproduce through cuttings. G. Cusset, "The conceptual bases of plant morphology", in *Axioms and principles of plant construction: Proceedings of a symposium held at the International Botanical Congress*, ed. by R. Sattler (The Hague, 1982), 12–13. I am grateful to Jennifer Coggon for this reference.
102. Nicolaas Rupke, *Richard Owen: Victorian naturalist* (New Haven, 1994), 227.
103. Frederick B. Churchill, "Sex and the single organism: Biological theories of sexuality in the mid-nineteenth century", *Studies in history of biology*, iii (1979), 139–77, pp. 149–50.
104. Richard Owen, *On parthenogenesis, or, the successive production of procreating individuals from a single ovum* (London, 1849), 48–49.
105. Owen, *On parthenogenesis* (ref. 104), 6. Two years later Owen called parthenogenesis a part of "metagenesis", a cycle of change carried through a series of individuals and not finished in a single lifetime. Anon., "Professor Owen on metamorphosis and metagenesis", *Edinburgh new philosophical journal*, l (1851), 267–78, p. 271. So this force was preserved the longest in the simple vegetable kingdom; retained only briefly in zoophytes; was quickly lost in insects and lower molluscs. Anon., *ibid.*, 278.This explained why the development of the compound polype closely followed the stages of the compound plant called shrub or tree, and why aphids produced by gemmation were analogous to the leaves of a tree. Richard Owen, "On metamorphosis and metagenesis", *Proceedings of the Royal Institution*, i (1851), 13–14.
106. Owen, *On parthenogenesis* (ref. 104), 36; Churchill, "Sex and the single organism" (ref. 103), 146.
107. Owen, *On parthenogenesis* (ref. 104), 56; 61–62, 54–55.
108. Henri Milne Edwards, "Annelida", in *The cyclopaedia of anatomy and physiology,* ed. by Robert B. Todd (3 vols, London, 1836–47), i, 172–3.
109. Richard Owen, "Articulata", *ibid*., i, 244. Owen thought his system followed Cuvier's because it, too, used the nervous system as the key to classification. Confusingly, some naturalists wrote of each segment having two ganglia; others wrote of each segment as having only one.
110. Richard Owen, "Mollusca", *ibid.*, iii, 363–4.
111. Thomas Rymer Jones, "Gasteropoda", *ibid*., ii, 392.
112. Jones, *A general outline of the animal kingdom* (ref. 89), 692.
113. Spencer, "A theory of population" (ref. 93), 474–5. Stephen J. Cross has pointed out how Hunter saw the animal body as a collection of interacting parts, as an "animal oeconomy", and discusses how

the self-motivated 'individuals' which composed economic society in classical political economy corresponded to the self-moving body parts of the physiologists; both interactions, of course, resulting in a 'natural harmony of interests'. He also notes that Owen edited at least ten papers of Hunter's for *Works*, iv (1835), and penned a preface in 1837. See Stephen J. Cross, "John Hunter, the animal oeconomy, and late eighteenth-century physiological discourse", *Studies in the history of biology*, v (1981), 1–110, pp. 74–75, 65–66; John Hunter *et al.*, *The works of John Hunter, F.R.S. with notes* (4 vols, London, 1837), iv. Owen also edited Hunter's posthumous papers, which finally appeared in 1861. John Hunter and Richard Owen, *Essays and observations on natural history, anatomy, physiology, psychology, and geology* (London, 1861). Thus we might be well rewarded by looking at Owen's links with Hunter and other British predecessors.

114. Spencer, "A theory of population" (ref. 93), 497, 492, 487, 479.
115. Spencer, "A theory of population" (ref. 93), 476–7, 485.
116. Duncan, *Life and letters of Herbert Spencer* (ref. 2), 64.
117. Edward Forbes, "On the morphology of the reproductive system of Sertularian Zoophytes, and its analogy with that of flowering plants", *Athenaeum*, dccclxxxvii (1844), 977–8.
118. Huxley Papers 7.94, 25 September 1852, quoted in Adrian Desmond, *Huxley: From devil's disciple to evolution's high priest* (London, 1997), 183–4; Duncan, *Life and letters of Herbert Spencer* (ref. 2), 65.
119. Thomas Henry Huxley, Leonard Huxley, and Jane Strachey, *Life and letters of Thomas Henry Huxley* (2 vols, London, 1900), i, 358.
120. Thomas Henry Huxley, *Diary of the voyage of H.M.S.* Rattlesnake*, edited by Julian Huxley* (London, 1935), 59–60, 69–70.
121. Thomas Henry Huxley, Michael Foster, and Edwin Ray Lankester, *The scientific memoirs of Thomas Henry Huxley* (4 vols, London, 1898), i, 52. "Zooid" is still used today.
122. Huxley, *Scientific memoirs* (ref. 121), i, 116–17.
123. This hostility is expressed in his "The cell-theory", Huxley, *Scientific memoirs* (ref. 121), i, 261–5. This is a reprint from the *British and foreign medico-chirurgical review*, xii (1853), 285–314. On Huxley's dislike of the implications of compound individuality in the cell-theory, and its context of professionalizing British science, see Marsha Richmond, "T. H. Huxley's criticism of German cell theory: An epigenetic and physiological interpretation of cell structure", *Journal of the history of biology*, xxxiii (2000), 247–89.
124. Huxley, *Scientific memoirs* (ref. 121), i, 146–51. Huxley's definition of individuality was that an individual was the single product of a fertilized ovum. His grandson Julian Huxley noted, however, certain problems with this clear-cut definition: that for example a pair of identical twins would be seen as one individual. Huxley, *Diary of the voyage of H.M.S.* Rattlesnake (ref. 120), 69–70.
125. Huxley, *Scientific memoirs* (ref. 121), i, 117–18, 116. This was a reprint of his paper, "Report upon the researches of Prof. Müller into the anatomy and development of the Echinoderms", *Annals and magazine of natural history*, 2nd ser., viii (1851), 1–19.
126. Herbert Spencer, *The principles of psychology* (1st edn, London, 1855), 539.
127. Spencer, *Principles of psychology* (ref. 126), 495–6.
128. Hollander, "Herbert Spencer as a phrenologist" (ref. 73), 149.
129. Edwin Clarke and L. S. Jacyna, *Nineteenth-century origins of neuroscientific concepts* (Berkeley, 1987), 31; L. S. Jacyna, "Principles of general physiology: The comparative dimension to British neuroscience in the 1830s and 1840s", *Studies in history of biology*, vii (1984), 47–92, pp. 50–51.
130. Spencer, *Principles of psychology* (ref. 126), 492–4. Carpenter was likely reporting the results of a series of experiments carried out by George Newport in the 1840s. Newport mutilated myriapods (like centipedes) in different ways in order to determine precisely how much control each ganglion

exerted over each segment. See George Newport, "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*, cxxxiii (1843), 243–302; and "Mr. Newport's researches in natural history, &c.", *British and foreign medical review*, xx (1845), 487–508, a general survey of Newport's work.

131. Spencer, *Principles of psychology* (ref. 126), 610.
132. Herbert Spencer, *The principles of biology* (2 vols, London, 1867), i, 207.
133. Spencer, *Principles of biology* (ref. 132), ii, 4–5.
134. Spencer, *Principles of biology* (ref. 132), i, 204.
135. Spencer, *Principles of biology* (ref. 132), ii, 91.
136. Spencer, *Principles of biology* (ref. 132), ii, 101–2.
137. Spencer, *Principles of biology* (ref. 132), ii, 98.
138. Herbert Spencer, *The principles of psychology* (2nd edn, 2 vols, London, 1870), i, 38, 25–27.
139. Carlyle proposed the "forcible deposition of the tyrant emotion" by the conscious will. Spencer thought this impossible — while a strong emotion like sorrow reigned, as in the mind of a mother who had lost a child, all consciousness was entirely occupied by it. A strong emotion could not be consciously overthrown: it could only be exhausted, and a change in mental state "spontaneously effected". Spencer, *Autobiography* (ref. 2), i, 279–80.
140. Herbert Spencer, "The social organism", *Westminster review*, lxxiii (1860), 90–121, pp. 105–8.
141. Spencer, "The social organism" (ref. 140), 101–2.
142. Spencer, "The social organism" (ref. 140), 114–20.
143. Spencer, "The social organism" (ref. 140), 93–95.
144. Spencer, "The social organism" (ref. 140), 96–99.
145. A. R. Wallace, "Wallace on the origin of insects", *Nature*, v (1872), 350–1. Wallace's speech was given on 22 January. Perrin's bibliography on Spencer (ref. 13) first guided me to Wallace's article.
146. Wallace, "Wallace on the origin of insects" (ref. 145), 350.
147. Alfred R. Wallace, *My life: A record of events and opinions* (2 vols, London, 1905), i, 234–6.
148. E. Ray Lankester, "The segmentation of Annulosa", *Nature*, v (1872), 443.
149. Huxley, *Scientific memoirs* (ref. 121), i, 117–18.
150. Thomas Henry Huxley, *The oceanic Hydrozoa; A description of the Calycophoridae and Physophoridae observed during the voyage of H.M.S. "Rattlesnake", in the years 1846–1850* (London, 1859), 8–9. Other words were also coined to deny the independence of subordinate units. To deny Schleiden and Schwann the colonial implication of their cell-theory, that a plant was an aggregate of independent cells, Huxley argued in 1853 that plants were only composed of "endoplasts" and a structurally homogeneous "periplast". Huxley, *Scientific memoirs* (ref. 121), i, 256. Far later, he also appears to have invented the word "metamere" to denote structurally similar invertebrate segments with two appendages. Thomas Henry Huxley, *The crayfish: An introduction to the study of zoology* (London, 1880), 142–3, 145.
151. See, for example, George Allman, "On the anatomy and physiology of *Cordylophora*, a contribution to our knowledge of the tubularian zoophytes", *Philosophical transactions of the Royal Society*, cxliii (1853), 367–84, particularly the footnote on p. 379; *idem*, *A monograph of the Gymnoblastic or Tubularian Hydroids* (2 vols, London, 1871), i, 22; E. Ray Lankester, "On some new British Polynoïna", *Transactions of the Linnean Society of London*, xxv (1867), 373–88, p. 373.
152. Bernard Lightman, "Fighting even with death: Balfour, scientific naturalism and Thomas Henry Huxley's final battle", in *Thomas Henry Huxley's place in science and letters: Centenary essays*, ed. by Alan Barr (Athens, Georgia, 1997), 323–50, p. 325.
153. Ian Hacking, "Making up people", in *The science studies reader*, ed. by Mario Biagioli (New York, 1999), 161–71, p. 166. This critical point was raised by Darrin Durant in conversation,

for which I am grateful.

154. Nicholas Jardine, *The scenes of inquiry* (Oxford, 1991), 51.
155. Huxley, "Administrative nihilism" (ref. 16), 530, 534.
156. Huxley, "Administrative nihilism" (ref. 16), 535.
157. Herbert Spencer, "Specialized administration", *Fortnightly review*, x (1871), 627–54, pp. 632–3, 640.
158. Huxley, *The Oceanic Hydrozoa* (ref. 150).
159. Spencer, "Specialized administration" (ref. 157), 640–2.
160. Peter Kropotkin, *Mutual aid* (Montreal, 1989), 53. See also Sapp, *Evolution by association* (ref. 12), for a discussion of the Kropotkin–Spencer affinity. The French zoologist Edmond Perrier, in *Les colonies animales* (Paris, 1881), proposed that evolution resulted from the fusion of a number of simpler individuals into a larger compound organism; this is discussed in Claude Blanckaert, "Edmond Perrier et l'étiologie du 'polyzoïsme organique'", *Revue de synthèse*, c (1979), 353–76, and Emile Durkheim, *De la division du travail social* (Paris, 1893). Durkheim approvingly refers to Perrier seven times over pp. 208–10, citing Perrier's argument that all organisms are structurally colonial.
161. Huxley, *Life and letters of Thomas Henry Huxley* (ref. 119), ii, 195.
162. Huxley, "Administrative nihilism" (ref. 16), 542.
163. Martin Fichman, *Alfred Russel Wallace* (Boston, 1981), 104.
164. Ruth Barton, "'Huxley, Lubbock, and half a dozen others': Professionals and gentlemen in the formation of the X Club, 1851–1864", *Isis*, lxxxix (1998), 410–44, p. 414.
165. Desmond, *Huxley* (ref. 118), 626–8.
166. To apply Frank Turner's notion of 'cultural leadership' and 'cultural authority' to my particular case — the role and rise of Huxley's experts — I have found useful Steve Fuller's *The governance of science: Ideology and the future of the open society* (Buckingham, 2000), 31, 126.
167. Frank M. Turner, *Contesting cultural authority: Essays in Victorian intellectual life* (Cambridge, 1993), 204–5.
168. Turner, *Contesting cultural authority* (ref. 167), 205, 208–9.
169. Adrian Desmond, "Redefining the X axis: 'professionals', 'amateurs' and the making of mid-Victorian biology. A progress report", *Journal of the history of biology*, xxxiv (2001), 3–50, p. 4.
170. In architecture, the architect Le Corbusier spoke of "monocephalic" cities, in which skyscrapers in the core of the city would act as the 'brain' of the city, issuing commands to the rest of the country. In revolutionary politics, Lenin reinforced the belief of the Communist Party as the leaders of a disciplined revolutionary army by speaking of the Party as the "brain" that could motivate and direct the unthinking "masses" towards revolution. Scott, *Seeing like a state* (ref. 5), 254, 111–12, 149.
171. Scott, *Seeing like a state* (ref. 5), 4–8, 93–94.
172. Adrian Desmond, "Redefining the X axis" (ref. 168), 25–26.
173. Duncan, *Life and letters of Herbert Spencer* (ref. 2), 404; Spencer, *Autobiography* (ref. 2), i, 336. Contrast Huxley's approach not only with Spencer's writings, but with occasions when Spencer actually practised these views. In one humorous episode, when Spencer appeared at the Potter household in "in the guise of a liberator", an annoyed governess turned this approach back on him, telling the children in her care to do whatever they wished on their walk with him. Spencer found himself trapped in a forest and being pelted with decaying beech leaves by these "little demons". Beatrice Potter Webb, *My apprenticeship* (Cambridge, 1979), 26.