

1 New Imponderables, New Sciences

In August 1862, the leading article of one British periodical was headed ‘Animal “Magnetism”’.¹ The quotation marks around the word magnetism indicated the anonymous author’s understanding of at least one of the many controversies that had surrounded this subject for over half a century. This was the question of whether, as animal magnetism’s proponents claimed, a weightless, invisible bodily fluid, force or emanation by which the will of an individual was alleged to directly influence the mind and body of another person was analogous to the magnetism associated with minerals. By the early 1860s, many of those who had accepted the effects of animal magnetism but rejected the idea that they derived from a kind of magnetic fluid described the effect as mesmerism, in honour of the Swabian physician Franz Anton Mesmer, who, in the 1770s, had announced the discovery of this ‘magnetic’ form of influence and turned it into the basis of a medical therapy that proved both controversial and popular in Continental Europe, Britain and North America.

‘Animal “Magnetism”’ was much more positive about animal magnetism than its cautious title suggested. Anticipating disdain from some readers, it asserted that the “quasi science” rested on indisputable facts and urged the need to establish connections between facts of an “extraordinary character and occult nature” and those “accepted by science”.² There were moral and intellectual motivations for this. Establishing facts about animal magnetism was no less important to the “cause of truth” than the recognition of other facts that “scientific orthodoxy” had a lamentable tendency to dismiss simply because such facts appeared to conflict with “accepted doctrine”.³ Moreover, recent developments in the physical sciences suggested the strong possibility that an obscure force, fluid or agency somehow connected with life could be related to the known physical forces. The eminent German chemist Justus von Liebig

¹ [Anon.], ‘Animal “Magnetism”’, *Electrician*, vol. 2 (1862), pp. 157–8.

² [Anon.], ‘Animal “Magnetism”’, p. 157. ³ [Anon.], ‘Animal “Magnetism”’, p. 157.

had demonstrated the similarity between the vital and chemical forces; the doyen of British natural philosophy, Michael Faraday, had shown that all bodies, including those of living beings, were to one degree or another extent influenced by magnetism; and another German chemist, Karl von Reichenbach, had produced evidence indicating that magnetism influenced the nervous system in ways comparable to the mysterious agency of mesmerism. The idea that the body produced and was susceptible to an obscure force somehow associated with magnetism was not as implausible as many suggested and was certainly ripe for investigation.

One of the most striking features of ‘Animal “Magnetism”’ was where it was published. Articles on animal magnetism and mesmerism were not uncommon in British periodicals in the mid-Victorian era, not least in those medical and spiritualist titles that were respectively hostile and sympathetic to the topics.⁴ The rhetoric of ‘Animal “Magnetism”’ – its attack on the narrowminded nature of scientific orthodoxy and appeal to recent discoveries in the physical sciences – was not untypical in spiritualist serials. Yet ‘Animal “Magnetism”’ appeared in *The Electrician*, a weekly technical paper that we might not expect to be interested in, let alone sympathetic to, the topics.

Founded in 1861, *The Electrician* aimed to represent the burgeoning number of individuals with interests in the scientific understanding and application of electricity, especially those connected with the expanding overland and undersea networks of electric telegraphs.⁵ Although the periodical’s content was mainly preoccupied with the electric telegraph, the use of electricity in medical therapies and physiological research, and other ‘material’ applications of electricity, the inclusion of material on animal magnetism was not inconsistent with its declared mission to show that electricity would “solve many of the important problems connected with the well-being of mankind”.⁶ Indeed, as a prominent platform for knowledge of the way electricity would improve human beings’ capacity to communicate and to understand and heal their bodies, it is not surprising that it tolerated the possibility of some other subtle force of fluid, perhaps related to electricity and magnetism, that was at the basis of

⁴ Examples from medical periodicals are [Anon.], ‘Mesmeric Hospital Reports’, *British Medical Journal*, vol. 2 (1862), pp. 308–9; [Anon.], ‘Reviews’, *Medical Times and Gazette*, vol. 14 (New Series) (1857), pp. 122–3. Examples from spiritualist serials include [Anon.], ‘Benjamin Brodie on Spiritualism’, *Spiritual Magazine*, vol. 1 (1860), pp. 97–103; John Ashburner, ‘On the Connection Between Mesmerism and Spiritualism, with Considerations on Their Relations to Natural and Revealed Religion and to the Welfare of Mankind’, Supplement to the *British Spiritual Telegraph*, vol. 3 (1859), pp. 1–96.

⁵ The *Electrician* is discussed in P. Strange, ‘Two Electrical Periodicals: The *Electrician* and The *Electrical Review*, 1880–1890’, *IEE Proceedings*, vol. 132 (1985), pp. 574–81.

⁶ [Anon.], ‘Introductory’, *Electrician*, vol. 1 (1861), p. 1.

other, perhaps ‘occult’, forms of communication and therapy typically maligned by scientific orthodoxy.

‘Animal “Magnetism”’ was not the only article in *The Electrician* to be interested in ‘occult’ phenomena and the possible benefits of investigating them, and neither was *The Electrician* the only British scientific and technical serial of the mid-Victorian period to be so.⁷ This material yields instructive insights into aspects of the nineteenth-century cultures of the sciences which this chapter will study in detail. It affords a glimpse of the presence of animal magnetism and related psychical or ‘occult’ phenomena in scientific and technical cultures from which we might expect them to have disappeared. It also suggests that the damning verdict on such phenomena given at the time by leading medical and scientific practitioners – that the effects were due to well-known mechanisms of the mind and body rather than new, hidden forces or fluids connected with the body and mind – were as unconvincing in some scientific quarters as in sections of the general population enthralled by the performances of itinerant mesmeric lecturers and spiritualist ‘mediums’. As the author of ‘Animal “Magnetism”’ demonstrated, the efforts of many medical and scientific practitioners to demarcate the study of such bodily emanations as a pseudo- or “quasi-science” were not decisive.

The ‘occult’ material in *The Electrician* and other scientific and technical serials of the 1850s and ‘60s also helps us to reassess the better-known forays of mid-Victorian scientific practitioners into similar subjects. In this period, a young professor of natural philosophy, John Tyndall, was testing Reichenbach’s claim that some people saw lights around magnets and investigating the alleged capacity of spiritualist mediums to commune with professed denizens of the spirit world; an electrician working for one of the British electric telegraph firms, Cromwell Varley, was exploring his own powers of mesmeric healing and investigating the popular fascination with tables that seemed to turn under the influence of unknown forces or spirits of the dead; and a student of chemistry, William Crookes, was taking a keen interest in Faraday’s attempt to explain the mystery of ‘table-turning’ in terms of a force unconsciously exerted by people participating in the popular pastime.⁸

⁷ For example, [Anon.], ‘Scientific Gossip’, *Photographic News*, vol. 6 (1862), pp. 3–4; [Anon.], ‘Gregory’s “Letters on Animal Magnetism”’, *Mechanics’ Magazine*, vol. 54 (1851), pp. 364–70; [Anon.], ‘Chemistry’, *Popular Science Review*, vol. 1 (1862), pp. 382–9; [Anon.], ‘Swedenborg – No. IV’, *English Mechanic*, vol. 2 (1865), pp. 87–8; ‘P.’, ‘On the Odic Principle of Reichenbach’, *London Journal of Arts, Sciences and Manufactures*, vol. 38 (1851), pp. 124–32, 193–9.

⁸ John Tyndall to Edward Frankland, [6 August 1856], in William H. Brock and Geoffrey Cantor (eds.), *The Correspondence of John Tyndall Volume 5* (Pittsburgh, PA: University of Pittsburgh Press, 2018), pp. 434–6; [John Tyndall], ‘Science and the

In the context of ‘Animal “Magnetism”’, the ‘occult’ interests of Tyndall, Varley and Crookes no longer seem so exceptional. They seem to represent a more widely shared belief that there might exist obscure forces, uidic powers and influences associated with the human body that could form the basis of potentially fruitful extensions of the physical sciences. This chapter explores the origins and development of this belief, which reached its culmination in the work of the late-nineteenth-century physical scientists, or, as we call them, ‘physical–psychical scientists’, who are the focus of this book. It studies the way that this belief was articulated, contested and defended from the late eighteenth until the mid-nineteenth centuries, and, in the contexts of animal magnetism, Reichenbach’s magnetic researches, table-turning and Modern Spiritualism. These developments took place in a period when the boundaries of physics were still in flux. The subject areas that were beginning to constitute the scientific discipline were being extended in myriad directions: the study of electricity was transforming approaches to problems in engineering and medical therapy; studies of force and heat were being extended to, and enriched by, questions in physiology and medicine; and understandings of atoms, energy and ether were adding new, and often competing, perspectives on the relationships between science and religion. These were precisely the contexts within which it became possible for some to argue that the physical sciences could and should be extended to the puzzling phenomena often lumped together as ‘occult’.

Animal Magnetism as Physics

“I dare to declare myself that the discoveries which I have made, and which are the subject of this book, will push back the limits of our knowledge in physics, as much as the invention of microscopes and telescopes has done for the age preceding our own.”⁹ This 1799 declaration by Mesmer problematises the assumption that his historical significance lies solely in the fields of psychiatry and psychology. As Alan Gauld has emphasised, Mesmer sought not only to apply animal magnetism to the treatment of bodily rather than mental illnesses, but saw himself as the discoverer of a genuinely novel physical agency – an invisible, weightless and uidic

Spirits’, Reader, vol. 4 (1864), pp. 725–6; Cromwell Varley, ‘Evidence of Mr. Varley’, in Report on Spiritualism of the Committee of the London Dialectical Society (London: Longmans, Green, Reader and Dyer, 1871), pp. 157–72; William Crookes, *Psychic Force and Modern Spiritualism: A Reply to the ‘Quarterly Review’ and other Critics* (London: Longmans, Green and Co., 1871), p. 11; Michael Faraday, ‘Table Turning’, Times, 30 June 1853, p. 8.

⁹ Franz A. Mesmer, *Mémoire de F. A. Mesmer, docteur en médecine, sur ses découvertes* (Paris: Fuchs, 1799), p. 6. My translation.

form of matter – that would transform the study of physiology and physics.¹⁰

Mesmer argued that, owing to its extraordinarily rare and nature, the fluid penetrated, and acted as a medium of mutual influence between, all bodies in the universe, whether animate or inanimate. Moreover, he proposed that the fluid sustained tidal effects which, in the human body, produced imbalances that caused bodily illnesses. By manipulating the subtle fluid, Mesmer believed he could restore this imbalance, a procedure that induced a ‘crisis’ in patients – spasms and other violent physical movements – which accelerated the natural healing process. Initially, Mesmer achieved curative effects by applying mineral magnets to the body (which drew on established traditions of magnetic cures), but he later accepted that his own body was equally effective as a source of the fluid, or, as he was soon calling it, ‘animal magnetism’. By employing a series of elaborate bodily gestures, notably touching and passing hands over patients, he believed he could cause the magnetic fluid in his own body to restore imbalances in those of ailing individuals (Figure 1.1).

Mesmer and the disciples he eventually attracted in Europe, Britain and North America had good grounds for believing that animal magnetism was an extension of existing scientific and medical thinking, as well as a development of ideas of a living, cosmic fluid promulgated in occult philosophies and sciences.¹¹ By the late eighteenth century, physical sciences divided the material cosmos into ponderable matter and a host of forces and imponderable (weightless) and invisible fluids such as gravity, mineral magnetism, frictional electricity and heat.¹² The apparent discovery of another invisible force or imponderable fluid fitted well within programmes of enquiry in these sciences. The ideas of a universal force or fluid linking the microcosm of animate and inanimate bodies on earth to the macrocosm of celestial objects and of the therapeutic benefits arising from the manipulation of such a fluid made sense within contemporary scientific and medical discourses. For popular scientific audiences in late-eighteenth-century European cities, many of these ideas were dramatised in scientific shows of electricity and other imponderables that were easier to sense than to comprehend. As Jessica Riskin has shown, when, in 1778, Mesmer arrived in Paris to market his mysterious

¹⁰ Gauld, History of Hypnotism, pp. 11 and 247.

¹¹ Nicholas Goodrick-Clarke, *The Western Esoteric Traditions: A Historical Introduction* (New York: Oxford University Press, 2008), pp. 174–8.

¹² John L. Heilbron, ‘Weighing Imponderables and Other Quantitative Science Around 1800’, *Historical Studies in the Physical Sciences*, vol. 24 (1993), pp. 1–33, 35–277, 279–337, esp. p. 16.



1.1 The rays of animal magnetism believed to mediate the influence of a mesmeric operator over the bodies and minds of their subjects. From Jules Baron Du Potet de Sennevoy, *Manuel de l'étudiant magnétiseur* (Paris: G. Ballière, 2^e, 1851), p. 22, figure 1. Reproduced by permission of the Syndics of Cambridge University Library.

new magnetic therapy, he encountered a clientele who were "ready" for him.¹³

To give intelligibility to the bodily gestures at the heart of his 'magnetic' therapy, Mesmer proposed that animal magnetism was essentially a universal fluid akin to the medium of gravity, and which transmitted motion and produced tidal ebbs and flows. Mesmer's goal to elucidate the "unknown mechanical laws" of this fluid reflected his debt to popular Newtonianism and embodied his attempt to extend the boundaries of physics: animal magnetism involved studying a mysterious agent that seemed to share physical properties with gravity, light, heat, sound, magnetism and frictional electricity (for example, it could be reflected

¹³ Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago University Press, 2002), p. 201. The following discussion is indebted to Riskin's incisive analysis of animal magnetism (in chapter 6).

by mirrors and accumulated in material objects), but it also promised to illuminate the ultimate nature of these better-known physical agents.¹⁴ As the means by which the will of a ‘magnetiser’ appeared to affect the sensations of a patient at a distance, the animal magnetic fluid was also indebted to late-eighteenth-century physiological theories that explained sensation as the motion of an imponderable ether or fluid in the nerves. However, animal magnetism extended physiological thinking by proposing the existence of an imponderable fluid that mediated sensations seemingly inaccessible to the five ordinary senses. Individuals subject to the passes of a ‘magnetiser’ claimed to be able to directly experience the magnetiser’s thoughts, as well as perceive hidden or distant objects (later christened ‘clairvoyance’), and past and future events.

The popularity and apparent success that Mesmer’s magnetic therapy enjoyed in Paris exasperated many leading French medical practitioners and led to a key development in the history of the relationship between established and occult sciences. In 1784, Louis XVI’s government set up two commissions – one from the Académie Royale des Sciences and the Paris Faculté de Médecine, the other from the Société Royale de Médecine – to investigate animal magnetism. Boasting such luminaries as the American natural philosopher and diplomat Benjamin Franklin, the chemist and tax collector Antoine Lavoisier and the astronomer Jean-Sylvain Bailly, the commissions delivered an intellectually weighty and damning verdict on Mesmer’s physics: while they accepted the genuineness of magnetic effects, they rejected the idea that an imponderable fluid was the cause, since all the effects could be explained in terms of the imagination. The imagination was a compelling explanation because the human subjects tested by the commissioners only experienced the effects of the fluid when they believed they were subjected to it.

It was hardly surprising that most of the commissioners entertained this verdict from the outset. The animal magnetic fluid was much more problematic than other imponderable agents to which it was often compared: like frictional electricity, mineral magnetism and gravity, it could only be detected by its effects, but unlike these imponderables its effects could only be exhibited on human subjects rather than inanimate objects and so there was a high probability of “moral causes” operating.¹⁵ Given that, by the 1780s, the imagination was known to be a cause of bodily effects, the commissioners regarded their scepticism towards the animal magnetic fluid as justifiable. By declaring that sensations could be the

¹⁴ Franz A. Mesmer, *Mémoire sur la découverte du magnétisme animal* (Geneva: P. F. Didot la jeune, 1779), pp. 74–83.

¹⁵ Rapport des commissaires de la Société Royale de Médecine, nommés par le roi, pour faire l’examen du magnétisme animal (Paris: Chez Moutard, 1794), p. 10.

result of the imagination stimulated by verbal and other suggestions, the commissioners effectively undermined a key epistemological claim of the sciences: that sensations were a reliable basis of empirical knowledge of the world.¹⁶

The verdict of the animal magnetism commissions was certainly consistent with the opinion of the German-speaking physicians and natural philosophers whose hostility to Mesmer's claims and therapeutic practice had earlier prompted his decision to move to Paris. The 'of cial' verdict, however, was neither unanimous nor authoritative. One member of the Société Royale de Medécine commission denied that all animal magnetic effects tested by his colleagues could be put down to the imagination.¹⁷ Plenty of Mesmer's followers, who by the 1780s could be found throughout France, attacked the commissions for sloppy experimental methods and for upholding the imagination as the main cause when this failed to explain all the evidence for animal magnetism's efficacy (notably on animals) and how, in the absence of some kind of imponderable fluid, the imagination was supposed to produce effects on the body.¹⁸ Most animal magnetisers maintained that the senses and feelings of magnetised subjects could be trusted and that they remained reliable instruments of the power of the magnetic influence. The 'of cial' verdict on animal magnetism certainly played a part in Mesmer's decision to leave Paris and eventually withdraw from the centre stage of animal magnetism, but this had little effect on the spread of his ideas and practices elsewhere in France and in Europe.

From the 1780s until the early 1800s, animal magnetism enjoyed less success as a possible contribution to physics than it did as a medical therapy and as a contribution to other branches of knowledge. Mesmer's vision of animal magnetism as physics was most strongly shared by several French and German physicians who sought to relate the animal magnetic fluid to electricity and other known imponderables or to a supposed atmosphere produced by the nervous fluid.¹⁹ However, this approach competed with the more psycho-physical one of those who followed the Marquis de Puységur, a disciple of Mesmer who in 1784 announced that animal magnetism could induce a state of artificial somnambulism or 'magnetic' sleep. In this state, an individual exhibited what would become the defining characteristics of animal magnetism: they displayed a consciousness distinct from that associated with their waking self, an insensibility to pain, a capacity to see through opaque objects and to great distances, and an ability to enter into a state of 'rapport' with the

¹⁶ Riskin, *Science in the Age of Sensibility*, pp. 222–3.

¹⁷ This was the botanist Antoine Laurent de Jussieu.

¹⁸ Crabtree, *From Mesmer to Freud*, pp. 31–2; Riskin, *Science in the Age of Sensibility*, p. 221.

¹⁹ Gauld, *History of Hypnotism*, chapters 4–5.

magnetiser, whose thoughts they seemed to be able to read and whose silent commands they obeyed. Neither the imagination nor the uid theories coped well with explaining these aspects of animal magnetism, and for this reason Puységur and his disciples largely sidestepped the question of the nature of the magnetic uid. While they maintained that some physical in uence passed from magnetiser to subject, their primary concern was with the nature of the will that mobilised this in uence and, accordingly, with animal magnetism as a branch of psychology.²⁰

Even less materialistic in their interpretations than Puységur and his followers were those French and German writers preoccupied with animal magnetism's spiritual and mystical signi cances. Some individuals in a state of magnetic sleep appeared to commune with angels and spirits and possess the powers of visionaries and prophets. The capacity of magnetised somnambules to commune with the soul of nature strengthened animal magnetism's appeal to proponents of Naturphilosophie.²¹ This key aspect of German Romanticism emphasised the fundamental identity of nature and spirit and that a true understanding of it required special abilities to interpret external nature and the spiritual depths that it symbolised. Individuals in a state of magnetic sleep became important enquirers into these depths but also seemed to exhibit some of the polarities that Naturphilosophen traced in living things – in this case, between the higher animal states associated with consciousness and the lower vegetative states associated with unconsciousness.

These developments in animal magnetism embodied many of the ideas and practices that would characterise Reichenbach's 'od', spiritualist mediumship, telepathy and the other psychical phenomena in which British physical scientists would show such a strong interest. Indeed, I want to suggest that the attitudes and approaches of these latter individuals to psychical phenomena built partly on the examples set by early-nineteenth-century British practitioners of and writers on animal magnetism because, more than many other proponents of the subject, they kept alive Mesmer's hopes that his medical therapy was also a source of progress in physics.

Animal magnetism made little impact in Britain until the 1830s, when many physicians, clergymen, littérateur and others began to practise, publish and lecture on a subject that had impressed some of them via

²⁰ Gauld, History of Hypnotism, pp. 112–13.

²¹ Gauld, History of Hypnotism, pp. 141–4. On Naturphilosophie see Robert J. Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago University Press, 2002), esp. pp. 128–46.

the London lectures of the leading French magnetiser Baron Dupotet.²² By the time Dupotet arrived in Britain, animal magnetism in France had become, after a state of relative latency during the Revolution, one of the most controversial subjects in medical circles. In continuation of the controversy following the 1784 commissions, one of the most contentious issues remained the existence of the animal magnetic uid. Many agreed with the French physician Alexandre Bertrand, whose *Traité du somnambulisme* (1823), a work later regarded as a foundational text in hypnotism, argued that magnetised somnambules who claimed to perceive magnetic uids only saw what they believed or were made to believe in such uids; others, including Dupotet, upheld the uid theory as the only interpretation that could cope with evidence that magnetisation worked on animals and infants (who, it was supposed, could not possibly be made to believe in uids) and when the magnetised subject was asleep or unaware of the magnetic operator's presence.²³

Given Dupotet's significance in stimulating British mesmerism, it is not surprising that so many of its proponents should also favour the idea that the modus operandi of mesmerism was a physical influence crossing the space between the operator and subject. Nineteenth-century mesmeric texts in Britain, France, Germany, North America and elsewhere shared a strong preoccupation with mesmerism as a new form of medical therapy and as a contribution to the emergent science of the mind, but the British texts were not as uninterested in the 'philosophical' aspects as some historians have claimed.²⁴ In *Isis Revelata* (1836), one of the earliest English-language surveys of animal magnetism, the lawyer John Campbell Colquhoun supported his theory that the mesmeric influence was the nervous uid owing out of the body with a detailed exposition of a "new theory of physics" tracing the mesmeric influence and all other imponderable agents to vibrations in the space-filling medium that many natural philosophers now accepted as the carrier of light waves across empty space: the luminiferous ether.²⁵ The Anglican clergyman Chauncy Hare Townshend developed a similar theory in his *Facts in Mesmerism* (1840).²⁶

²² On early Victorian mesmerism see Gauld, *History of Hypnotism*, chapters 11–12; Winter, *Mesmerized*.

²³ Baron Dupotet de Sennevoy, *An Introduction to the Study of Animal Magnetism* (London: Saunders and Otley, 1838), pp. 329–46.

²⁴ See, for example, Gauld, *History of Hypnotism*, p. 210.

²⁵ J. C. Colquhoun, *Isis Revelata: An Inquiry into the Origin, Progress and Present State of Animal Magnetism*, 2 vols. (Edinburgh: Maclachlan and Stewart, 1836), vol. 2, p. 349–408.

²⁶ Chauncy Hare Townshend, *Facts in Mesmerism, with Reasons for a Dispassionate Inquiry into It* (London: Longman, Orme, Brown, Green and Longmans, 1840), pp. 488 and 497.

Colquhoun and Townshend exemplify a tendency among some British mesmeric writers of the 1830s and '40s to link the mesmeric and nervous fluids and to suppose that both were identical to, or at least closely related to, electricity. Yet by the 1850s, some mesmeric writers had accepted that electrical analogies for the nervous and mesmeric fluids were problematic. In 1851, for example, the physician Joseph Haddock warned that the "best physiologists" had rejected the identity of electrical and nervous fluids, so that the mesmeric power of the nervous fluid outside the body could not be called electrical.²⁷

Townshend shared with several leading British mesmerists a belief that establishing the relationship between the mesmeric fluid and known imponderables would be a major step towards linking animal magnetism to the physical sciences and thus raising the intellectual credibility of the controversial practice.²⁸ For some British medical and scientific practitioners this was a stimulus for experimental as well as theoretical activity. An instance of the experimental approach took place in 1838 at University College Hospital, London, and involved the hospital's leading physician and medical professor John Elliotson and the Irish natural philosopher Dionysius Lardner.²⁹ One of the most vociferous of all English mesmerists, Elliotson had stimulated considerable publicity and professional hostility for using female patients in displays of mesmeric phenomena and treatment in the wards.³⁰ Elliotson regarded his work as partly the prosecution of the "physics of mesmerism" insofar as it investigated the capacity of different metals and water to carry the mesmeric influence and thereby cause muscular rigidity and other bodily reactions in patients making contact with the substances.³¹ Publicised in

²⁷ Joseph W. Haddock, *Somnolism and Psycheinism; Or, the Science of the Soul and the Phenomena of Nervation as Revealed by Mesmerism* (London: James S. Hodson, 2nd ed., 1851), p. 50. Haddock was probably referring to Hermann von Helmholtz, who in 1850 had shown that the speed of stimuli in sensory nerves was far lower than that of Voltaić electric currents, thus challenging their identity. See Kathryn Olesko and Frederic L. Holmes, 'Experiment, Quantification and Discovery: Helmholtz's Early Physiological Researches', in David Cahan (ed.), *Hermann von Helmholtz and the Foundations of Nineteenth Century Science* (Berkeley, CA: University of California Press, 1993), pp. 50–108.

²⁸ Townshend, *Facts in Mesmerism*, p. 488; John Elliotson, 'Review of Karl von Reichenbach's Abstract of Researches on Magnetism and Certain Allied Subjects', *Zoist*, vol. 4 (1846–7), pp. 104–24, p. 122.

²⁹ [Dionysius Lardner and Edward Bulwer Lytton], 'Animal Magnetism', *Monthly Chronicle*, vol. 1 (1838), pp. 289–306; vol. 2 (1838), pp. 11–30. The anonymous authors of this report on the experiments are identified in Winter, *Mesmerized*, pp. 52–6.

³⁰ See Gauld, *History of Hypnotism*, pp. 199–203; Winter, *Mesmerized*, chapters 2–4.

³¹ Elliotson, 'Review of Karl von Reichenbach's Abstract of Researches', p. 123. See also John Elliotson, *Human Physiology* (London: Longman, Orme, Brown, Green and Longman, 1840), pp. 1163–94.

an anonymous article by Lardner and the English novelist Edward Bulwer-Lytton, the experiments took this physics much further and appeared to show that the mesmeric influence experienced by patients could be, like light, reflected from mirrors and metallic surfaces. The influence also seemed to penetrate opaque screens placed between the operator and patient, diminish in strength when the distance between participants was increased, and be unaffected by electric shocks given to the patients from a galvanic apparatus and Leyden jar provided by the natural philosopher and electric telegraph pioneer Charles Wheatstone.

The 1838 experiments illustrate the modest but telling overlap between early Victorian mesmerism and the cultures of electrical display and measurement.³² Most mesmerist practitioners and writers accepted that human beings were the primary instruments of research, principally because they were sensitive to subtle influences that could not otherwise be detected. For some, however, the addition of inanimate instruments promised to illuminate the suspected connections between animal magnetism and known imponderables as well as symbolise the capacity of mesmeric phenomena to become what Lardner and Lytton called “subjects of vast importance, whether regarded as appertaining to general physics or the special science of medicine”.³³

Lardner, Bulwer-Lytton and Elliotson were not alone in recognising that their physical approach to mesmerism depended on connections with academic professors, popular lecturers and instrument makers. Thus, in the mid-1840s, the physician John Ashburner turned to the Royal Polytechnic Institution, one of London’s premier venues of popular science, for a “splendid apparatus” used to determine whether magnetism induced the same physiological responses as mesmerism.³⁴ A few years later, the gas engineer John O. N. Rutter commissioned fellow Brighton resident, the surgeon-electrician E. O. Wildman Whitehouse, to make a “galvanoscope” that yielded quantitative support for Emil Du Bois Reymond’s recent evidence that human muscular contraction generated electrical currents.³⁵ Although Rutter’s principal concern was animal electricity, he recognised its value in a plausibility argument for animal magnetism: the discovery of electromagnetism suggested that as a carrier of electric currents, the human body should also be sensitive to

³² On these cultures of display and measurement see Morus, *Frankenstein’s Children*.

³³ Lardner and Lytton, ‘Animal Magnetism’, p. 28.

³⁴ John Ashburner, ‘Observations upon the Analogies Between the Mesmeric and Magnetic Phenomena’, *Zoist*, vol. 4 (1846–7), pp. 124–39, p. 130.

³⁵ John O. N. Rutter, *Human Electricity: The Means of Its Development* (London: John W. Parker, 1854), p. 100. Whitehouse is referred to on p. 117. Whitehouse was heavily involved in submarine cable telegraphy during the 1850s: see Bruce J. Hunt, ‘Scientists, Engineers and Wildman Whitehouse’.

and the source of magnetic “currents”, even if these currents were too feeble to be detected by instrumental means.³⁶

British mesmerists’ hopes that their physical approaches to animal magnetism would help raise the medical and scientific profile of the subject were significantly weakened by the indifference or outright hostility towards the subject shown by the British medical and scientific establishments. Few of the natural philosophers who witnessed mesmeric demonstrations (notably Faraday, Wheatstone and William Whewell) sustained any interest in the subject.³⁷ Worse, Elliotson, Ashburner and others found themselves regularly attacked by medical professionals and commentators for basing their claims for the reality and curative effects of the mesmeric fluid on the judgement of deceptive or potentially unreliable human subjects and on investigative methods that allowed for mesmeric effects arising from what subjects merely imagined or expected.

A further blow to claims for the reality of the mesmeric fluid was dealt by the popularity of the work of the Scottish surgeon James Braid. In the 1840s, he argued that the mesmeric sleep (which he sought to replace with a new term, ‘hypnosis’) was a physiological response produced when an individual fixed their gaze on a small bright object and which was entirely independent of any exterior magnetic fluid. Predictably, mesmerists challenged the capacity of Braid’s theory to explain all cases of mesmerism, but they also appealed to evidence of another imponderable agency attacked by Braid and which seemed to surpass the mesmeric fluid in helping to ally animal magnetism to the physical sciences.³⁸

The Oddity of Od

Despite the hostility shown towards it in many quarters of the British medical and scientific establishment, mesmerism enjoyed a significant presence in early Victorian culture, from stage shows, sermons and popular tracts to dedicated hospitals, journals and treatises. It reflected and contributed to the turbulence in British political, religious and scientific as well as medical establishments, and its religious, political, scientific and medical significance changed according to the quarter in which it was experienced.³⁹ In the *Zoist*, a periodical launched by Elliotson in 1843, mesmerism was pushed forward as a medical therapy practised by professional elites and as a materialistic science of the mind centred on cerebral

³⁶ Rutter, *Human Electricity*, p. 165. ³⁷ Winter, *Mesmerized*, pp. 49–52.

³⁸ James Braid, *The Power of the Mind over the Body: An Experimental Enquiry into the Nature and Cause of the Phenomena Attributed by Baron Reichenbach and Others to a ‘New Imponderable’* (London: John Churchill, 1846).

³⁹ Winter, *Mesmerised*.

physiology, and this contrasted with the more democratic and spiritual meanings of mesmerism upheld elsewhere.⁴⁰

Elliotson well captured his journal's intellectual ambitions in an issue of 1846 when he praised a certain "philosopher" for writing a book that placed mesmerism "among the physical sciences" by showing that the mysterious animal magnetic influence obeyed laws similar to those describing other imponderables.⁴¹ The author of the book, whose status as a "philosopher" rather than a mesmerist conferred additional weight on Elliotson's claim, was Baron Karl von Reichenbach, a wealthy German industrial chemist already renowned for the discovery and manufacture of creosote and other coal-tar products.⁴² For many Victorian readers, including some of the protagonists of this book, few mid-nineteenth-century natural philosophers deserved more praise than Reichenbach for struggling to bring an obscure force within the realm of physics.

The work reviewed by Elliotson was an English-language abridgement of a series of papers that had been published the year before in the *Annalen der Chemie und Pharmacie*, the prestigious scientific serial edited by the eminent German chemists Justus von Liebig and Friedrich Wöhler.⁴³ Later revised for publication as *Physicalisch-physiologische Untersuchungen über die Dynamide des Magnetismus* (1849–50), the papers embodied a long series of investigations into the existence and nature of a new force or power that only seemed to manifest itself to human subjects of a 'sensitive' nature and which Reichenbach, working mainly from his castle near Vienna, studied in a range of individuals, from those who were physically healthy but melancholic to those suffering from such nervous disorders as somnambulism, catalepsy and hysteria.⁴⁴ Unable to sense the force himself,

⁴⁰ See Jennifer Ruth, "'Gross Humbug' or 'The Language of Truth': The Case of the Zoist', *Victorian Periodicals Review*, vol. 32 (1999), pp. 299–323.

⁴¹ Elliotson, 'Review', p. 122.

⁴² See Ferzak, Reichenbach and Nahm, 'Sorcerer of Cobenzl'.

⁴³ Karl von Reichenbach, *Abstract of 'Researches on Magnetism and on Certain Allied Subjects', including a New Imponderable*, translated and abridged from the German by William Gregory (London: Taylor and Walton, 1846).

⁴⁴ Karl von Reichenbach, *Physicalisch-physiologische Untersuchungen über Die Dynamide der Magnetismus, der Electricität, der Wärme, des Lichtes, der Krystallisation, des Chemismus in ihren Beziehungen zur Lebenskraft*, 2 vols. (Braunschweig: Friedrich Vieweg and Son, 1849–50). Two English translations of the second edition of this work were published in close succession, translated and edited by renowned British mesmerists: Karl von Reichenbach, *Researches on Magnetism, Electricity, Heat, Light, Crystallisation, and Chemical Attraction, in their Relations to the Vital Force*, translated and edited by William Gregory (London: Taylor, Walton and Moberly, 1850); Karl von Reichenbach, *Physico-Physiological Researches on the Dynamics of Magnetism, Electricity, Heat, Light, Crystallisation, and Chemistry in Their Relations to the Vital Force*, translated and edited by John Ashburner (London: Hippolyte Baillière, 1850). Since the Gregory edition was the one most frequently cited by British physical-psychical scientists, it will be used throughout this book.

Reichenbach's main witnesses were a handful of women who reported having peculiar sensory responses to the physical world: they experienced a "gentle" but "unpleasant" physical sensation when magnets were passed over their bodies; they saw faint coloured luminous emanations around magnets, crystals and human bodies; they felt their hands drawn to magnets; they felt a strange coolness when exposed to the light of the sun and stars and a puzzling warmth when exposed to lunar rays; and they claimed peculiar sensations from other agents including electricity, heat, mechanical friction, artificial light and chemical activity⁴⁵ (Figure 1.2).

Reichenbach was convinced that the force, which he christened "od" but which was often called 'odyle' or the 'odic' force by his English translators, was either an entirely new one, the "modication" of an existing physical force, or a "complex" combination of existing forces.⁴⁶ Independently of these questions, it seemed to be ubiquitous in the physical world and had a complex relationship with known physical forces. On the one hand, it was closely associated with and shared many of the properties of existing physical forces: it always accompanied natural and artificial magnetic sources (including the earth's magnetism); it exhibited polar characteristics akin to magnetism and electricity; and it was propagated by radiation and conduction (like heat). On the other hand, it was not identical with any existing physical force: for example, it was not identical to magnetism or electricity because its presence was not limited to magnetic and electrical sources; and while it accompanied heat, it had no effect on thermometers and often induced opposite thermal sensations to heat.

The apparent tendency of od to follow "fixed physical laws" that matched and transcended those of existing imponderables was enormously exciting to Reichenbach because it represented a possible extension of the "domain of physics" and the opening of a "new leaf in the history of the Dynamides or Imponderables".⁴⁷ Since od was closely linked to vitality, it also had far greater potential than other imponderables to bring physiology closer to physics and to show the "unity of these imponderables in a higher form".⁴⁸

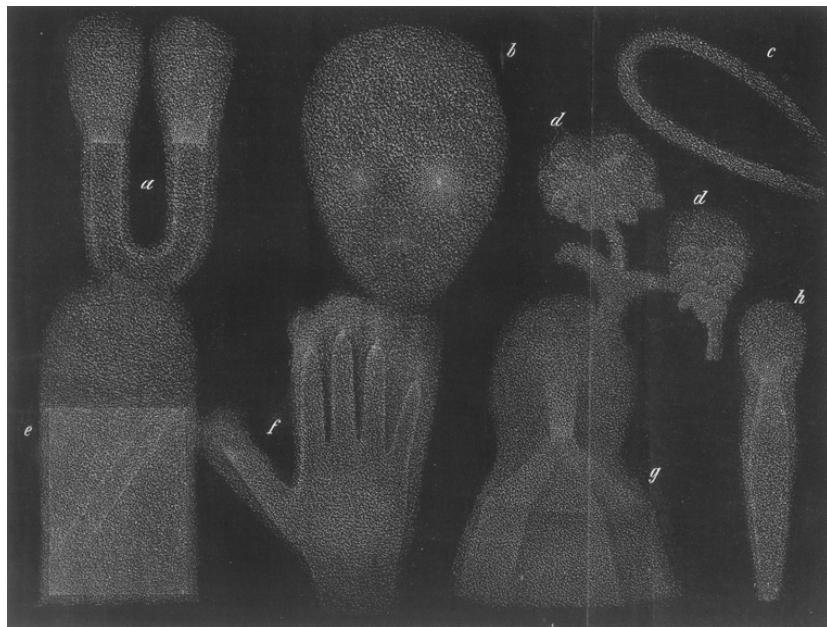
Reichenbach's conceptions of od had obvious roots in Romantic ideas of nature that flourished in late-eighteenth- and early-nineteenth-century scientific, literary and artistic circles, particularly in the German lands of

⁴⁵ Reichenbach, *Researches on Magnetism*, p. 1.

⁴⁶ Reichenbach, *Researches on Magnetism*, p. 163.

⁴⁷ Reichenbach, *Researches on Magnetism*, pp. 3 and 59.

⁴⁸ Reichenbach, *Researches on Magnetism*, p. 164.



1.2 The luminous manifestations of 'od'. From Karl von Reichenbach, *Researches on Magnetism, Electricity, Heat, Light, Crystallisation, and Chemical Attraction*, in Their Relation to the Vital Force, translated and edited by William Gregory (London: Taylor, Walton and Moberly, 1850), plate III.

Reichenbach's youth and early career.⁴⁹ His belief in the close connection between physical and vital forces, the unity of imponderables in some "higher form" and the cosmic significance of polarity owed a great deal to one aspect of Romanticism: Naturphilosophie. It is also possible that Reichenbach's acceptance of the capacity of his sensitives to perceive occult features of the physical world owed something to the belief of Naturphilosophen in the power of genius and imagination to discern nature's hidden reality. Reichenbach was acutely aware of the danger of resting the case for od on human subjects, whose judgements might be impaired by poor physical and mental health. The goal of making od part of physics needed the discovery of a "universal inorganic reagent" for the force, a "means of recognising and measuring it" which could liberate

⁴⁹ For Romanticism and sciences see Andrew Cunningham and Nicholas Jardine (eds.), *Romanticism and the Sciences* (Cambridge University Press, 1990); Richards, *Romantic Conception of Life*.

students of the subject "from the frequently more than painful dependence on diseased persons, hospitals, and uncultivated people of every kind".⁵⁰

Reichenbach's intellectual goals for od underpinned his ambivalence towards Mesmer and his followers. Not surprisingly, his critics and allies saw him as a latter-day Mesmer, propounding an updated theory of a universal but obscure force that was strongly associated with mineral magnetism and to which only certain individuals were sensitive. Reichenbach was certainly familiar with the literature on mesmerism, and his claims for od, especially its luminous manifestations, built partly on animal magnetism. But he was adamant that his work adopted the critical approach to the work of Mesmer and his followers that he believed would placate such formidable critics of mesmerism as the German physiologists Emile du Bois-Reymond and Johannes Müller.⁵¹ While his researches confirmed the existence of a force that was concentrated in but not limited to magnetic sources, he deemed animal magnetism an "unfit" term because the phenomena associated with it did not exactly coincide with those "properly called Magnetism".⁵²

Few aspects of Mesmer's work drew more criticism from Reichenbach than the closest thing Mesmer got to a therapeutic instrument: the baquet. This was a circular wooden tub containing bottles of 'magnetised' water, whose subtle influence was communicated via iron rods to patients forming a 'magnetic' chain around the perimeter of the vessel. Reichenbach was not alone in being highly circumspect about this attempt to create a collective form of magnetic therapy, not least because Mesmer sought to enhance the effect with rituals, music and darkness. As far as he was concerned, the only truth buried in this "mysterious superstructure" was the slow and continuous chemical action of the baquet, which, as he concluded from his own investigations, was itself a source of od which had distinct physiological effects.⁵³

Reichenbach's discussion of the baquet in his *Physicalisch-physiologische Untersuchungen* led to telling examples of the way he sought to render od plausible in the context of recent physical discovery. Having found evidence that od was perceived in even feeble chemical reactions, Reichenbach considered it highly likely that chemical activity within the body was the source of

⁵⁰ Reichenbach, *Researches on Magnetism*, p. 60. His British champion William Gregory agreed. In 1851 he argued that storing od independently of the body and measuring it were important desiderata in addressing the "peculiar difficulties" surrounding the subject: William Gregory, *Letters to a Candid Inquirer on Animal Magnetism* (London: Taylor, Walton, and Moberly, 1851), p. 292.

⁵¹ Reichenbach, *Researches on Magnetism*, pp. xxiii–xliv.

⁵² Reichenbach, *Researches on Magnetism*, pp. 62–3.

⁵³ Reichenbach, *Researches on Magnetism*, p. 121.

its remarkable capacities for od. Not surprisingly for a work first published in the *Annalen der Chemie*, Reichenbach emphasised that a “guarantee of the essential truth” of his own “observations and deductions” was the fact that they seemed to converge with Liebig’s far better-known research on the relationship between chemical activity and the vital functions, and in particular the roles of respiration and digestion in the production of heat and muscular power – the same vital functions that Reichenbach believed also yielded od.⁵⁴

Another convergence was sought between od and Faraday’s recent work on diamagnetism, which referred to the susceptibility of all bodies, whether magnetic or not, to an external magnetic field. Annoyed that the British natural philosopher had apparently ignored his researches on od, Reichenbach insisted that they were actually “drawing the same vehicle, but by different ropes”.⁵⁵ Published in 1845, Faraday’s research would certainly have intrigued Reichenbach because it derived from Faraday’s discovery of an effect – the magnetic rotation of the plane of polarised light – lending credence to the magneto-optic connection that Reichenbach’s sensitives perceived in the form of odic luminosity around magnets.⁵⁶ But Reichenbach’s principal interest in diamagnetism was that, like od, it seemed to be a power shared by animate and inanimate matter, although it was not clear whether diamagnetism was a manifestation of od or whether both derived from a still-higher power. Either way, he anticipated that Faraday’s “fertile genius” would unravel the mystery of universal powers.⁵⁷

For all their intended rhetorical power, Reichenbach’s connections between od research and recent physical discoveries sidestepped the critical problem of employing human beings as the principal instruments or ‘reagents’. Although he appealed to the fact that patients’ testimony was a necessary feature of medical discovery, he evidently felt that what his experimental subjects reported about od needed bolstering in other ways. His least successful response to this problem was to try to photograph, at some time in the late 1840s, the perceived magnetic luminosity. With the help of a Viennese photographer, he established that a daguerreotype inside a light-tight box had become fogged by a long exposure to a strong magnet. If “other causes” of the fogging could be ruled out, Reichenbach concluded, then the plate must have been

⁵⁴ Reichenbach, *Researches on Magnetism*, p. 123.

⁵⁵ Reichenbach, *Researches on Magnetism*, p. 229.

⁵⁶ On Faraday’s work see David Gooding, ‘A Convergence of Opinion on the Divergence of Lines: Faraday and Thomson’s Discussion of Diamagnetism’, *Notes and Records of the Royal Society of London*, vol. 36 (1982), pp. 243–59; Frank A. J. L. James, “‘The Optical Mode of Investigation’: Light and Matter in Faraday’s Natural Philosophy’, in Gooding and James, *Faraday Rediscovered*, pp. 137–61.

⁵⁷ Reichenbach, *Researches on Magnetism*, p. 229.

exposed to a “real light” owing from the magnet.⁵⁸ Although he was satisfied that the plates had not been exposed to other sources of light, Reichenbach did not deem the result decisive and only returned to the problem in the early 1860s.⁵⁹ Nevertheless, his original photographic test would certainly pique the interest of other scientific investigators, including many British physical-psychical scientists revisiting the subject from the 1870s onwards.

Reichenbach achieved more success with a far simpler series of tests, which were designed to eliminate the possibility that his experimental subjects were deceiving him or themselves, notably by using clues in their environment rather than a genuine odic sensitivity. One test was prompted by the fact that an individual he studied particularly closely, Leopoldine Reichel, claimed to perceive the image of a magnetic ‘ame’ focussed onto the wall of a darkened room by a glass lens. Since the image was invisible to Reichenbach and his assistants, he decided to conduct a more stringent test of her powers, which involved her pointing to the place where the image fell as the lens was silently and repeatedly moved. Reichel’s ability to correctly identify the different places where Reichenbach believed the image must have fallen confirmed her abilities “beyond a doubt”.⁶⁰

Reichenbach’s most conspicuous strategy regarding his sensitives, however, responded to criticism that he had relied far too heavily on Reichel and four other young women who, despite passing crucial experimental tests, were fundamentally unreliable as observers because of the nervous disease that made them strongly sensitive to od. For this reason, *Physicalisch-physiologische Untersuchungen* presented evidence of odic sensitivity in a much larger sample of people (59), a large proportion of whom were not only physically healthy but drawn from the middling and highest social ranks of Viennese society, including baronesses, university professors and daughters of tradespeople. Not surprisingly, these individuals featured heavily in Reichenbach’s more detailed studies of odic luminosity, which included examinations of the detection of odic ‘ames’ by crystals and human hands, the changing colour of the odic luminosity of a bar magnet turned in the earth’s magnetic field, and the striking parallel between the odic colours of a magnetised iron sphere and the aurora. Having accepted the potential of od to unify a wide range of phenomena in nature, Reichenbach concluded from this

⁵⁸ Reichenbach, *Researches on Magnetism*, p. 17.

⁵⁹ Karl von Reichenbach, *Odische Begebenheiten zu Berlin in den Jahren 1861 und 1862* (Berlin: G. H. Schroeder, 1862), pp. 6–8.

⁶⁰ Reichenbach, *Researches on Magnetism*, p. 18.

last observation that the earth's polar lights were a "vast manifestation" of odic light whose sheer power ensured that they were not just visible to sensitives.⁶¹

The immediate medical and scientific reactions to Reichenbach's work in the German-speaking lands were generally unfavourable. In 1846, a committee of Austrian physicians failed in their attempt to replicate Reichenbach's results and questioned the judgement and honesty of their experimental subjects; similar criticisms against Reichenbach were made by Liebig, who had been enthusiastic enough to publish the first of his papers on od, but who by 1852 was no longer convinced by the credibility of the "science of od" because it depended on observers who possessed unreliable sensory and nervous apparatuses.⁶² This fundamental problem had long been aired in the British medical press, which was generally no more sympathetic to Reichenbach than it had been towards Mesmer and his followers. Reviewing the English-language Abstract of Reichenbach's treatise, the *Lancet* lambasted the "hysterical young women" employed by the chemist as the "most suitable subjects for the development of shams" and erroneous judgements of sensory experiences and, recalling the ferocious battle it had waged against mesmerism since the late 1830s, placed Reichenbach beside Elliotson as a perpetrator of "disguised quackery".⁶³

The English translations of *Physicalisch-physiologische Untersuchungen* prompted even more trenchant criticisms from the British medical press. For many medical commentators, the case for od was undermined by the fact that Reichenbach and his chief English-language translator and champion, the Scottish academic chemist William Gregory, were physical scientists who seemed to lack the knowledge of physiology and psychology that, as the British and Foreign Medico-Chirurgical Review charged, was essential to a "right investigation of the phenomena".⁶⁴ For this latter reviewer, the "fatal" gap in Reichenbach's "high character as an inductive and experimental philosopher" was his failure to understand the nature and reliability of his

⁶¹ Reichenbach, *Researches on Magnetism*, p. 455.

⁶² Justus von Liebig, *Über das Studium der Naturwissenschaften. Eröffnungsrede zu seinen Vorlesungen über Experimental-Chemie im Wintersemester 1852/53* (Munich: Cotta, 1852), pp. 18–19. On the German reception see William H. Brock, *Justus von Liebig: The Chemical Gatekeeper* (Cambridge University Press, 1997), pp. 66–7; Ferzak, Reichenbach, pp. 120–8; Nahm, 'Sorcerer of Cobenzl', pp. 391–401.

⁶³ [Anon.], 'Reviews', *Lancet*, vol. 2 (1846), pp. 103–4.

⁶⁴ [Anon.], 'Odyle, Mesmerism, Electro-Biology', *British and Foreign Medico-Chirurgical Review*, vol. 8 (1851), pp. 378–431, p. 385. See also [Anon.], 'Gregory's Edition of Reichenbach', *Medical Times*, vol. 21 (1850), pp. 451–2.

"instruments of research" and to recognise his unconscious role in determining what such human apparatus sensed.⁶⁵ A good deal of this criticism appealed to Braid's work on hypnotism, which yielded powerful evidence of the way that individuals could be made to experience the tactile and visual sensations claimed by Reichenbach's sensitives simply as the result of verbal suggestions and in the absence of magnets and crystals.⁶⁶ For Braid and other critics, Reichenbach's descriptions of his experiments simply failed to rule out the possibility that he had inadvertently led his highly suggestible subjects towards their observations.

Gregory was one of several mid-Victorian scientific and medical practitioners who, in opposition to this hostility, upheld Reichenbach's work and used it in their writings on the credibility and therapeutic benefits of animal magnetism.⁶⁷ Their independent studies of odic sensitivity, coupled with Reichenbach's scientific reputation and the sheer quantity of his empirical evidence for odic sensitivity, lent powerful support to Mesmer's original discovery. However, British mesmerists diverged from Reichenbach himself in the extent to which they believed od was relevant to mesmeric phenomena: Gregory well exceeded the limits of Reichenbach's speculations in proposing od as the possible mechanism of two psychological powers associated with the mesmeric trance – thought-reading and clairvoyance – while the physician John Ashburner believed that Reichenbach had unfairly neglected using mesmerised sensitives who, as Ashburner's own experiments revealed, possessed significant odic sensitivity.⁶⁸ Gregory's use of Reichenbach was hardly surprising given mesmerists' preoccupation with the subtle physical means by which psychological powers extended beyond the material brain, and it was precisely this function that would attract so many spiritualists and psychical researchers to the question of od later in the nineteenth century.

Reichenbach's researches were ignored rather than explicitly criticised in the most prestigious British scientific publications, but in some scientific quarters they were certainly considered worthy of critical or sympathetic comment. The young John Tyndall was not the only scientific practitioner who privately shared Liebig's doubts about Reichenbach's

⁶⁵ [Anon.], 'Odyle, Mesmerism, Electro-Biology', pp. 388–9.

⁶⁶ Braid, *Power of the Mind*.

⁶⁷ Gregory, *Letters to a Candid Inquirer*, pp. 247–84; Herbert Mayo, *On the Truths Contained in Popular Superstitions with an Account of Mesmerism* (London: William Blackwood, 1851), pp. 11–16; John Ashburner, 'Preface', in Reichenbach, *Physico-Physiological Researches*, pp. vii–xx.

⁶⁸ Gregory, *Letters*, pp. 285–319; Reichenbach, *Physico-Physiological Researches*, footnotes on pp. 11–13, 75–7.

claims.⁶⁹ That prominent forum of intellectual and scientific comment, the Athenaeum, was more equivocal insofar as it questioned the scientific judgement of Reichenbach's witnesses but expressed great confidence in his abilities and in the possibility that with further investigations employing more reliable observers, an important contribution could be made to the understanding of the correlation of the physical and vital forces.⁷⁰ Scientific reputation weighed even more heavily with the Mechanics' Magazine, which in 1851 pointed to the scientific stature of Reichenbach, as well as of sympathisers Gregory and the Swedish chemist Jöns Jacob Berzelius, as reasons for defying the British medical profession's notorious contempt for animal magnetism. Part of the defiance was repudiating the argument that Reichenbach, like Mesmer and Elliotson, had at best inadvertently contributed to the study of physiology and psychology by showing how scientific experts and their human subjects perpetuated false beliefs: on the contrary, the Mechanics' Magazine had no doubt that Reichenbach had helped make animal magnetism a "new branch of physical enquiry".⁷¹

By the early 1860s, some British scientific commentators had fresh reasons for sharing the Mechanics' Magazine's optimism. In 1861, Reichenbach seemed to be moving closer to his ambition of bringing od within the remit of physics by getting a new instalment of his research published in the distinguished German scientific journal, the *Annalen der Physik*.⁷² The paper focussed on the different sources of phosphorescence, including crystallisation, fusion, fermentation and, most tellingly, the human body. His experimental evidence for human phosphorescence was clearly drawn from ongoing od researches, but references to od were strategically omitted and the work was linked to existing debates in the *Annalen* and in physics more generally on the relationship between molecular movement and imponderable forces.⁷³

Reichenbach's success with German physicists, however, was short lived, and from this point until his death in 1869 he encountered stiff

⁶⁹ See note 8. In 1846 Faraday was reputedly "not disposed to place faith in the magnetic experiments of Reichenbach" or mesmerism until effects could be shown with "inorganic matter or a baby" – whose responses to new forces could not possibly derive from knowledge of what to expect: Walter White, *The Journals of Walter White* (London: Chapman and Hall, 1898), p. 69.

⁷⁰ [Anon.], 'Review of Karl von Reichenbach's Researches on Magnetism', *Athenaeum*, 19 October 1850, pp. 1088–90.

⁷¹ [Anon.], 'Gregory's "Letters on Animal Magnetism"', p. 370.

⁷² Karl von Reichenbach, 'Zur Intensität der Lichterscheinungen', *Annalen der Physik und Chemie*, vol. 112 (1861), pp. 459–68.

⁷³ On the contents of the *Annalen* in this and later periods see Christa Jungnickel and Russell McCormmach, *Intellectual Mastery of Nature: Theoretical Physics from Ohm to Einstein*, 2 vols. (Chicago University Press, 1986), vol. 2, chapter 13.

opposition from leading savants who, having accepted his invitations to witness new attempts at odic photography and related experiments, maintained their doubts about the reality of the new force.⁷⁴ As we have seen, Reichenbach enjoyed a more sympathetic hearing in some sections of the British scientific and technical press, where, in agreement with the Electrician author with which we began this chapter, writers directly or indirectly encouraged further investigations into od. In 1862, for instance, an anonymous writer in the Popular Science Review (probably William Crookes) pointed out that although readers were entitled to be circumspect about those statements of Reichenbach that had been greeted with "incredulity", he remained "one of the first chemists and physicists of the day, and his researches in this 'occult' science" were "characterised by equal philosophical acumen with his chemical experiments".⁷⁵ What made a less incredulous approach to od particularly pressing by this time was that it promised to explain aspects of another 'occult' science, but one that had become the talk of Victorian society.

Outdoing the Electric Telegraph

If there was one area of agreement between Reichenbach's supporters and critics it was that od was related to occult phenomena other than just mesmerism. It was often lumped together with the divining rod (typically a forked twig held in the hands that appeared to move near hidden sources of water independently of the will), the puzzling movements of a pendulum bob suspended from a stationary finger, and the crazes for table-turning and spirit-rapping that swept across the United States, Continental Europe and Britain from the early 1850s.

In table-turning, groups of people gathered around tables and, after placing their fingers lightly on table-tops, observed the furniture rotating seemingly independently of their volition. Electricity, magnetism, a new physical force, disembodied spirits and the Devil were offered as possible causes. Spirit-rapping was the ability of professed spirits of the dead to commune with the living via messages encoded as rapping noises on furniture and other objects. The manifestation of raps tended to require the presence of individuals, later called 'mediums', whose bodily and mental constitutions made them especially susceptible to otherworldly influences. Od offered a possible explanation of these effects insofar as it

⁷⁴ Reichenbach's defensive account of these battles is his *Odische Begebenheiten*.

⁷⁵ [Anon.], 'Chemistry', p. 388. See also [Anon.], 'Obituary', *Chemical News*, vol. 19 (1869), p. 82. See also [Anon.], 'Scientific Gossip'; [Anon.], 'Swedenborg'.

was the imponderable channel through which the unconscious human will could cause mechanical effects beyond the body, or the invisible carrier of communication between the living and the dead.⁷⁶

Table-turning and spirit-rapping were early phases of that iconic aspect of nineteenth-century occultism: spiritualism. Emerging in the United States in the late 1840s, spiritualism spread to Continental Europe, Britain, Russia, Australia and elsewhere and reached the peak of its popularity in the final quarter of the century, when the number of followers had swelled to several millions.⁷⁷ It was primarily a culture focussed on the production, interpretation and promulgation of evidence that the human spirit or soul survived the dissolution of the material body, communed with and manifested itself to the living, and experienced moral and spiritual progress in the next state of existence. Although communion with spirits of the dead had been practised for millennia, spiritualism approached the question via distinctive practices and increasingly startling physical and psychological phenomena.

One of spiritualism's most distinctive practices, spirit-rapping was developed in the founding events of 'Modern Spiritualism', a term used by many spiritualists to distinguish what they did from older forms of spiritual communion. The events took place in 1848 at Hydesville, New York, where three teenage sisters, Katherine, Leah and Margaretta Fox, appeared to be able to communicate with mysterious rapping noises in their family home. The source of the rapping seemed to be intelligent because it imitated the girls' finger-snapping and clapping noises and revealed information about itself by sounding one rap for 'no' and two for 'yes' in response to vocalised questions. Relatives and friends of the Fox sisters had several reasons to accept the genuineness of the girls' spiritual powers and of the communicating intelligence. The rapping noises could not be easily ascribed to any known natural cause (including

⁷⁶ Edward Coit Rogers, *Philosophy of the Mysterious Agents, Human and Mundane* (Boston: John P. Jewett and Company, 1853), esp. pp. 171–203; George Sandby, 'The Mesmerisation and Movement of Tables', *Zoist*, vol. 11 (1853–4), pp. 175–85.

⁷⁷ By the 1860s, the number of spiritualists in the United States and Britain was reputedly in the millions and thousands respectively: Gauld, *Founders of Psychical Research*, pp. 29 and 77. The literature on Modern Spiritualism is vast. The more analytically sophisticated studies include Barrow, *Independent Spirits*; Braude, *Radical Spirits*; Cathy Gutierrez, *Plato's Ghost: Spiritualism in the American Renaissance* (New York: Oxford University Press, 2009); Sophie Lachapelle, *Investigating the Supernatural: From Spiritism and Occultism to Psychical Research and Metapsychics in France, 1853–1931* (Baltimore, MD: Johns Hopkins University Press, 2011); John Warne Monroe, *Laboratories of Faith: Mesmerism, Spiritism and Occultism in Modern France* (Ithaca, NY: Cornell University Press, 2008); Oppenheim, *Other World*; Owen, *Darkened Room*; Diethard Sawicki, *Leben mit den Toten: Geisterglauben und die Entstehung des Spiritismus in Deutschland 1770–1900* (Paderborn: Ferdinand Schöningh, 2002).

trickery) and the intelligence revealed information unknown to anybody present and which proved to be correct (it claimed to be the spirit of a man murdered in the house years earlier, and whose remains were soon discovered in the cellar of the property).

The much-publicised displays of spirit-rapping that the Fox sisters subsequently staged in New York initiated the spread of Modern Spiritualism in the United States and promulgated two further key elements of spiritualist practice. These were the presence of 'mediums' and the staging of spirit 'circles' or seances, by which small groups of individuals gathered, typically in the presence of a known medium and in a dimly lit room, to contact the professed denizens of the other world. As spiritualism spread, it came to be associated with a plethora of other, equally striking physical and psychological phenomena. Mediums seemed to be able to move objects and play musical instruments without touching them; to levitate themselves and handle hot coals; to write, draw and speak under the guidance of spirits; to cause spirits to directly write and draw, and to communicate via wooden 'planchettes' and ouija boards; and to produce phosphorescent lights, cool breezes and images of spirits on photographic plates. Most spectacular and controversial of all, mediums seemed to partially or fully 'materialise' the bodies of spirits, and fully formed varieties were even able to walk and talk like living people (Figure 1.3).

The increasingly startling nature of spiritualistic phenomena ensured that it catered to burgeoning tastes for magical and 'supernatural' entertainment but also to medical and scientific interests in obscure powers of the human mind and body.⁷⁸ But spiritualism proved popular for a host of other and more commonly shared reasons. As a culture focussed on otherworldly interventions, it served popular fascinations with ghosts, haunted houses and other preternatural phenomena that the critical theological, philosophical and scientific arguments of the Reformation and Enlightenment had not vanquished.⁷⁹ It consoled myriad bereaved individuals with opportunities to contact deceased loved ones, and it gave others answers to questions about the existence and nature of the post-mortem state that were more satisfactory than those offered by established religions, philosophies and sciences.

The teachings and practices that came to define spiritualism built partly on the existing cultures of American Universalist religion (which preached the salvation of all, irrespective of earthly sins), Swedenborgianism (which

⁷⁸ On spiritualism and popular entertainment see Simone Natale, *Supernatural Entertainments: Victorian Spiritualism and the Rise of Modern Media Culture* (University Park, PA: Pennsylvania State University Press, 2016).

⁷⁹ See Owen Davies, *The Haunted: A Social History of Ghosts* (Basingstoke: Palgrave Macmillan, 2007).



1.3 A typical late-Victorian seance. After seating themselves at a table, people joined hands and observed such spectacular effects as untouched objects floating about and disembodied hands writing messages. From [Anon.], "Spirits" and their manifestations. An evening séance', Frank Leslie's Illustrated Newspaper, 2 April 1887, p. 105. Reproduced by permission of Corbis Historical/Getty Images.

emphasised the close proximity of the earthly and spiritual realms), and mesmerism, from which spiritualism drew some of its personnel, techniques and language. Spiritualist mediumship conferred upon an individual many of the powers – notably thought-reading, clairvoyance and spiritual vision – that magnetised somnambules had long been exhibiting, and the means by which professed spirits influenced mediums were often believed to be the mesmeric uid.⁸⁰

Yet spiritualism catered to spiritual and religious needs in ways that mesmerism rarely did. It offered more powerful evidence that consciousness could exist without the material body and was accordingly embraced as an argument against materialist philosophies seeking to reduce humans and the cosmos to mere matter and motion. It presented evidence of that cornerstone of Christian faith – the existence of an

⁸⁰ [Anon.], *Heaven Opened; Or, Messages for the Bereaved, From Our Little Ones in Glory. Through the Mediumship of F. J. T.* (London: James Burns, 1870), p. 19; 'C. D.' [Sophia De Morgan], *From Matter to Spirit: The Result of Ten Years' Experience in Spirit Manifestations* (London: Longman, Green, Longman, Roberts and Green, 1863), p. 100.

afterlife – but connected it with beliefs and practices that many favoured over those associated with orthodox Christianity.⁸¹ For example, spiritualism abolished hell as a distinct place of punishment and thereby responded to a moral revulsion many felt towards the idea of eternal damnation. It taught that the afterlife was an altogether happier place where the spirits of all individuals, irrespective of their earthly sins, experienced moral and spiritual progress through effort. It also emphasised individual approaches to, and sensuous forms of, spirituality, as opposed to those heavily mediated by orthodox Christian clergy or embodied in abstract theological concepts.

The source of spiritualism's appeal that is most relevant to the purposes of this study was its claim to be a new scientific approach to religion and spirituality, and the moral and ethical questions that followed from them. In 1856, Britain's first spiritualist newspaper quoted one medical follower's declaration that spiritualism was a "religion of works – not a passive, dead faith. Spiritualism is a science – a positive, practical, teachable science".⁸² Spiritualists usually believed that they exuded the scientific spirit of the age and were merely applying the empirical, inductive and rational methods of enquiry that had proved so successful in understanding the material cosmos to questions of mind and spirit. As the leading English-American spiritualist Emma Hardinge put it in 1866, these questions had been answered satisfactorily neither by established religion, which required belief in God and spirit yet closed "against our spiritual eyes the realm of investigation", nor by the established sciences, which had "contentedly endured banishment to the realm of matter, dealt only with effects, and offered us systems which trace creation no farther than the visible universe conducts us".⁸³ By the systematic study of the psycho-physical phenomena of spirit circles, spiritualists believed they could elucidate laws of the mind and put together a "science of the soul" or a form of psychology to rival the physiological-based form being vigorously promoted in Britain with limited success.⁸⁴

⁸¹ See Georgina Byrne, *Modern Spiritualism and the Church of England, 1850–1939* (Woodbridge: Boydell Press, 2010), chapter 4.

⁸² Mr Randall cited in [Anon], 'What Constitutes a Spiritualist?', *Yorkshire Spiritual Telegraph*, vol. 1 (1856), pp. 127–8, p. 127.

⁸³ Emma Hardinge, 'Psychology; Or, the Science of Soul', *Spiritual Magazine*, vol. 1 (New Series) (1866), pp. 385–401, p. 388. She became Emma Hardinge Britten in 1870.

⁸⁴ Hardinge, 'Psychology'. A similar argument is made in [Anon.], 'The Study of Human Nature', *Human Nature*, vol. 1 (1867), pp. 1–5. On the troubles of mid-Victorian psychophysiology see Kurt Danziger, 'Mid-Nineteenth Century British Psycho-Physiology: A Neglected Chapter in the History of Psychology', in William R. Woodward and Mitchell G. Ash (eds.), *The Problematic Science: Psychology in Nineteenth Century Thought* (New York: Praeger, 1982), pp. 119–46.

Hardinge's ambition well reflected more widely shared spiritualist convictions that they, like other scientific enquirers, were merely trying to extend the realm of natural law – in their case, to phenomena whose 'supernatural', spiritual and psychological attributes had excluded them from the domain of the sciences.⁸⁵ But Hardinge's ambition also highlighted the anti-materialist stance that many spiritualists adopted towards natural law: spiritualistic phenomena followed laws that far transcended those of matter, force and purely physical qualities and which necessarily embraced mind and spirit.⁸⁶

The seriousness with which spiritualists took the scientific status of their enterprise is evident in their borrowing and adaptation of the languages, concepts and theories of the established sciences. They often explained the interactions between spirit and matter in terms of electricity and the ether, both of which had long associations with religion and spirituality.⁸⁷ Seances were often described as groups of individuals whose combined 'vital' magnetism or electricity composed the 'battery' required by a spirit to manifest itself.⁸⁸ Spiritualists took a special interest in scientific achievements in the study and manipulation of imponderables because this work demonstrated the interconnectivity and power of agents far subtler than gross matter. Physiological studies of the connection between the nervous force and galvanic electricity lent plausibility to the idea that the body produced and was influenced by subtler forces that could be related to these more material forces.⁸⁹

The immense strides made in extending the electric telegraph across continents and under oceans gave many spiritualists reason to think that communication by subtler forces would be no less successful. For one American spiritualist in the late 1840s, the Fox sisters were already doing this by showing that "God's telegraph has outdone Morse's altogether".⁹⁰ In 1860, and in the wake of the first attempts to lay submarine cables across the Atlantic, another American spiritualist could boast that

⁸⁵ See, for example, Robert Dale Owen, *Footfalls on the Boundary of Another World* (London: Trübner and Sons, 1860), pp. xi–xii, 42–58.

⁸⁶ Thomas Brevoir, 'The Religious Heresies of the Working Classes', *Spiritual Magazine*, vol. 6 (1865), pp. 29–32; William Howitt, 'A Letter from William Howitt', *Spiritual Magazine*, vol. 2 (1861), pp. 449–56.

⁸⁷ Ernest Benz, *The Theology of Electricity* (Eugene, OR: Pickwick Publications, 2009); Carroll, *Spiritualism in Antebellum America*, pp. 65–71.

⁸⁸ Emma Hardinge, 'Rules to Be Observed for the Spirit Circle', *Human Nature*, vol. 2 (1868), pp. 48–52; [De Morgan], *From Matter to Spirit*, p. 100. For discussion of spiritualists' electrical analogies and metaphors see Stolow, 'Spiritual Nervous System'.

⁸⁹ De Morgan, *From Matter to Spirit*, pp. 96–100.

⁹⁰ A. H. Jervis to E. W. Capron, circa 1849, cited in Emma Hardinge, *Modern American Spiritualism: A Twenty Years' Record of the Communion Between the Earth and the World of Spirits* (New York: Emma Hardinge, 1870), p. 51.

spiritualists' "modern study of the imponderables", already "productive" of astonishing results, would afford "glimpses of progress in another direction" that promised to outshine the "lightning-wire" joining the United States and Britain.⁹¹

By the early 1860s, however, many had reason to question the achievements of these telegraphs. The earliest attempts (in 1857–8) to span the Atlantic with submarine telegraph cables had proven costly failures, but the continued growth of overland and short undersea networks testified to the fact that public confidence in the technology per se had not been shattered.⁹² Public confidence in the spiritual telegraph was far shakier. Challenging the estimated millions of spiritualist converts on both sides of the Atlantic were myriad individuals who were openly critical of or indifferent to spiritualism. The *London Review* echoed so many critics when, in 1862, it charged that "the mania for séances with spirits has passed like a disease from America to England", whose inhabitants had "no idea how infected American society is with spirit-rappers, spirit-mediums, spirit-orators, spirit-newspapers, and spirit-humbugs generally".⁹³

The 'mania', which many critics feared had reached epidemic proportions, had serious religious, moral and philosophical implications. In sections of the British press, spiritualism was attacked as the sorry revival of old superstitions about supernatural visitations and witchcraft, and ridiculed as the displacement of traditional spiritual experiences with such vulgar, absurd and 'material' alternatives as spirits that rocked tables, gave erroneous information about the living and offered vague platitudes about the future life.⁹⁴ The revival of beliefs in the agency of spirits of the dead exasperated those who thought they were living in an age in which science and "matter-of fact" had eradicated the "love of the marvellous".⁹⁵ For these critics, the enlightened and matter-of-fact Victorians seemed to have forgotten the well-known argument against miracles proposed by the eighteenth-century Scottish philosopher David Hume: this proposed that it was more likely that testimony in favour of phenomena violating long-established natural laws was mistaken than

⁹¹ Owen, *Footfalls*, p. 38.

⁹² On mid-nineteenth-century electric telegraphy see Daniel R. Headrick, *The Invisible Weapon: Telecommunications and International Politics, 1851–1945* (New York: Oxford University Press, 1991), chapters 2–3; Richard R. John, *Network Nation: Inventing American Telecommunications* (Cambridge, MA: Harvard University Press, 2010); Roland Wenzlhuemer, *Connecting the Nineteenth Century World: The Telegraph and Globalization* (Cambridge University Press, 2013).

⁹³ [Anon.], 'Spirit Rapping', *London Review*, 1 March 1862, pp. 206–7, p. 206.

⁹⁴ [Anon.], 'Howitt on the Supernatural', *London Quarterly Review*, vol. 21 (1863–4), pp. 27–70; [Anon.], 'Modern Spiritualism', *Quarterly Review*, vol. 114 (1863), pp. 179–210.

⁹⁵ [Anon.], 'The Mystery of the Tables', *Illustrated London News*, 18 June 1853, pp. 481–2.

that such laws needed to be abandoned. Christian-minded critics were more vexed by threats to Christian morality and authority: spiritualists had abjured scriptural warnings about exchanges with potentially deceptive spirits, abandoned hell as the ultimate source of moral sanction in the earthly life and chosen vulgar mediums rather than respectable clergymen as their spiritual guides.⁹⁶

For many critics, the honesty of spiritualism's principal instruments weighed more heavily than these philosophical and theological concerns. Mediums had been associated with fraud almost from Modern Spiritualism's birth. In 1851, the Fox sisters were accused of faking 'spirit' rapping noises by surreptitiously cracking the joints in their knees and toes. Two years later, the American medium who brought spiritualism to Britain, Maria Hayden, was 'exposed' by the writer George Henry Lewes, who charged that her knowledge of dead persons known only to a particular seance-goer had nothing to do with her rapport with spirits and everything to do with her ability to exploit unconscious but telling hesitations of the participant as they used the alphabet method to decode spirit raps.⁹⁷

Mediums who produced more physical effects were especially suspect because their feats more closely resembled what stage magicians claimed to be able to replicate without the agency of spirits. This was exactly the problem faced by Ira and William Davenport, two American mediums who, during their sensational tour of Britain in the mid-1860s, sparked a heated debate over public seances in which they appeared to play levitating musical instruments and cause spirits to speak whilst they were tied to chairs within a wooden cabinet. Many were baffled by these performances, but two newcomers to the world of conjuring, John Nevil Maskelyne and George Cooke, fuelled growing hostility towards the Davenports by claiming to reproduce the 'cabinet' manifestations using sleight-of-hand.⁹⁸

Many of these 'exposures', however, were not decisive. Rumours about the Fox sisters did not deter Cromwell Varley, who, in the 1860s, clearly found it difficult to attribute to joint-cracking a deafening "chorus of raps" that he heard during a seance given by Katherine Fox.⁹⁹ Likewise,

⁹⁶ [Anon.], 'Howitt on the Supernatural'.

⁹⁷ George Henry Lewes, 'The Rappites Exposed', *Leader*, vol. 4 (1853), pp. 261–3. The 'alphabet' method involved composing messages by seance-goers calling out or pointing to, sequentially, letters of the alphabet to which 'spirits' rapped either yes or no.

⁹⁸ On nineteenth-century conjuring and spiritualism see Simon During, *Modern Enchantments: The Cultural Power of Secular Magic* (Cambridge, MA: Harvard University Press, 2002), chapter 5; Peter Lamont, *Extraordinary Beliefs: A Historical Approach to a Psychological Problem* (Cambridge University Press, 2013), chapter 4.

⁹⁹ Varley, 'Evidence of Mr. Varley', p. 165.

Lewes's damning verdict was not shared by the eminent British mathematician Augustus De Morgan, who, in seances given by Maria Hayden in 1853, was convinced that she could see "neither my hand nor my eye, nor at what rate I was going through the letters" of the alphabet, and either she or the "spirits" had been able to correctly answer questions that he had asked purely mentally.¹⁰⁰ The Davenports may have left Britain under a dark cloud, but some spiritualists responded to accusations of their trickery with an argument that they would make in response to the 'exposure' of other mediums: they had made more searching studies of the mediums over a longer period and these had failed to reveal fraudulent activity.¹⁰¹

What exasperated so many contemporary nineteenth-century people about mediumistic fraud was that the rules by which seances were conducted made it harder to detect. Typically, these rules or conditions were designed to optimise the vital magnetic powers in the 'circle' that spirits required to manifest themselves, although spiritualists warned novice enquirers that following the rules would not necessarily guarantee manifestations that were notoriously capricious. The rules related to physical and psychological conditions: the best circles, for example, were those held in warm, dimly lit rooms and which involved a small group of friends, family members or other individuals who could strike up an atmosphere of harmony, sympathy and mutual trust.¹⁰² Individuals who were dogmatic, mischievous or strongly sceptical were usually excluded because they poisoned this psychological atmosphere. Professional scientists were often seen by spiritualists as particularly unpromising seance participants because their education had made them overly sceptical and altogether unable to adapt to the protocols of spiritualist scientific practice. As we shall see in the following section, however, spiritualists had many more reasons to think that 'scientific men' were more threatening than useful to their new science of imponderables.

'Scientific Men' and Spiritualism

One of the reasons why so many scientific practitioners had misgivings about spiritualism was because seance rules seemed to conflict with their ideas about fair conditions of scientific enquiry and

¹⁰⁰ 'A. B.' [Augustus De Morgan], 'Preface', in De Morgan, *Matter to Spirit*, pp. v-xlv, pp. xli and xlivi.

¹⁰¹ Robert Cooper, *Spiritual Manifestations, Including Seven Months with the Brothers Davenport* (London: Heywood and Son, 1867), pp. 215-19.

¹⁰² Hardinge, 'Rules to Be Observed for a Spirit Circle'.

testing.¹⁰³ This was certainly one of the reasons why, in 1861, Faraday declined an invitation to a seance with Daniel Dunglas Home, the famous Scottish-American medium who in the 1850s had stunned Americans, Britons and Europeans with such feats as spirit-rapping, playing untouched musical instruments, self-levitation and handling hot coals.¹⁰⁴ For Faraday, “occult manifestations” had to be studied with the “strictest critical reasoning and the most exact and open experiment” that had yielded so many discoveries in natural philosophy. Among the conditions that he insisted on being met was that Home himself “investigate as a philosopher” and have “no concealments – no darkness – to be open in communication – and to aid inquiry all that he can”.¹⁰⁵

Faraday was not convinced that mediums and spiritualists would ever meet his conditions and this is why he declined a later invitation to a seance and asked John Tyndall, a fellow professor at London’s Royal Institution, to go in his place. Tyndall’s notorious account of this seance revealed that he was as dismayed as Faraday by spiritualists’ apparent want of critical reasoning. He had no qualms about breaking the rules of seance conduct to highlight the self-deception at play: at one point he accidentally caused vibrations in the floor and chair and was bemused to report that one credulous participant ascribed the unexpected tremor communicated to his chair entirely to “spirits’ work”.¹⁰⁶

Spiritualists did not think that a dogmatic attitude towards seance conditions or a mischievous approach to puzzling physical effects was becoming to the likes of Faraday and Tyndall, who should have displayed a spirit of serious, open-minded enquiry. In 1868, for example, the leading spiritualist publisher James Burns criticised Tyndall for abandoning “his usual scientific method” in allowing himself, an “ignorant outsider” to spiritualism, to demand “superlative effects” to appear under conditions that more experienced investigators knew were detrimental to the manifestation of such effects.¹⁰⁷ For spiritualists, the main

¹⁰³ See, for example, Henry Dircks, ‘Science Versus Spiritualism’, *Times*, 27 December 1872, p. 10; W. Matthieu Williams, ‘Science and Spiritualism [1871]’, in *Science in Short Chapters* (London: Chatto and Windus, 1882), pp. 237–51.

¹⁰⁴ The most balanced recent account of Home is Peter Lamont, *The First Psychic: The Peculiar Mystery of a Notorious Victorian Wizard* (London: Little, Brown, 2005).

¹⁰⁵ Michael Faraday to James Emerson Tennent, 14 June 1861, in Frank A. J. L. James (ed.), *The Correspondence of Michael Faraday Volume 6 November 1860–August 1867* (London: Institution of Engineering and Technology, 2012), pp. 106–7, p. 107.

¹⁰⁶ [Tyndall], ‘Science and the Spirits’, p. 725. Like Faraday, Tyndall’s low opinion of spiritualists never changed: see John Tyndall to [Sved Hassan] El Medini, 23 August 1889, f. 30, Add. 41295, British Library.

¹⁰⁷ James Burns cited in [Anon.], ‘Professor Tyndall and the Spiritualists’, *Human Nature*, vol. 2 (1868), pp. 455–6, p. 455.

problem with Tyndall was that, like other scientists, he dogmatically treated spiritualism as a problem in physics, and was accordingly blind to the fact that, unlike purely physical enquiries, the success or failure of effects depended on the psychological state of participants.¹⁰⁸

For all their differences, scientific and medical critics of spiritualism and spiritualists agreed on the importance of the mental state of spiritualist enquirers. But to explain why so many were falling prey to mediumistic trickery, scientific and medical critics turned increasingly to the psycho-physiological causes that had been invoked for mesmerism, Reichenbach's od and related phenomena. Few individuals represented this Victorian bulwark against Victorian spiritualism more volubly than William Benjamin Carpenter.¹⁰⁹ Trained as a doctor, Carpenter established a reputation as a leading authority on medicine and physiology primarily through textbooks, journalism, original research papers and academic positions in London. In the 1840s, he, the British physician Thomas Laycock and others spearheaded a physiological approach to psychology which sought to extend the material laws established to describe bodily behaviour to the mind. This approach built on earlier work finding that bodily responses to nervous stimuli could occur independently of the brain via an 'excito-motor' mechanism centred on the spinal cord. Carpenter argued that a higher level of the nervous system – the cerebrum – could also produce 'automatic' reflexes. If the directing power of the will – the highest level of nervous system – was temporarily absent then the cerebrum could reflect external impressions, sensations, ideas and emotions as 'ideo-motor' responses. As he remarked in 1852, an individual in this state had become a "thinking automaton, the whole course of whose ideas is determinable by suggestions operating from without", even if those suggestions involved false or irrational ideas normally dismissed by the power of the will.¹¹⁰ An individual could reach this state in various ways: they could allow their thoughts to become dominated by particular ideas; they could give themselves up to a state of

¹⁰⁸ Emma Hardinge, 'The Scientific Investigation of Spiritualism', *Spiritual Magazine*, vol. 6 (1871), pp. 3–17.

¹⁰⁹ On Carpenter see Danziger, 'Mid-Nineteenth Century British Psycho-Physiology'; Vance D. Hall, 'The Contribution of the Physiologist William Benjamin Carpenter (1813–1885) to the Development of the Principles of the Correlation of Forces and the Conservation of Energy', *Medical History*, vol. 23 (1979), pp. 129–55; Roger Smith, 'The Human Significance of Biology: Carpenter, Darwin and the *vera causa*', in U. C. Knoepfle and G. B. Tennyson (eds.), *Nature and the Victorian Imagination* (Berkeley, CA: University of California Press, 1977), pp. 216–30; Winter, *Mesmerized*, pp. 287–305.

¹¹⁰ William B. Carpenter, 'On the Influence of Suggestion in Modifying and Directing Muscular Movement, Independent of Volition [1852]', *Notices of the Proceedings of the Meetings of the Members of the Royal Institution*, vol. 1 (1851–4), pp. 147–53, p. 147.

reverie; or, following Braid's work on hypnosis, they could fix their attention on a small bright object.

The integration of mental reflexes into nerve mechanisms reflected Carpenter's ambition to turn psychology into a branch of physiology and thus to raise its scientific status. Cases of mesmerism, odd, table-turning and spirit-rapping to which he devoted considerable attention furnished him with new insights into abnormal powers of the mind and further material for achieving this goal for the study of psychology. One of the earliest of many expositions of this argument appeared in his scathing anonymous review of works on mesmerism, odd, table-turning and related subjects in an 1853 issue of the distinguished forum of intellectual debate, the *Quarterly Review*.¹¹¹ Carpenter argued that physiological and psychological phenomena ascribed directly to agencies beyond the body (for example, mesmeric fluids, odd and disembodied spirits) were more likely to have been caused by ideas within the body – in the mind of the subject. Claims that mesmeric operators directly controlled the will of their subjects via a physical influence was vitiated by the lack of evidence for such a will being exercised independently of ideas about the supposed influence being inadvertently communicated to the subject. Mesmerised subjects were more likely to be automata of mesmeric operators because the mesmeric gaze and passes induced the very state of volitional abandonment that enabled their thoughts and actions to become directed by ideas suggested by operators. Reichenbach's subjects were no less vulnerable to delusive ideas: they were individuals whose "considerable powers of voluntary abstraction" made it possible for ideas about odd inadvertently suggested by Reichenbach to produce physiological sensations ascribed to the alleged new imponderable.¹¹²

Table-turning and spirit-rapping were also best understood as only the latest examples of the deplorable consequences of ideo-motor action. Table-turners themselves, rather than spirits or demons, were the probable cause of the effect. The "dominant power" exerted on their minds and bodies by the very idea of tables turning caused them to push the tables via involuntary muscular action.¹¹³ Witnesses to spirit manifestations – notably those ascribing table raps and movements to discarnate intelligences – were simply not reliable owing to the mental state into which they were

¹¹¹ [William B. Carpenter], 'Electro-biology and Mesmerism', *Quarterly Review*, vol. 93 (1853), pp. 501–57. Carpenter's critique also covered the topic of electro-biology, which was closely related to mesmerism. After staring at a bimetallic coin held in the hand, individuals were thrown into a state of mental and physical susceptibility to the will of an electrobiological operator. The effect was explained in terms of imbalances in the flow of electricity in the body.

¹¹² [Carpenter], 'Electro-biology and Mesmerism', p. 540.

¹¹³ [Carpenter], 'Electro-biology', p. 547.

probably thrown by the "solemn expectancy" and darkness of seances.¹¹⁴ In this state, they were likely to unconsciously produce the movements of tables corresponding to the dominant ideas they had about spirits or to unconsciously produce the revealing bodily gestures exploited by fraudulent mediums *shining* for clues.

For Carpenter, mental education was the main remedy for the spiritualistic and other "epidemic disorders" of the mind because it could train the will to bring the power of reasoning to bear on the automatic tendencies of lower regions of the mind and nervous system.¹¹⁵ But it was not just popular judgement that was a problem: some of the scientific practitioners to whom the public turned on occult matters, notably Gregory and Reichenbach, had no authority because they lacked the "philosophical discrimination" required in subjects that were "essentially physiological and psychological".¹¹⁶ In the 1870s, Carpenter would have new reasons to reiterate this attack on physical scientists appearing to exceed their authority.

Not all physical scientists seemed to lack such discriminatory powers. Indeed, to support his theory of table-turning, Carpenter appealed to Faraday's recent and much-debated intervention on the subject. In the summer of 1853, and beleaguered by repeated requests for his verdict, Faraday communicated the results of his investigations to leading London newspapers. For at least one of the protagonists of this book, Faraday's decision to weigh into this early spiritualistic controversy set a powerful example of the right of natural philosophers or others with expertise in physical science to take the lead on strange physical phenomena capturing the public's attention.¹¹⁷ What especially concerned Faraday was that the public mind was being exposed to explanations that struck him as either scientifically dubious or morally repugnant. He was sceptical of proposals that table-turning was due to electricity, magnetism, an unknown "physical power", the earth's rotation or some "diabolical or supernatural agency".¹¹⁸ Faraday's decision to go public was prompted by a conviction that table-turners had failed to exercise proper scientific judgement and offended his deeply held Christian belief in the dangers of dabbling with potentially "unclean spirits".¹¹⁹

¹¹⁴ [Carpenter], 'Electro-biology', p. 551.

¹¹⁵ [Carpenter], 'Electro-biology', p. 556. See Winter, *Mesmerized*, pp. 294–300.

¹¹⁶ [Carpenter], 'Electro-biology', p. 541.

¹¹⁷ This was Crookes: see Crookes, *Psychic Force and Modern Spiritualism*, pp. 4–6.

¹¹⁸ Faraday, 'Table-Turning'.

¹¹⁹ Cantor, *Michael Faraday*, p. 149; Frank A. J. L. James, *Michael Faraday: A Very Short Introduction* (Oxford University Press, 2010), p. 100.

In his public intervention, however, Faraday played down his moral repugnance and represented table-turning as a regrettable public problem to which the methods of “physical investigation” could be decisively applied.¹²⁰ Employing such methods in several table-turning sessions, he reported failing to detect electrical, magnetic and ‘attractive’ forces. Moreover, he constructed simple mechanical devices showing that table-turners’ hands moved before the tables (suggesting that they dragged the table, not vice versa) and that they involuntarily exerted a horizontal force, even when they were convinced that they only pressed downwards. The most elaborate of the devices, which Faraday strategically displayed in a leading London instrument-maker’s shop window, comprised two horizontal wooden platforms that rolled on each other via glass cylinders, the relative motion of the platforms being magnified by the motion of long straw indicators attached to the platforms. When table-turners rested their hands on the platform but were prevented from seeing the indicators, the indicators moved in the direction in which they expected the table to move, but when they could see the indicators, the indicators failed to move, showing table-turners’ ability to correct the muscular forces that they had been unconsciously exerting in the other scenario. Without this visual evidence of their own agency, table-turners became slaves to the illusory idea that external agencies were responsible.

Faraday linked his interpretation to Carpenter’s psycho-physiological theory and, despite embodying a “physical” approach to table-turning, shared the physiologist’s conclusion that the subject had more to do with psychology and morality than with natural philosophy.¹²¹ The situation tested to the public’s woeful lack of educated judgement and lack of deference to experts on the mind.¹²² Yet both Faraday and Carpenter would be frustrated in their ambition to deliver decisive blows against a subject that challenged their sense of moral and intellectual propriety. Many medical and scientific practitioners, as well as critics of spiritualism, welcomed their interventions and helped give them a prominent place in mid- to late-nineteenth-century debates on epidemic delusions and unconscious powers of the mind.¹²³ But there were many others who, from the mid-1850s onwards, challenged the ideo-motor explanation

¹²⁰ Michael Faraday, ‘Experimental Investigation of Table-Moving’, *Athenaeum*, no. 1340 (2 July 1853), pp. 801–3, p. 801.

¹²¹ Faraday, ‘Experimental Investigation’, p. 803.

¹²² Michael Faraday, ‘Observations on Mental Education [1854]’, in Michael Faraday, *Experimental Researches in Chemistry and Physics* (London: Richard Taylor and William Francis, 1859), pp. 463–91.

¹²³ S. E. D. Shortt, ‘Physicians and Psychics: The Anglo-American Medical Response to Spiritualism’, *Journal of the History of Medicine and Allied Sciences*, vol. 39 (1984), pp. 339–55; Winter, *Mesmerized*, pp. 287–305.

upheld by Faraday and Carpenter. A common criticism was that it failed to explain how tables had moved with only light pressure being applied or with no bodily contact at all.¹²⁴ Spiritualists were not alone in expressing such doubts. A contributor to the *Mechanics' Magazine*, for example, regretted that Faraday had not determined whether the force attributed to table-turners was sufficient to turn the tables and had inadvertently hindered the study of a "principle" that was potentially "precious" to science.¹²⁵ Faraday's verdict would certainly persuade William Thomson, but not the British telegraph engineer Latimer Clark, who in 1857 told Faraday about his experiences of seances in which mere finger contact had caused heavy tables to tilt, and which he denied could be put down to self-delusion and trickery.¹²⁶

The case for a better 'physical' investigation of this "precious" subject gained a far weightier advocate in the American academic chemist Robert Hare. In *Experimental Investigations into Spirit Manifestations* (1855), a work hailed by many spiritualists as the most scientific approach to their subject to date, Hare explained that in 1853 he had accepted Faraday's explanation of table-turning and repudiated the electrical theory because the human body could not produce electric currents and, even if it could, tables could not store enough electricity to cause the rotation.¹²⁷ However, Hare's confidence in the theory of unconscious muscular action was undermined after attending numerous seances where he was convinced that he had seen objects moving without being touched. The motion seems to have been initiated by disembodied spirits working through a medium and which had also persuaded him of their genuineness based on their ability to convey information to him that nobody present at the seances could have known.

To conclusively rule out trickery in these physical and psychological feats, Hare followed Faraday's example of introducing mechanical devices into a site of spiritualistic enquiry. One device was designed to

¹²⁴ J. H. Powell, *Spiritualism: Its Facts and Phases* (London: F. Pitman, 1864), pp. 83–4; Epes Sargent, *Planchette, Or, the Despair of Science* (Boston: Roberts Brothers, 1869), p. 15.

¹²⁵ [Anon.], 'Professor Faraday and Table-Turning', *Mechanics' Magazine*, vol. 59 (1853), pp. 23–5, p. 23.

¹²⁶ Silvanus P. Thompson, *The Life of William Thomson, Baron Kelvin of Largs*, 2 vols. (London: Macmillan and Co., 1910), vol. 2, p. 1105; Latimer Clark to Michael Faraday, 29 April 1857, in Frank A. J. L. James (ed.), *The Correspondence of Michael Faraday Volume 5 November 1855–October 1860* (London: Institution of Engineering and Technology, 2008), pp. 221–3. Cf. the science journalist William H. Harrison who later criticised Faraday's theory as "all stuff & nonsense": William H. Harrison to Balfour Stewart, 1868, PRO BJ1/25, Records of the Kew Observatory, National Archives.

¹²⁷ Robert Hare, *Experimental Investigation of the Spirit Manifestations* (New York: Partridge and Brittan, 1855), p. 35.

measure the force owing from a medium's hands on a wooden board, direct contact being eliminated by positioning the hands in a vessel of water resting on the board. The significant result that Hare managed to replicate several times – the medium managed to produce a force of 18 pounds without appearing to experience any mechanical reaction – suggested the direct mechanical effect of spirits. While Hare's argument persuaded few scientific readers of the 1850s, it certainly made an impact on later scientific enquirers such as Crookes, Varley and the naturalist Alfred Russel Wallace.¹²⁸

When interpreting the results of his experimental investigations, Hare shared the reservations of many spiritualists towards odic and similar theories of spirit manifestations. Od, like the mesmeric fluid and better-established imponderables, could not explain the intelligence of the force behind most of these manifestations, including that causing another of Hare's mechanical devices to spell out 'spirit' messages via a pointer moving around letters on a dial.¹²⁹ Even physical tests such as Hare's confirmed that spirit manifestations seemed to be intractably psychological in nature. As we have seen with Carpenter, the problem faced by many enquirers into spiritualism was whether the intelligence behind spirit manifestations was associated with a material brain or was entirely disembodied. For some commentators on spiritualism, including many British mesmerists, spirit manifestations were entirely under the control of an embodied mind, even if that mind exerted influence beyond the material brain via the mesmeric fluid.¹³⁰

This was also the conclusion reached by the eminent French statesman Count Agénor de Gasparin, who, in an 1854 work later praised by Crookes, reported myriad cases of heavy objects levitating without physical contact and responding to the human will that could not be put down to fraud or ideo-motor action.¹³¹ Yet despite impressing readers

¹²⁸ Hare, *Experimental Investigation*, pp. 49, 164–5, and text facing plate 3; William Crookes, 'Some Further Experiments in Psychic Force', *Quarterly Journal of Science*, vol. 1 (1871), pp. 471–93, p. 477; Cromwell F. Varley, 'Psychic Force', *English Mechanic and World of Science*, vol. 14 (1872), pp. 454–5; Alfred Russel Wallace, *The Scientific Aspect of the Supernatural* (London: F. Farrar, 1866), pp. 33–5.

¹²⁹ Hare, *Experimental Investigation*, pp. 392–4. Cf. William Howitt to G. H. Forbes, 9 May 1861, cited in Thomas P. Barkas, *Outline of Ten Years' Investigations into the Phenomena of Modern Spiritualism* (London: Frederick Pitman, 1862), pp. 148–60.

¹³⁰ Crabtree, *Mesmer to Freud*, pp. 245–65. These mesmerists included John Elliotson, who, a philosophical materialist, bitterly condemned the "delusion" about spirits, which he classed as "supernatural fancies" having no place in "philosophical work". See John Elliotson, 'The Departed Spirits', *Zoist*, vol. 11 (1853–4), pp. 191–201, p. 200. Seances with Home in 1861, however, persuaded him of the genuineness of disembodied spirits.

¹³¹ Comte Agénor de Gasparin, *Des tables tournantes, du surnaturel en général et des esprits*, 2 vols. (Paris: E. Dentu, 1854). Crookes, 'Some Further Experiments', pp. 476–7. On Gasparin and the context of French table-turning see Monroe, *Laboratories*, chapter 1.

with the stringency of its tests and its measurements of the mechanical strength of levitating force, Gasparin's approach would not have satisfied thousands of seance-goers who were convinced that disembodied minds had to be behind the physical effects because such agents also relayed information that they were satisfied could not have been obtained by any embodied mind.

By the 1860s, sections of the British press were in no doubt that spiritualism remained an acute moral and scientific problem given the estimated millions of converts across the globe.¹³² The interventions by Carpenter, Faraday and other scientific practitioners had simply failed to vanquish what many deemed a mixture of delusion and imposture. In 1861, the North British Review contended that spiritualism merited a "more philosophical and scientific examination than it has yet received", while over a decade later the London Times criticised "our scientific men" for "signally failing to do their duty by the public, which looks to them for its facts", including facts that would "decide a prejudiced controversy".¹³³ These pleas were partly prompted by the increased cultural profile that spiritualism had gained in Britain during the 1860s. In addition to the much-publicised activities of Home, the Davenport brothers and other visiting American mediums, spiritualism now boasted an expanding number of home-grown mediums, a handful of dedicated periodicals and organisations, a plethora of private spirit circles and a growing list of distinguished converts, including the Tory peer and archaeologist Lord Adare, the publisher and author Robert Chambers and the physician James Manby Gully.

Spiritualism continued to divide the scientific practitioners whose approach to the subject disappointed so many journalists. Two of Britain's most senior natural philosophers – Faraday and David Brewster – had no time for the subject because their negative experiences (of table-turning and Home seances respectively) persuaded them that further enquiries would only confirm the delusive, banal and morally pernicious nature of spirit manifestations.¹³⁴ Many younger scientific savants agreed: Thomas Henry Huxley notoriously refused to join a systematic enquiry into spiritualism launched by the London Dialectical Society because he had no time or inclination to investigate

¹³² Estimate given in [Anon.], 'Modern Necromancy', *North British Review*, vol. 67 (1861), pp. 110–41, p. 110.

¹³³ [Anon.], 'Modern Necromancy', p. 110; [Anon.], 'Spiritualism and Science', *Times*, 26 December 1872, p. 5.

¹³⁴ Michael Faraday to Robert Cooper, 31 January 1863, in James, *Correspondence of Michael Faraday Volume 6*, p. 290; [David Brewster], 'Pretensions of Spiritualism – Life of D. D. Home', *North British Review*, vol. 39 (1863), pp. 174–206.

the banal “chatter” of spirits or the “twaddle” of mediums.¹³⁵ But a growing number of scientific savants challenged such dismissive attitudes. These included Carpenter and his closest scientific and medical allies, who, during their battles against popular delusions, accepted that spiritualism was a legitimate branch of psycho-physiological enquiry that could yield new insights into mental mechanisms.¹³⁶

But there were other savants – notably De Morgan, Varley and Wallace – who believed that spiritualistic investigation had a still-wider scientific importance. Few savants tried harder to persuade fellow scientific savants of this possibility than Wallace. After attending seances between 1865 and 1867, the cofounder with Darwin of the theory of biological evolution by natural selection was convinced that disembodied spirits had communicated information about a dead brother that could not have been known by any living soul, and had caused heavy objects to levitate and flowers and fruit to materialise out of thin air.¹³⁷ Like many Victorians, Wallace was drawn to spiritualism because of personal experiences of the mesmeric trance, because its spiritual theories better fitted the psychological and physical facts of the seance than any other theory (including fraud), and because the future state revealed by spirits was altogether more appealing than that taught by orthodox Christianity.¹³⁸

Unlike many of the spiritualists who championed his work, however, Wallace had much more confidence in scientists’ capacity to investigate seance phenomena as long as they were humble and patient enough to learn the conditions under which phenomena could be witnessed.¹³⁹ But he also echoed the views of Mesmer and Reichenbach in recognising that the study of strange new imponderable agencies was relevant to and potentially important to the physical sciences. His argument stemmed partly from Faraday’s declaration of 1854 that while table-turning was a delusion, conclusive proof of a new force enabling the fingers to attract

¹³⁵ Thomas Henry Huxley quoted in Report on Spiritualism, pp. 229–30.

¹³⁶ This is apparent from William B. Carpenter to G. W. Bennett, 24 December 1869, quoted in Report on Spiritualism, p. 266.

¹³⁷ On Wallace and spiritualism see Martin Fichman, *An Elusive Victorian: The Evolution of Alfred Russel Wallace* (Chicago University Press, 2004), chapter 4; Malcom J. Kottler, ‘Alfred Russel Wallace, the Origin of Man and Spiritualism’, *Isis*, vol. 65 (1974), pp. 145–92; James R. Moore, ‘Wallace in Wonderland’, in Charles H. Smith and George Beccaloni (eds.), *Natural Selection and Beyond: The Intellectual Legacy of Alfred Russel Wallace* (Oxford University Press, 2008), pp. 353–67; Charles H. Smith, ‘Wallace, Spiritualism, and Beyond: “Change”, or “No Change”’, in Smith and Beccaloni, *Natural Selection*, pp. 391–423.

¹³⁸ Wallace, Scientific Aspect; Alfred R. Wallace, *My Life: A Record of Events and Opinions*, 2 vols. (London: Chapman and Hall, 1905), vol. 2, 275–350.

¹³⁹ Alfred R. Wallace, draft letter to the editor of the *Pall Mall Gazette*, circa May 1868, ff. 35–43, Add. 46439, ARW-BL.

or repel untouched objects would gain the discoverer "the attention of the whole scientific and commercial world".¹⁴⁰ The same remark would make an impression on at least one of our protagonists.¹⁴¹ But Wallace also expected physicists to take spiritualism seriously because he, and other reputable scientific inquirers, could now "show" a force that had been "declared impossible".¹⁴² For Wallace, the "rapid strides" made in "physical science" over the previous few decades was a good reason why physicists could not legitimately adhere dogmatically to ideas about the possible or impossible.¹⁴³

Extending the Boundaries of Physics

In *The Scientific Aspect of the Supernatural*, his first substantial publication on spiritualism, Wallace argued that the spiritualist idea of the human personality transiting, more or less unchanged, to a disembodied state was rendered "more probable" by one "great law" of science.¹⁴⁴ This was the universal law of 'continuity', which the Welsh barrister and natural philosopher William Robert Grove had chosen as the theme of his presidential address to the British Association for the Advancement of Science, which held its 1866 annual meeting only a few months before Wallace's book appeared.¹⁴⁵ Grove had defined the law as a belief that the "progress of science" would reveal the "intermediate links" uniting "apparently segregated" natural phenomena with "other more familiar phenomena".¹⁴⁶

Although Grove declined to discuss spiritualism, Wallace was evidently impressed by the fact that his conception of continuity allowed the seemingly "segregated" manifestations of disembodied spirits to be reconciled with the more familiar phenomena of psychology.¹⁴⁷ Continuity was the perfect principle for underpinning an argument, shared by Wallace and most spiritualists, that seemingly supernatural phenomena such as

¹⁴⁰ Faraday, 'Mental Education', p. 471.

¹⁴¹ This was William Fletcher Barrett. See William F. Barrett to Oliver Lodge, 20 November [circa 1900], SPR.MS 35/155, OJL-SPR.

¹⁴² Alfred R. Wallace to Thomas Henry Huxley, 1 December 1866, f. 12, Add. 46439, ARW-BL.

¹⁴³ Wallace, *Scientific Aspect of the Supernatural*, p. 10.

¹⁴⁴ Wallace, *Scientific Aspect of the Supernatural*, p. 43.

¹⁴⁵ On Grove see Iwan Rhys Morus, *William Robert Grove: Victorian Gentleman of Science* (Cardiff: University of Wales Press, 2017).

¹⁴⁶ William Robert Grove, 'Address', in *Report of the Thirty-Sixth Meeting of the British Association for the Advancement of Science Held at Dundee in September 1867* (London: John Murray, 1867), pp. liii–lxxii, p. lvi.

¹⁴⁷ Grove's refusal to pass judgement on spiritualism was reported in [Anon.], 'Professor W. R. Grove on Spirits', *Spiritualist*, vol. 1 (1869–71), p. 95.

disembodied spirits would turn out to be part of an enlarged conception of the natural order. Wallace would not be the only Victorian man of science who found within the sciences, and especially the physical sciences, laws, principles and discoveries that lent weight to this.

Few achievements in the sciences gave Grove greater confidence in the law of continuity than those illuminating the close relationship between different physical forces or "affections of matter".¹⁴⁸ Since the 1840s, he had been a leading architect of the widely used idea that gravitation, inertia, heat, light, electricity, magnetism and chemical affinity could be closely correlated. Scientific investigations into these forces since the early 1800s had yielded evidence that they were not only dependent on each other, but mutually convertible, and ultimately reducible to forms of matter in motion.¹⁴⁹ As Iwan Morus has argued, Grove's conception of correlation was one of many strategies used by mid-nineteenth-century natural philosophers to give coherence to a range of divergent scientific enterprises and to redefine such enterprises as aspects of what would become the discipline of physics.¹⁵⁰

The period between the 1830s and the 1860s witnessed many other steps towards the creation of the discipline. By the start of this period, many of the methodological features of physics had been established, especially those relating to experiment, measurement and calculation.¹⁵¹ Subsequent decades saw the growth of professorships and academic research and teaching laboratories, as well as the emergence of such unifying concepts as energy, whose laws of conservation and dissipation were promoted by its architects as surpassing the long-cherished Newtonian ideas about force.¹⁵² The middle decades of the century also saw the increasing presence of physical subjects in popular lectures, scientific and industrial exhibitions and commercial culture, and a marked rise in the place of physical

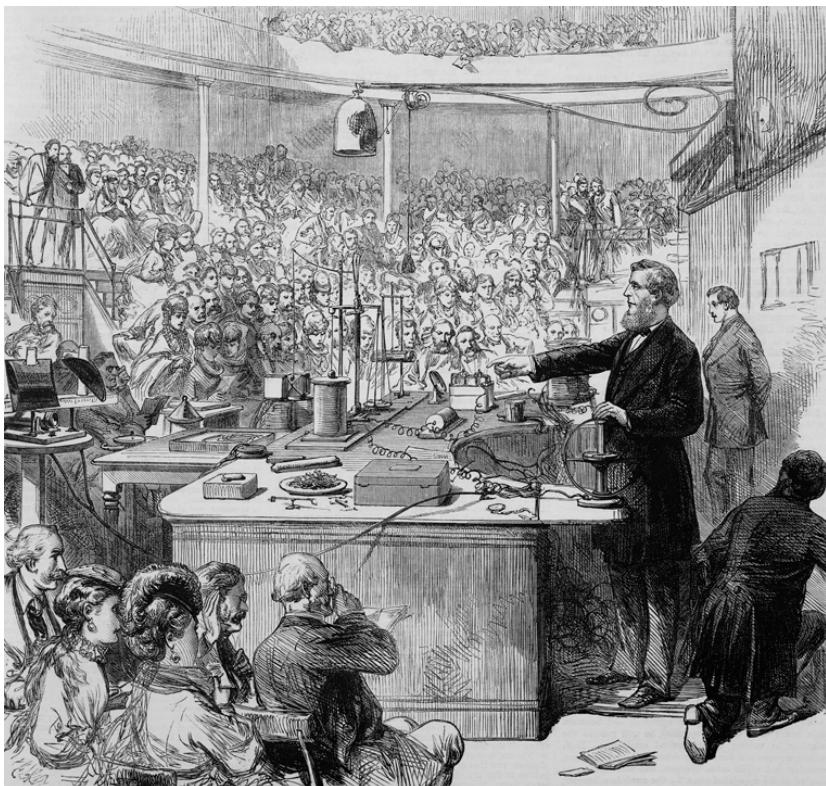
¹⁴⁸ William Robert Grove, *The Correlation of Physical Forces* (London: Longman, Green, Longman, Roberts, & Green, 1862), p. 240.

¹⁴⁹ Morus, *When Physics Became King*, chapter 3.

¹⁵⁰ Morus, *When Physics Became King*, pp. 76–7.

¹⁵¹ Jed Z. Buchwald and Sungook Hong, 'Physics', in David Cahan (ed.), *From Natural Philosophy to the Sciences: Writing the History of Nineteenth-Century Science* (Chicago University Press, 2003), pp. 163–95, pp. 163–6.

¹⁵² On the rise of physics laboratories see David Cahan, 'An Institutional Revolution in German Physics, 1865–1914', *Historical Studies in the Physical Sciences*, vol. 15 (1985), pp. 1–65; Graeme J. N. Gooday, 'Precision Measurement and the Genesis of Physics Teaching Laboratories in Victorian Britain', *British Journal for the History of Science*, vol. 23 (1990), pp. 25–51; Graeme J. N. Gooday, 'Teaching Telegraphy'; Terry Shinn, 'The French Science Faculty System, 1808–1914: Institutional Change and Research Potential in Mathematics and Physical Sciences', *Historical Studies in the Physical Sciences*, vol. 10 (1979), pp. 271–332. On the rise of the energy concept see Smith, *Science of Energy*.



1.4 Few individuals embodied the growing cultural significances of physics more than John Tyndall, here depicted giving a lecture on electricity at the Royal Institution, London's premier venue for public science. From *Illustrated London News*, 14 May 1870. Reproduced by permission of De Agostini/Getty Images.

sciences in print culture, from classroom textbooks to the blossoming periodical press (Figure 1.4).¹⁵³ This was also the period in which some of this book's protagonists built their careers, and the diversity

¹⁵³ On popular physics lectures see Sophie Lachapelle, *Conjuring Science: A History of Scientific Entertainment and Stage Magic in Modern France* (London: Palgrave Macmillan, 2015), chapter 1; Bernard Lightman, *Victorian Popularizers of Science: Designing Nature for New Audiences* (Chicago University Press, 2007), chapter 4; Morus, *When Physics Became King*, chapter 4. On physics periodicals see Graeme Gooday, 'Periodical Physics in Britain: Institutional and Industrial Contexts, 1870–1900', in Gowan Dawson, Bernard Lightman, Sally Shuttleworth and Jonathan Topham (eds.), *Constructing Scientific Communities: Science Periodicals in Nineteenth*

of their career paths illustrates the fluidity of the boundaries of physics. It was possible for individuals with backgrounds in such areas as analytical chemistry and scientific journalism (Crookes), medicine (William H. Stone), meteorology (Balfour Stewart) and telegraph engineering (Varley) to make significant contributions to the nascent discipline. It was precisely this fluidity that underpinned their conviction that psychical phenomena were a potential area into which physics could be further extended.

As one of the leading scientific popularisers of the 1840s, Grove well understood that the success of the intellectual transformation of natural philosophy hinged on persuading audiences of its ultimate cultural, social and economic utility. Natural philosophers needed to demonstrate that their ability to understand and control physical forces had more than just intellectual significance. The importance of serving the “thinking portion of mankind” and “practical minds” was precisely the reason why, in his 1866 address, Grove deemed the “greatest triumph of force-conversion” to be the recent laying of two telegraph cables under the Atlantic Ocean.¹⁵⁴ A large-scale application of the conversion of chemical into electrical force, the first successful transatlantic cables gave new continuity to Britain and the United States of America, whose relationship had been strained during the American Civil War.¹⁵⁵

One of Grove’s auditors would have been especially gratified to hear the Atlantic cable reference. This was Cromwell Varley, who, enjoying a popular image as one of the scientific ‘heroes’ of this engineering feat, was at the British Association to present new researches on the electrical properties of the Atlantic cable.¹⁵⁶ Varley’s career exemplified the wider significances of natural philosophy that Grove and others had long been emphasising. The son of an artist and optical instrument maker, Varley had attended Grove’s popular scientific lectures in the 1840s before building a career as an electrician for Britain’s largest commercial operator of inland telegraphs, the Electric Telegraph Company, and later as

Century Britain, forthcoming. On physics textbooks see Josep Simon, ‘Physics Textbooks and Textbook Physics in the Nineteenth and Twentieth Century’, in Buchwald and Fox, Oxford Handbook of the History of Physics, pp. 651–78. For physical topics in the general periodical press see Myers, ‘Nineteenth Century Popularizations’; Smith, Science of Energy, chapter 9.

¹⁵⁴ Grove, ‘Address’, pp. liii and lxvi.

¹⁵⁵ Historical studies of oceanic telegraphy are numerous but see Headrick, *Invisible Weapon*, chapter 2; Simone Müller, *Wiring the World: The Social and Cultural Creation of Global Telegraph Networks* (New York: Columbia University Press, 2015), introduction and chapter 1; Smith and Wise, *Energy and Empire*, chapters 19–20.

¹⁵⁶ [Anon.], ‘The Heroes of the Atlantic Telegraph Cable’, *Illustrated Times*, 25 August 1866, p. 21.

a consultant for transatlantic cable businesses.¹⁵⁷ His ascent depended on his ability to make expertise in understanding and manipulating physical forces the key to telegraphy's technical and commercial success. Indeed, he was one of many British electrical engineers, natural philosophers and physicists who were involved in the development of new and more accurate tools of telegraph signalling and fault detection and more robust standards of electrical measurement, all of which made telegraphy technically more reliable and commercially more attractive.¹⁵⁸

From the late 1850s onwards, Varley was actively involved in campaigns to raise public confidence in and the huge financial backing needed for long-distance submarine telegraphy, an enterprise plagued by sloppy, secretive and even fraudulent engineering practices. The failures of the first transatlantic cables and the Red Sea cable of 1859–61 compounded perceptions that, as one commentator charged in 1862, telegraphy was an "art occult even to many of the votaries of electrical science".¹⁵⁹ Varley would have agreed with this assessment but had no doubt that the extension of electrical science to the oceanic engineering experiments would vanquish professional scientific and public misgivings about the integrity of telegraphy and its practitioners (Figure 1.5).

By 1866, Varley had accepted that his skills in correlating physical forces could be profitably extended to other, and much more troublesome, 'occult' telegraphs. In 1868, many would have been intrigued to learn that one of their cable heroes had publicly declared his belief in the phenomena and teachings of spiritualism. Nearly a decade of investigating the subject had persuaded him of the reality of "physical manifestations" not accounted for in "known laws of nature" and which opened up an "extensive field of mental and physical knowledge".¹⁶⁰ As he explained to Wallace a year later, however, the task of relating this and the other world would require some of the skills that had proved so successful in connecting the Old and New Worlds. Giving spiritualism an "intelligible shape" to the world required a "clever man" to "establish a clue to the relations existing between the physical forces known to us and those forces, by which the spirits are sometimes able to call into play the power by which they produce physical phenomena".¹⁶¹ He had already

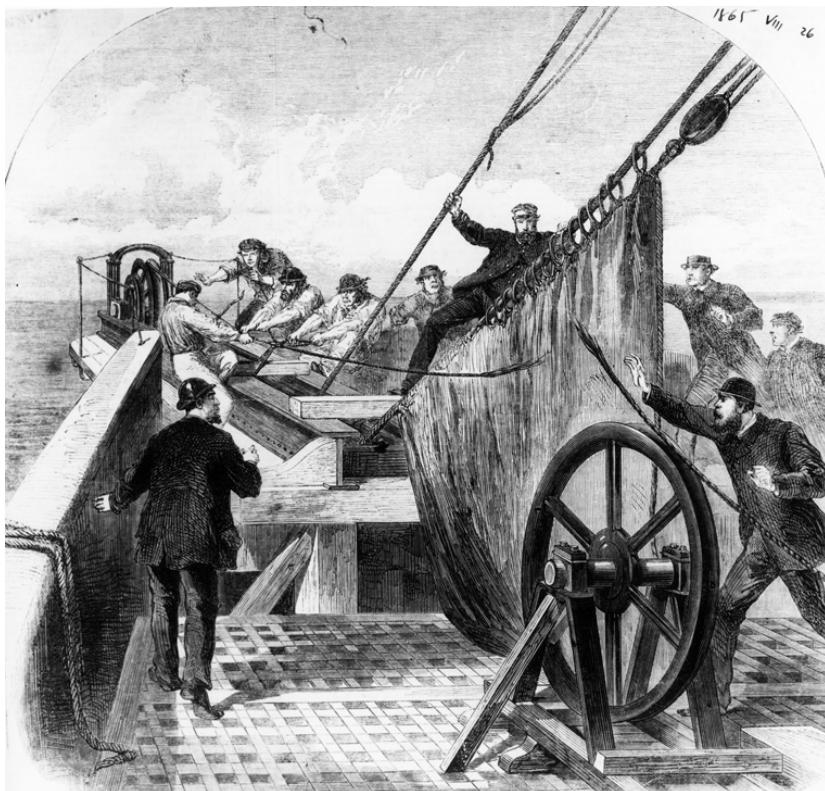
¹⁵⁷ On Varley see Noakes, 'Telegraphy'.

¹⁵⁸ Hunt, 'Ohm Is Where the Art Is'; Smith and Wise, *Energy and Empire*, chapter 19.

¹⁵⁹ [Anon.], 'Moral Causes', *Electrician*, vol. 2 (1862), pp. 39–40, p. 39.

¹⁶⁰ Varley quoted in [Anon.], 'Lyon v. Home', *Spiritual Magazine*, vol. 3 (New Series) (1868), pp. 241–54, p. 244. Varley's declaration appeared as part of his affidavit testifying to the honesty of D. D. Home, who had been accused of using fraudulent mediumistic methods to swindle money out of a wealthy widow.

¹⁶¹ Cromwell F. Varley to Alfred R. Wallace, 28 January 1869, ff. 47–50, Add. 46439, ARW-BL.



1.5 The transatlantic cable breaks while being laid from the steamship Great Eastern in August 1865. This accident dramatised the troublesome nature of oceanic telegraphy in this period. From *Illustrated London News*, 26 August 1865. Reproduced by permission of Hulton Archive/Getty Images.

made some headway in this quest. Two years earlier, in seances with the famous American medium Katherine Fox, he had used electrical apparatus commonly used in telegraphy to establish that professed spirits, like Reichenbach's subjects, appeared to perceive powers accompanying electricity and magnetism that were invisible to most people.¹⁶²

Varley's approach to mysterious 'spirit' forces requiring the presence of a medium represented a bold extension of work done by physiologists and physicians over previous decades to relate physical and vital forces. It

¹⁶² Varley, 'Evidence of Mr. Varley', pp. 165–6.

owed something to the development of the field of electrophysiology, which explored the relationships between different types of electricity, vitality and the nervous force.¹⁶³ A greater debt was to the more general shifts of physiology towards chemistry and natural philosophy. In separate studies during the 1840s, the German physician Julius Robert Mayer and his compatriot, the physician-turned-physiologist and natural philosopher Hermann von Helmholtz, analysed the close connections between the human body's vital processes (notably the oxygenation of food) and its capacity to produce heat and mechanical work.¹⁶⁴ Although suffering a poor initial reception, their researches were later hailed as foundation stones for two of the major generalisations in nineteenth-century physics – that the total amounts of force and energy in the cosmos were constant, although they could change form.

Another medically trained scientific practitioner whose work was seen to have helped establish these generalisations was Carpenter.¹⁶⁵ In 1850, and before his most public interventions on mesmerism and spiritualism, he extended Grove's concept of correlation to the vital forces that produced physiological phenomena from the transformation of physical forces. His research examined some of the psycho-physical interactions that we have already discussed in this chapter, including studies of the close link between electricity and the nervous force and, more significantly, the apparently convergent investigations by Reichenbach and Faraday suggesting links between magnetism and the nervous force.¹⁶⁶

Carpenter's enthusiasm for Reichenbach's proposed odic link between the physical and vital forces was short-lived, and by 1853 he was accusing Reichenbach of relying on witnesses who were victims of the closely correlated forces of human physiology and psychology. However, others, including the author of *The Electrician's 'Animal "Magnetism"'*, maintained that studies of od could fuel the progress of the physical sciences. The physician and medical electrician William H. Stone agreed. In a period when the British medical establishment typically associated medical electricity with quackery, he fought hard to raise the intellectual profile of research on the

¹⁶³ On electrophysiology see Edwin Clarke and L. S. Jacyna, *Nineteenth-Century Origins of Neuroscientific Concepts* (Berkeley, CA: University of California Press, 1987), chapter 5.

¹⁶⁴ See Kenneth Caneva, *Julius Robert Mayer and the Conservation of Energy* (Princeton University Press, 1993) and Fabio Bevilacqua, 'Helmholtz's Über die Erhaltung der Kraft: The Emergence of a Theoretical Physicist', in Cahan, *Hermann von Helmholtz*, pp. 293–333.

¹⁶⁵ For discussion see Hall, 'Contribution of the Physiologist'.

¹⁶⁶ William B. Carpenter, 'On the Mutual Relations of the Vital and Physical Forces', *Philosophical Transactions of the Royal Society of London*, vol. 140 (1850), pp. 727–57, p. 746.

relationship between electricity and the human body.¹⁶⁷ As someone who had long recognised the value of turning medical and physiological problems into fruitful enquiries in physical science, Stone's interest in studying alleged connections of od to physical and vital forces is hardly surprising.

Like others establishing close links between the physical and vital realms, Carpenter tried to distance himself from charges of philosophical materialism to which the more 'physical' approaches to physiology and psychology had been subjected. For him, the mechanisms of the human body and mind, as well as those pervading the cosmos, were under the control of an immaterial will, whether human or divine.¹⁶⁸ This need to challenge materialist interpretations of extensions of physical principles into the vital realm was also felt by a young William Crookes in 1862. By this time, Crookes had established himself as a prominent analytical chemist and scientific journalist.¹⁶⁹ Between 1849 and 1854 he had studied at London's Royal College of Chemistry, and by the early 1860s he had significantly boosted his scientific reputation by editing scientific periodicals and discovering a new chemical element: thallium. This latter achievement depended critically on Crookes's mastery of the relatively new technique of spectro-chemical analysis (later christened 'spectroscopy'). A significant extension of optics into the field of analytical chemistry, this yielded evidence of the chemical composition of material bodies (both terrestrial and celestial) by analysing the light that they emitted into a spectrum of lines. For Crookes and others, mastering this technique was not easy because of such practical difficulties as observing faint and transient chemical 'spectra' and conclusively distinguishing known and unknown elements from such spectral fingerprints¹⁷⁰ (Figure 1.6).

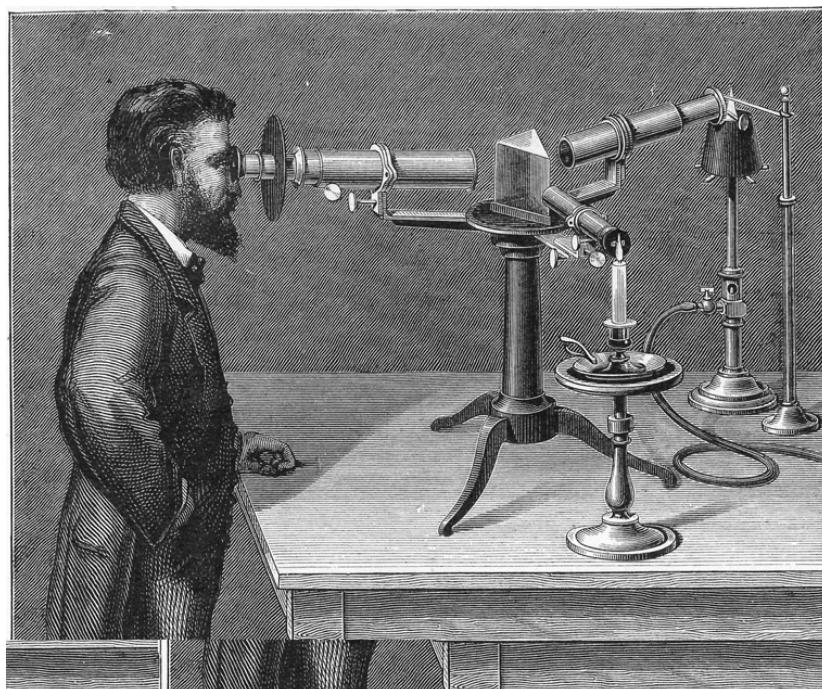
Through his teacher, the German chemist August Wilhelm Hofmann, Crookes acquired an understanding of the chemical and physical bases of animal physiology, a major research area of Liebig, who had taught Hofmann and inspired Helmholtz. A good deal of this understanding is evident in an essay that Crookes contributed to an 1862 number of the Popular Science Review, one of a plethora of semi-popular science

¹⁶⁷ Iwan Rhys Morus, 'The Measure of Man: Technologizing the Victorian Body', *History of Science*, vol. 37 (1999), pp. 249–83; Takahiro Ueyama, 'Capital, Profession and Medical Technology: The Electrotherapeutic Institutes and the Royal College of Physicians, 1888–1922', *Medical History*, vol. 41 (1997), pp. 150–81.

¹⁶⁸ Smith, 'Human Significance of Biology', p. 223.

¹⁶⁹ On Crookes's early career see Brock, *William Crookes*, chapters 1–4.

¹⁷⁰ On spectroscopy see Klaus Hentschel, *Mapping the Spectrum: Techniques of Representation in Research and Teaching* (Oxford University Press, 2002); James, 'Practical Problems'; Frank A. J. L. James, 'The Study of Spark Spectra, 1835–1859', *Ambix*, vol. 30 (1983), pp. 137–62; Schaffer, 'Where Experiments End'.



1.6 A standard late-nineteenth-century compound spectrograph. Here, light from chemical substances burned in a gas flame (far right) is passed through a slit and collimator which focusses the image of the flame on a prism (centre). The prism disperses the image into a spectrum, which is observed in the telescope (left). The candle flame on the centre-right illuminates a photographic scale in a telescope lens enabling measurements of spectra. From J. Norman Lockyer, *The Spectrograph and Its Applications* (London: Macmillan and Co., 2nd ed., 1873).

periodicals established in the mid-Victorian period.¹⁷¹ The essay explored an analogy between the life of a human being and of a candle flame and was partly designed to emphasise the social utility of science. Scientific analysis of human respiration revealed that human life, like that

¹⁷¹ William Crookes, 'The Breath of Life', *Popular Science Review*, vol. 1 (1862), pp. 91–9. For these periodicals see Ruth Barton, 'Just before Nature: The Purposes of Science and the Purposes of Popularization in English Popular Science Journals of the 1860s', *Annals of Science*, vol. 55 (1998), pp. 1–33; Susan Sheets-Pyenson, 'Popular Science Periodicals in Paris and London: The Emergence of a Low Scientific Culture, 1820–1875', *Annals of Science*, vol. 42 (1985), pp. 549–72.

