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DARWINISM, POSITIVISM, MATERIALISM, RELATIVISM

Science and Philosophy in the 1860s

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20.1 Introduction

Any philosopher of science worth their salt can tell you that Darwinism does not imply materialism or naturalism (Sober 2011, chap. 4). Nevertheless, looking at the entire history of evolutionary theorizing, one would be hard-pressed to find an evolutionist who was not also accused of being a materialist. The proto-evolutionary speculations of Charles Darwin's grandfather, for instance, were classed among "the systems of materialism" by the Scottish philosopher Thomas Brown (1798, xvi). But though the connection between evolution and materialism had been made well before the mid-nineteenth century, it became more explicit and more common in the wake of the anonymous *Vestiges of the Natural History of Creation*, a bestseller published in 1844 (Secord 2000). After *Vestiges*, evolutionism became the hallmark of what was often called "modern materialism," a link that was only strengthened by Darwin's work.

As a case in point, the Unitarian pastor John Weiss, who was later involved with the Free Religious Association, gave a speech with this title in Massachusetts that began by laying out "the physical basis for the new kind of materialism":

If, [the materialist] says, the present complex state of the brain has resulted from a gradual accumulation of its organs, each of which has been added according as natural circumstances called for a fresh faculty, at what point in the line can you introduce an independent human soul? . . . Upon this basis the materialist . . . proceeds to ask what difference, except in degree, there is between man and the animals which rank next to him in intelligence and varied capacity.

(Weiss 1852, 8–9)

By the time another radical Unitarian, James Martineau, delivered his own address on the topic in London, the link between Darwinism and materialism was firmly established. The "new 'book of Genesis,'" declared Martineau, "resorts to Lucretius for its 'first beginnings', to protoplasm for its fifth day, to 'natural selection' for its Adam and Eve, and to evolution for all the rest" (Martineau 1874, 8).

This chapter is a brief overview of the relationships between Darwinism and materialism in the 1860s. Building on the research of Bernard Lightman (1987, 2004, 2015), Ruth Barton (2018, 440–444), and W. J. Mander (2020, chaps. 1–4), I will demonstrate that materialism was part of a package of interrelated and frequently associated philosophical positions, including positivism, agnosticism, relativism, and Darwinism. The chapter has three parts. First, I will provide a bit of background on the scientific aspects of German materialism and Herbert Spencer’s reformulation of positivism in the 1850s. Next, I will discuss the late-1860s views of the most prominent “modern materialists,” the Irish physicist John Tyndall and the English zoologist Thomas Henry Huxley. Third, I will analyze parallels between these views and those of Friedrich Albert Lange, a German neo-Kantian critic of materialism, suggesting that both depended on a distinction between the perspective of science and that of philosophy.

20.2 Materialism and Positivism in the 1850s

The German materialists were very interested in topics such as organic evolution and spontaneous generation (Gregory 1977, chap. 8). In this section, I will show that Ludwig “Louis” Büchner, the most popular of these philosophers, was motivated by some of the same scientific developments that influenced Darwin and Spencer. I will then discuss Spencer’s appropriation of positivism in the 1850s.

Büchner brought together materialism and science from the very beginning of his infamous book, *Force and Matter*. He admitted that materialism was not a new metaphysical viewpoint but claimed that the “necessary empirical basis” for it had only been provided by “the progress of the natural sciences in our century” (Büchner 1855, ix).¹ He thus labeled his chapters studies in empirical – in contrast to speculative – *Naturphilosophie*, from the laws of nature to animal minds.

Although Darwin’s *Origin* was not yet published, Büchner’s discussions of “The Periods of Creation of the Earth” and “Spontaneous Generation” were built on the same foundation: uniformitarian geology. As the subtitle of Charles Lyell’s *Principles of Geology* (1830) indicates, uniformitarians defended the view that “the former changes of the Earth’s surface” could be attributed “to causes now in operation” but acting over extremely long periods of time. Lyell and his uniformitarian predecessors applied this principle not only to the inorganic but also to the organic world: John Playfair suggested that “whole *species*, and even perhaps *genera*,” could be extinguished, changes which were “a part of the order of nature, and . . . visible in instances to which human power cannot have extended” (Playfair 1802, 469–470; quoted in Lyell 1830, 86).

Lyell made Playfair’s claim the epigraph of the second volume of his *Principles*, which Darwin read in South America during his 1830s travels, and provided a more detailed argument for it: “The stations of different plants and animals depend on a great complication of circumstances, – on an immense variety of relations in the state of the animate and inanimate worlds.” If these circumstances “are perpetually changing,” and if these changes “be so great as materially to affect the general condition of stations, it will follow that the successive destruction of species must now be part of the regular and constant order of Nature” (Lyell 1832, 140–141). Darwin added natural selection to the mix, viewing it as implicated in the process described by Lyell (Darwin 1859, 109–110).

Büchner explicitly endorsed the uniformitarian position in *Force and Matter*. Mentioning Lyell but mainly relying on the German zoologist Hermann Burmeister, he declared

that “the recent development of the geological sciences” had exposed as illusory the idea that “supernatural forces” had played any direct role “in the developmental history of the earth”:

More mature consideration and observation has taught that the greater part of those transformations, the traces of which we perceive on the surface of the earth, are only the result of a gradual and slow action of natural forces, but operating over vast periods of time.

(*Büchner* 1855, 60–61; see *Burmeister* 1851, 12–13)

Again following *Burmeister*, who unlike *Lyell* saw in the fossil record clear evidence of progressive development, *Büchner* attributed “the origin and growth of organic beings” entirely to “the cooperation of natural forces and materials,” and “the gradual increase of living things” primarily to “the gradual transformation and development of the surface of the earth itself.” In short, for *Büchner*, evolution – “the slow, gradual emergence of higher forms from the lower and more imperfect forms that preceded them” – was “a scientific fact established with certainty by paleontological research” (*Büchner* 1855, 75–76; see *Burmeister* 1851, 151–152; cf. *Lyell* 1851, xxxiii–xxxix).

While materialism was becoming popular in Germany, positivism was attracting followers in England. Having already embraced evolution after reading the second volume of *Lyell’s Principles*, *Herbert Spencer* encountered *Comte’s Course of Positive Philosophy* in the early 1850s (*Spencer* 1904, 1:176–177, 445). *Comte’s* ideas, from the egoism-altruism contrast to the correspondence between organism and environment, formed the foundation of *Spencer’s* system of philosophy (*Dixon* 2008; *Pearce* 2010). Even *Spencer’s* metaphysical views, although clearly inspired by *William Hamilton*, had a *Comtean* flavor. In some ways, *Hamilton* and *Comte* were not that far apart: *Comte*, like *Hamilton*, was greatly affected by “*Kant’s* theory of the limits of knowledge” (*Pickering* 1993, 294). In the early 1850s, when the *Course of Positive Philosophy* received its first English translations and *Hamilton* finally published his collected *Discussions* (1852), *Spencer* would probably have understood the positive philosophy and the philosophy of the conditioned as sharing a basic commitment to knowledge’s limits.

Here is how *Spencer’s* two direct sources, *George Henry Lewes* and *Harriet Martineau*, translated *Comte’s* well-known characterization of the human mind in its “positive state” (i.e., *Comte* 1830, 4–5):

The mind, convinced of the futility of all inquiry into *causes* and *essences*, restricts itself to the observation and classification of phenomena, and to the discovery of the invariable *relations* of succession and similitude which things bear to each other: in a word, to the discovery of the *laws* of phenomena.

(*Lewes* 1853, 11)

The mind has given over the vain search after Absolute notions, the origin and destination of the universe, and the causes of phenomena, and applies itself to the study of their laws, – that is, their invariable relations of succession and resemblance. Reasoning and observation, duly combined, are the means of this knowledge.

(*Martineau* 1853, 1:2)

For Comte, the search for causes, essences, absolute notions, and ultimate origins was vain and futile; observation of the invariable relations of phenomena and the search for laws describing those invariable relations was the true task of positive science.

This Comtean agnosticism had an immediate impact on Spencer, despite their various disagreements. In a review of the ninth edition of Lyell's *Principles* along with two other books, Spencer presented the account of evolution that he would later elaborate in *First Principles* (1862): the "law of organic progress is the law of all progress"; that is, from geology and biology to art and science, "the transformation of the homogeneous into the heterogeneous, is that in which Progress essentially consists" (Spencer 1857, 446–447). He concluded the review by claiming that this law of progress had no deep "ontological bearings," since even the most basic laws cannot reach beyond the phenomena: "The sincere man of science," discovering that the origin, the destination, and the "essential nature" of both inner and outer phenomena are "alike inscrutable . . . sees that the Materialist and Spiritualist controversy is a mere war of words, the disputants being equally absurd – each believing he understands that which it is impossible for any human being to understand," namely, "all that transcends experience" (485). Although Spencer did not call himself a positivist, it seems that the mind of his sincere man of science had achieved its positive state.²

Spencer returned to this theme in the final paragraphs of *First Principles* (1862), stating that science "systematize[s] our experience" but "in no degree extend[s] the limits of our experience." Because "the connection between the phenomenal order and the ontological order is for ever inscrutable," concluded Spencer,

the reasonings contained in the foregoing pages, afford no support to either of the antagonist hypotheses respecting the ultimate nature of things. Their implications are no more materialistic than they are spiritualistic; and no more spiritualistic than they are materialistic. Any argument which is apparently furnished to either hypothesis, is neutralized by as good an argument furnished to the other. . . . Though the relation of subject and object renders necessary to us these antithetical conceptions of Spirit and Matter; the one is no less than the other to be regarded as but a sign of the Unknown Reality which underlies both.

(Spencer 1862, 502–503)

Although he disagreed with many of Comte's doctrines, Spencer was nonetheless defending what I have elsewhere called "big tent" positivism, namely, agnosticism about anything beyond the phenomena (Pearce 2015, 443–454).

In the 1850s, both Büchner and Spencer embraced evolutionary arguments and appealed to geological evidence, but whereas Büchner was a materialist, Spencer was a positivist. These contrasting metaphysical positions provided the backdrop for the "scientific materialism" of Tyndall and Huxley.

20.3 Biology and Materialism in the 1860s

Büchner and Spencer were both enthusiastic about Darwin's new theory when it appeared. In 1864, Spencer referred to natural selection throughout the first volume of his *Principles of Biology*, and Büchner patted himself on the back in the English edition of *Force and Matter* for having anticipated some of Darwin's ideas. That same year saw the first meeting of

the X Club, the small dinner and discussion group of which Spencer was a member along with Tyndall and Huxley (Barton 2018).

At the beginning of the 1870s, both thinkers published popular collections: Huxley's *Lay Sermons, Essays, and Reviews* (1870) and Tyndall's *Fragments of Science for Unscientific People* (1871). The texts collected in these volumes referred explicitly to materialism from 1867 onwards. Even before that, Tyndall – echoing Hermann Helmholtz – had told readers of the *Reader* that “the tendency . . . of modern science is to break down the wall of partition between organic and inorganic” (Tyndall 1864, 545; cf. Helmholtz 1856, 509–511). At the end of this essay, Tyndall struck a note that recalled Spencer's *First Principles*: asking after the origin of perpetually conserved energy, he answered, “Science does not know: the mystery, though pushed back, remains as deep as ever” (Tyndall 1864, 546).

Late in 1865, with the public approval of X Club members and scientific luminaries such as Lyell, a series of “Sunday Evenings for the People” was announced. Its goal was to give “those who at present do not attend places of worship” the opportunity to “listen to discourses on science” and thereby be moved to “a reverence and love of the Deity” (“Advertisements” 1865; see also Jackson 2018, 220–221). In the first of these lectures, Huxley claimed that “certain phenomena” present such “constancy of occurrence” that all human beings naturally take “strictly positive and scientific views” towards them (Huxley 1866, 633). But with rarer and more complex phenomena, the usual tendency is for the individual to view them “as the product of the volitions of persons like himself, but stronger” (633–634). Although Huxley did not name Comte, this was exactly what the French philosopher had referred to as the “theological state” of the human mind (Comte 1830, 4). Like Comte, Huxley argued that according to modern science, even complex phenomena were seen as the result of “a definite and predictable order and succession of events” rather than the whims of superhuman agents. For example, “the naturalists find man to be no centre of the living world, but one amidst endless modifications of life,” and “the physiologist finds life to be as dependent for its manifestation on particular molecular arrangements as any physical or chemical phenomenon” (Huxley 1866, 635). He even declared, alluding to Spencer and Hamilton, that modern scientific theology recommended silent worship “at the altar of the Unknown and Unknowable” (Huxley 1866, 636; see Hamilton 1852, 15n; Spencer 1862, 45). In an 1866 letter to Tyndall, the French doctor Louis Bergeret said that the *Sunday Evening* series in general, and Huxley's lecture in particular, demonstrated that “the sympathetic philosophy ought to give way to Positivism” (Tyndall 2016–, vol. 9, no. 2365).³

This would be the theme for both Tyndall and Huxley in subsequent years: although they often talked of materialism, with their backs against the metaphysical wall they endorsed positivism or agnosticism – the latter a word first used in print to characterize Huxley's view (Hutton 1870, 135).⁴ Tyndall put his cards on the table first, in a public speech with the Büchner-esque title “On Matter and Force.” He declared that “the physical philosopher, as such, must be a pure materialist,” since “his inquiries deal with matter and force, and with them alone” (Tyndall 1867, 138). But although Tyndall argued for complete “freedom of investigation” – chemists would even be allowed to “produce a baby” if they could – he reiterated that science was unable to answer the deepest questions:

The mind of man may be compared to a musical instrument with a certain range of notes, beyond which in both directions we have an infinitude of silence. The phenomena of matter and force lie within our intellectual range, and as far as they reach we

will at all hazards push our enquiries. But behind, and above, and around all, the real mystery of this universe remains unsolved; and here the true philosopher will bow his head in humility.

(138)

Ultimately, Tyndall endorsed something like Spencer's positivism despite suggesting that scientists are effectively materialists.

Huxley's own positivism – though he would vehemently reject the label – was on display in an Edinburgh lay sermon of 1868 on protoplasm as the material basis of all living things. Huxley argued that if we treat “the dull vital actions of a fungus” as “direct results of the nature of the matter of which [it is] composed,” we must also treat our very thoughts as “the expression of molecular changes” in this same type of matter (Huxley 1869, 140). He insisted, however, that although “the terms of [these] propositions are distinctively materialistic,” he was no materialist. He instead embraced the odd “union of materialistic terminology with the repudiation of materialistic philosophy” (141).

Concluding his lecture, Huxley cited a Edinburgh address delivered two days earlier by William Thomson, Archbishop of York, on the limits of philosophical inquiry. Thomson had criticized the “new philosophy” for claiming that the “enlightened mind” should only be concerned with “knowledge acquired . . . from observation and experiment,” dispensing with causes, essences, necessities, absolutes, and anything beyond “pure induction from the facts” (Thomson 1868, 4–7). Huxley endorsed the view criticized by Thomson but rejected the archbishop's labeling of it as “the Positive Philosophy,” preferring to identify it with the tradition of David Hume (Huxley 1869, 142). However, at this level of generality, Huxley's metaphysical position was obviously similar to that of Hamilton, Comte, and Spencer:

If it is certain that we can have no knowledge of the nature of either matter or spirit, and that the notion of necessity is some thing illegitimately thrust into the perfectly legitimate conception of law, the materialistic position that there is nothing in the world but matter, force, and necessity, is as utterly devoid of justification as the most baseless of theological dogmas.

(144)

Huxley hated Comte and was also skeptical of Spencer's “Unknown Reality,” but his approach was fairly described as positivism in the broad sense: he treated both matter and spirit as merely “unknown and hypothetical” causes – that is, “imaginary substrata of groups of natural phenomena” (143). As J. S. Mill had noted a few years earlier, many a thinker who “finds himself, sometimes to his displeasure, . . . classed with Positivists,” is nevertheless so categorized “by a tolerably correct instinct” (Mill 1865, 2).

Although he viewed mind as a special form of life, Spencer argued that evolutionary psychologists need not be materialists (Spencer 1870, 156–162). Tyndall and Huxley, in contrast, admitted that a physiological and evolutionary approach to the human mind did involve a kind of practical materialism. The view that he would in *Fragments of Science* (1871) call “scientific materialism,” said Tyndall, correctly maintained “that the growth of the body is mechanical, and that thought, as exercised by us, has its correlative in the physics of the brain” (Tyndall 1868, 104). Huxley likewise defined “legitimate materialism” as “the extension of the conceptions and of the methods of physical science to the highest as well as the lowest phenomena of vitality” (Huxley 1870, 79). Spencer agreed with all of

this except the label, insisting – in an essay that Tyndall read in draft form – that no line could be drawn between organic and inorganic phenomena: “the conception of a ‘first organism’ . . . is wholly at variance with [the] conception of evolution; and scarcely less at variance with the facts revealed by the microscope” (Spencer 1869, 597; Tyndall 2016–, vol. 10, no. 2933).

Thus, though the phrase echoed Büchner (1864, lxxv), scientific materialism was not really materialism at all. Tyndall rejected the view that “molecular groupings, and motions, explain everything.” He also confessed to “absolute ignorance” as to the “real bond of union” between mind and matter (Tyndall 1868, 104). Going even further, Huxley – perhaps following Spencer – argued that “legitimate materialism” amounted to “neither more nor less than a sort of shorthand Idealism,” since “if I say that thought is a property of matter, all that I can mean is that, actually or possibly, the consciousness of extension and of resistance accompany all other sorts of consciousness.” Picking up the refrain, he called the reason for this association “an insoluble mystery” (Huxley 1870, 79; cf. Spencer 1870, 159–160).⁵ The upshot was that new results in physiology and evolution did not support the elimination of mind in favor of matter. On the contrary: “the evolution hypothesis,” said Tyndall, instead of being seen as a degradation of mind or spirit, should lead us to “exalt [matter] from its abasement” (Tyndall 1870, 39).

Although infamous as defenders of both evolution and materialism, Tyndall and Huxley admitted that their practical materialism was perfectly consistent with practical idealism – that is, the view that “all our knowledge is a knowledge of states of consciousness” (Huxley 1870, 79). Ultimately, although they did not embrace the label, they were positivists – officially agnostic about any claim regarding the fundamental nature of things beyond phenomena and their invariable relations. In other words, they were methodological materialists but metaphysical positivists.⁶

20.4 Materialism, Positivism, Relativism

Bernard Lightman, in the chapter from which I have borrowed the term “methodological materialists,” suggests that Lange’s *History of Materialism* (1866) influenced the metaphysical position of Huxley and Tyndall (Lightman 2015, 180–181). In this final section, I will examine the connections between what Lange called relativism and the materialism of Tyndall and Huxley. Even though all three of them praised one another in the early 1870s, the similarities between their views stem primarily from shared heritage rather than mutual influence. All of these thinkers relied on the idea of a rough-and-ready materialist or relativist philosophy for working scientists that, although effective in its domain, could not stand up to deeper philosophical scrutiny.

Like his counterparts in England, Lange praised Darwin’s *Origin* in the 1860s. Darwin’s theory, he wrote, promised to ease the tension recently diagnosed by Hermann Lotze between the perspective and needs of the soul (*Gemüt*) on the one hand and science’s mechanistic understanding of nature on the other:

Darwin has taken a mighty step towards completion of a natural-philosophical world-view that is able to satisfy in equal measure the understanding and the soul, since it is built on the firm basis of facts and presents in grand outlines the unity of the world, without contradicting the details.

(Lange 1866a, 399–400; see Lotze 1856, v–vi, xiv–xv)

Although he noted that it would take many generations to supply experimental confirmation of the theory of evolution by natural selection, Lange was impressed by how Darwin had brought together a variety of types of evidence, akin to “rays of light gathered at a focal point” (Lange 1866a, 401).

One of the striking features of Lange’s mid-1860s writings is his claim that relativism “constitutes the soul of all the exact sciences” (Lange 1866b, iv). The term ‘relativism’ (*Relativismus*) was uncommon at the time. Where did this vocabulary come from? The answer involves several sources that were shared by Lange, Spencer, and the rest – most importantly Comte and Mill, with Kant lurking in the background.

Beginning his discussion of “Philosophical Materialism since Kant,” Lange declared that Comte was the greatest French philosopher since Denis Diderot and that Mill was the greatest English philosopher since Hume (Lange 1866a, 278). Comte had gained some posthumous prominence in the early 1860s with the publication of Émile Littré’s book on positivism as well as his new edition of the *Course of Positive Philosophy* (Littré 1863; Comte 1864; Richard 2018). Although there was no apparatus in the first edition of Lange’s *History of Materialism*, the second cited Littré’s 1864 edition of the *Course* as well as Mill’s *Auguste Comte and Positivism* (1865), which originated as a review of both Littré and Comte (Lange 1873–75, 2:134–135).

The contrast between relative and absolute knowledge was most famously drawn by William Hamilton in 1829. According to idealists like F.W.J. Schelling, said Hamilton, “while the lower sciences are of the relative and conditioned, Philosophy, as the science of sciences, must be of the absolute and unconditioned” (Hamilton 1829, 207). In fundamental agreement with Kant, Hamilton countered that “our knowledge, whether of mind or matter, can be nothing more than a knowledge of the relative manifestations of an existence which in itself it is our highest wisdom to recognise as beyond the reach of philosophy” (204). The next year, independently of Hamilton but having also read Kant, Comte claimed – as quoted above – that “in the positive state, the human mind recognizes the impossibility of obtaining absolute notions”; but he did not explicitly contrast relative and absolute knowledge (Comte 1830, 4; Pickering 1993, 289–296).

Littré and Mill, however, interpreting Comte after having read Hamilton, clearly distinguished between the relative and the absolute.⁷ According to Littré, the sciences had renounced “absolute questions” and were thus able to build, “little by little, on the foundation of experiment and the relative, that ensemble of notions that is one of the marvels of the human mind” (Littré 1863, 107–108). Mill’s version of Comte’s “positive state” also highlighted the contrast:

We have no knowledge of anything but Phænomena; and our knowledge of phænomena is relative, not absolute. . . . The laws of phænomena are all we know respecting them. Their essential nature, and their ultimate causes, either efficient or final, are unknown and inscrutable to us.

(*Mill* 1865, 6)

The “unknown and inscrutable” language – absent in the original French – was a clear allusion to Spencer’s *First Principles* (1862). Mill’s book also predated and may have influenced the English discussions of materialism described in the previous section. Both Tyndall and Huxley published articles in the same volume of the *Fortnightly Review* in which Lewes identified “two schools” of positivism, the first – linked with Mill and Littré – endorsing

only the core of the positive philosophy and the second subscribing also to Comte's political and religious views (Lewes 1866, 402). Hence positivism was prominent in the context of Huxley and Tyndall's late-1860s discussions.

Mill and Comte agreed that science should seek the laws of phenomena rather than their ultimate causes. Comte's prime example of this was Isaac Newton, who in 1713 had refused to speculate about the reason for gravity's properties because it could not be deduced from the phenomena (Newton 1999, 943). Comte concurred:

As for determining what this attraction and this gravity are in themselves, what their causes are, these are all questions that we regard as insoluble, that are no longer in the domain of positive philosophy, and that we rightly leave to the imagination of theologians or the subtleties of metaphysicians.

(Comte 1830, 15–16)

Lange echoed Comte on this point, introducing the term 'relativism':

The absurdity of action at a distance was made harmless for the exact sciences by being pushed back into the metaphysical foundations of natural science [see Kant (1786)] and left there to remain as unnoticed as possible. Growing *relativism* soon meant that having a completely satisfactory starting point was no longer considered necessary for the progress of the sciences. If you had any fixed point, you could make progress. The absolute basis was left to the metaphysician; the natural scientist stuck to the relative.

(Lange 1866a, 359–360)

Lange thus used the term 'relativism' to refer to the view that science requires only a relatively firm foundation; the exact nature of that foundation and the source of its solidity are irrelevant to the practice of research and best left to philosophers like Kant. Lange provided several examples of this approach. The atomic theory in chemistry, he said, given "the ever more sharply increasing relativism of the exact sciences," should be seen as "a mere *presupposition* in support of the mathematical explanation of nature" (Lange 1866a, 362). The working assumption of self-interest in economics is similarly helpful, even though it is not valid as a general account of human nature:

The political economy of egoism has incalculable value as the only secure beginning of an exact science of society, whereas the elevation to absolute validity of its merely relatively valid doctrines produces a hideous caricature of science.

(Lange 1866b, iv)

Indivisible atoms and pure self-interest are fallible but fruitful assumptions that guide research and make mathematical treatment possible.

According to Lange, logic and mathematics more generally illustrate the benefits of the relativist approach:

France's genius has breathed life into mathematical formulas, breeding definition and inference to produce that consistent *relativism* which forms the only secure basis of all exactness. The French researcher always remains conscious of his premises and

does not state his conclusion in absolute terms but according to the postulate that his theorems are not dogmas but rather links in the endless chain of scientific progress.

(Lange 1866a, 323)

This perspective also helps explain why Lange saw so much promise in Darwin's theory in the mid-1860s. It was irrelevant that the theory was hypothetical and unproven; what mattered was its ability to make sense of a variety of observations and thus guide research: "the rich unfolding of the theory conducts the seemingly remotest phenomena of organic life into the stream of evidence" (401).

Lange made clear in *Mill's View of the Social Question* that 'relativism' was simply his preferred term for what I have been calling positivism in the broad sense. Like Mill the year before, Lange emphasized the relative/absolute contrast in his presentation of Comte's views:

The only philosophy that has significance for the future of humanity is the *positive*, the philosophy of the *exact sciences*, which is peculiar in that it seeks a *relative* rather than an *absolute truth*. Only with the renunciation of knowledge of the absolute essence of things and the ultimate grounds of all appearances can the really valuable research begin.

(Lange 1866b, 4)

Lange referred to "the strict relativism of [Comte's] theory of knowledge" and called Mill "a master in handling that relativism that forms the soul of the exact sciences." He even identified a tension between Mill's relativistic epistemology and his purportedly more dogmatic commitment to utilitarianism in ethics (iv, 5, 9). Comte and Mill, both of them positivists, were Lange's prime examples of relativists.

Thus, although the timing is suggestive – Huxley praised Lange in 1870, right around the time he began discussing materialism – the parallels between Huxley's "legitimate materialism" and Lange's relativism are more likely due to the Comtean background of both, anticipated by Hamilton in Scotland and filtered through Spencer in England (Huxley 1870, 78n). Mill argued that the core of Comte's positivism was shared by the tradition of Scottish philosophy from Hume to Hamilton as well as by "all the great scientific minds" throughout history, including Newton (Mill 1865, 7–9). Huxley agreed, tracing it to the same Scottish tradition and recalling in a letter that as a teenager in the 1840s he had read Hamilton and subsequently given up on "ontological speculation" (Huxley to Charles Kingsley, 23 September 1860, in Huxley 1900, 1:218).

But the most important parallel between Tyndall and Huxley in England and Lange in Germany was their treatment of the relationship between science and philosophy. All three distinguished the practical metaphysical outlook of scientific research and the more reflective positions taken up in philosophy. Tyndall and Huxley argued that working scientists were effectively materialists, or at least restricted to materialistic terminology. Lange likewise claimed that physicists like Helmholtz would avoid philosophical mistakes if they restricted themselves to *relative* concepts of matter and force (Lange 1866a, 380). In other words, Lange was perfectly fine with materialism as long as it was seen as a relative viewpoint, that is, a presupposition that promised to guide and structure future research.

Materialism, although appropriate as a relatively valid metaphysics for working scientists, had no claim to absolute validity in philosophy. Tyndall, Huxley, and Lange were

agreed on this point despite disagreeing about the best general philosophical framework: Tyndall and Huxley were positivists or agnostics whereas Lange was a neo-Kantian. This difference between their positions was already anticipated by Hamilton when he distinguished between his own view that “the unconditioned is incognisable and inconceivable” and Kant’s view that “it is not an object of knowledge; but its notion [is] a regulative principle of the mind” (Hamilton 1829, 202). Whatever their philosophical differences, Lange and the so-called modern materialists were all convinced that materialism was right for science but wrong for philosophy (Beiser 2014b, 364).

20.5 Conclusion

Debates over evolution and materialism continued in subsequent decades: in England, in the Metaphysical Society and the new journal *Mind*; in Germany, in the philosophical speculations of Ernst Haeckel and Eduard von Hartmann (Beiser 2014a; Marshall, Lightman and England 2019; Verburgt 2025). I have stopped in 1870 in part to show that positions in the debate were staked out prior to widespread acceptance of evolution and before the era’s most famous speeches: Emil du Bois-Reymond’s “The Limits of Knowledge of Nature” (1872) and Tyndall’s “Belfast Address” (1874), both of which emphasized humility and unknowability.

What appears particularly modern in these nineteenth-century discussions is their focus on fallibility, with materialism cast as a philosophical “working hypothesis” for science. Foreshadowing Lange’s account of relativism, English writers applied this label in the 1850s and ’60s to a variety of unconfirmed but fruitful scientific theories. Huxley seems to have been one of the first to use the phrase (Huxley 1855, 251). Richard Holt Hutton, reviewing the first edition of Spencer’s *Principles of Psychology* along with several other books, called the wave theory of light “a *working* hypothesis, opening up ever new explanations of relations hitherto more or less outlying and unattached” (Hutton 1856, 113). Lyell argued that many of its opponents thought of evolution in similar terms:

Though the doctrine is untenable it is not without its practical advantages as a “useful working hypothesis,” often suggesting good experiments and observations, and aiding us to retain in the memory a multitude of facts . . . which, but for such a theory, would be wholly without a common bond of relationship.

(Lyell 1863, 471)

Hence it is no surprise that Lange praised the English for occupying the sweet spot between the overly speculative Germans and the purely relativist French:

The English, like the Germans, know how to find in a philosophical idea the impetus to research that is meaningful and directed toward general truths, but also, like the French, know how to avoid the useless flaunting of metaphysical consequences.

(Lange 1866a, 323–324)

Despite all the arguments, more orthodox philosophers – idealists and Reidians alike – agreed with Lange and the positivists: biological discoveries could not ground metaphysical conclusions. As Spencer, Tyndall, and Huxley had already suggested, however, the real struggle, one that occupied most scientifically inclined philosophers in the late nineteenth

century, was over the relationship between evolution, epistemology, and ethics (Uebel 2019; Pearce 2020). Darwinists need not be materialists, but one could not deny the influence of Darwin on philosophy (Dewey 1910).

Notes

- 1 All translations are my own unless otherwise noted.
- 2 Tyndall told a correspondent in 1852 that, although he was ultimately unsatisfied, the beginning of Lewes's series on Comte had "excited a hope" in him; Spencer also wrote to Tyndall about evolution and progress in the late 1850s (Tyndall 2016–, vol. 3, no. 631; vol. 6, no. 1593).
- 3 Although I have been unable to locate the phrase "*philosophie sympathétique*" in other writings of the time, Bergeret may have been referring to the eclecticism of Victor Cousin, who held up "universal sympathy" as a goal (Cousin 1828, 10).
- 4 Note that throughout this chapter I call Tyndall, Huxley, and Spencer 'positivists', a label they explicitly rejected. Although this is not always good historiographical practice, it is justified in this case by their endorsement of metaphysical agnosticism, which both the positivists and their opponents described at the time as the core of Comte's philosophy.
- 5 The first 160 pages of Spencer's book were issued to subscribers in 1868 (see Spencer 1870, vi).
- 6 For the methodological/metaphysical distinction, see Brightman (1937, 157–158).
- 7 Hamilton's 1829 essay was translated into French in 1840 and was at the time more widely accessible in France than in the United Kingdom (Hamilton 1840). Mill did not refer to the essay until the fourth edition of his *System of Logic*, published four years after Hamilton's *Discussions* (1852).

References

- "Advertisements." 1865. *Public Opinion* 8, no. 223 (December 30): 700.
- Barton, Ruth. 2018. *The X Club: Power and Authority in Victorian Science*. Chicago: University of Chicago Press.
- Beiser, Frederick C. 2014a. *After Hegel: German Philosophy, 1840–1900*. Princeton, NJ: Princeton University Press.
- Beiser, Frederick C. 2014b. *The Genesis of Neo-Kantianism, 1796–1880*. New York: Oxford University Press.
- Brightman, Edgar Sheffield. 1937. "An Empirical Approach to God." *Philosophical Review* 46, no. 2 (March): 147–169.
- Brown, Thomas. 1798. *Observations on the "Zoonomia" of Erasmus Darwin*, M.D. Edinburgh: Mundell & Son.
- Büchner, Louis. 1855. *Kraft und Stoff: Empirisch-naturphilosophische Studien*. Frankfurt am Main: Meidinger Sohn.
- Büchner, Louis. 1864. *Force and Matter: Empirico-Philosophical Studies, Intelligibly Rendered, with an Additional Introduction Expressly Written for this Edition*. Edited by J. Frederick Collingwood. London: Trübner.
- Burmeister, Hermann. 1851. *Geologische Bilder zur Geschichte der Erde und ihrer Bewohner*. Vol. 1. Leipzig: Otto Wigand.
- Comte, Auguste. 1830. *Cours de philosophie positive*. Vol. 1, Les préliminaires généraux et la philosophie mathématique. Paris: Bachelier.
- Comte, Auguste. 1864. *Cours de philosophie positive*. 6 Vols. 2nd ed. Edited by Émile Littré. Paris: J. B. Baillière et Fils.
- Cousin, Victor. 1828. *Cours de philosophie: Introduction à l'histoire de la philosophie*. Paris: Pichon et Didier.
- Darwin, Charles. 1859. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. London: John Murray.
- Dewey, John. 1910. *The Influence of Darwin on Philosophy, and Other Essays in Contemporary Thought*. New York: Henry Holt.
- Dixon, Thomas. 2008. *The Invention of Altruism: Making Moral Meanings in Victorian Britain*. Oxford: Oxford University Press.

- Gregory, Frederick. 1977. *Scientific Materialism in Nineteenth Century Germany*. Dordrecht: D. Reidel.
- Hamilton, William. 1829. "Cousin's Course of Philosophy." *Edinburgh Review* 50, no. 99 (October): 194–221.
- Hamilton, William. 1840. *Fragments de philosophie*. Translated by Louis Peisse. Paris: Ladrangé.
- Hamilton, William. 1852. *Discussions on Philosophy and Literature, Education and University Reform*. London: Longman, Brown, Green, and Longmans.
- Helmholtz, Hermann. 1856. "On the Interaction of Natural Forces." Translated by John Tyndall. *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 4th ser., 11, no. 75: 489–518.
- Hutton, Richard Holt. 1856. "Atheism." *National Review* 2, no. 3 (January): 97–123.
- Hutton, Richard Holt. 1870. "Pope Huxley." *Spectator* 43, no. 2170 (January 29): 135–136.
- Huxley, Thomas Henry. 1855. "Science." *Westminster and Foreign Quarterly Review* 63, no. 123 (January 1): 239–253.
- Huxley, Thomas Henry. 1866. "On the Advisableness of Improving Natural Knowledge." *Fortnightly Review* 3, no. 17 (January 15): 626–637.
- Huxley, Thomas Henry. 1869. "The Physical Basis of Life." *Fortnightly Review* 11 (February 1): 129–145.
- Huxley, Thomas Henry. 1870. "On Descartes' 'Discourse Touching the Method of Using One's Reason Rightly, and of Seeking Scientific Truth.'" *Macmillan's Magazine* 22 (May): 69–80.
- Huxley, Thomas Henry. 1900. *Life and Letters of Thomas Henry Huxley*. 2 Vols. Edited by Leonard Huxley. London: Macmillan.
- Jackson, Roland. 2018. *The Ascent of John Tyndall: Victorian Scientist, Mountaineer, and Public Intellectual*. Oxford: Oxford University Press.
- Kant, Immanuel. 1786. *Metaphysische Anfangsgründe der Naturwissenschaft*. Riga: Johann Friedrich Hartknoch.
- Lange, Friedrich Albert. 1866a. *Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart*. Iserlohn: J. Baedeker.
- Lange, Friedrich Albert. 1866b. *J. St. Mill's Ansichten über die sociale Frage and die angebliche Umwälzung der Socialwissenschaft durch Carey*. Duisburg: Falk & Lange.
- Lange, Friedrich Albert. 1873–75. *Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart*. 2 Vols. 2nd ed. Iserlohn: J. Baedeker.
- Lewes, George Henry. 1853. *Comte's Philosophy of the Sciences: Being an Exposition of the Principles of the "Cours de Philosophie Positive" of Auguste Comte*. London: Henry G. Bohn.
- Lewes, George Henry. 1866. "Auguste Comte." *Fortnightly Review* 3, no. 16 (January 1): 385–410.
- Lightman, Bernard. 1987. *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge*. Baltimore, MD: Johns Hopkins University Press.
- Lightman, Bernard. 2004. "Scientists as Materialists in the Periodical Press: Tyndall's Belfast Address." In *Science Serialized: Representations of the Sciences in Nineteenth-Century Periodicals*, edited by Geoffrey Cantor and Sally Shuttleworth, 199–238. Cambridge, MA: MIT Press.
- Lightman, Bernard. 2015. "Nineteenth-Century Science and Western Materialisms." In *Science and Narratives of Nature*, edited by Sundar Sarukkai, 174–194. London: Routledge.
- Littre, Émile. 1863. *Auguste Comte et la philosophie positive*. Paris: L. Hachette.
- Lotze, Hermann. 1856. *Mikrokosmos: Ideen zur Naturgeschichte und Geschichte der Menschheit*. Vol. 1. Leipzig: S. Hirzel.
- Lyell, Charles. 1830. *Principles of Geology, Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes Now in Operation*. Vol. 1. London: John Murray.
- Lyell, Charles. 1832. *Principles of Geology, Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes Now in Operation*. Vol. 2. London: John Murray.
- Lyell, Charles. 1851. "Anniversary Address of the President." *Quarterly Journal of the Geological Society of London* 7 (February 21): xxv–lxxvi.
- Lyell, Charles. 1863. *The Geological Evidences of the Antiquity of Man, with Remarks on Theories of the Origin of Species by Variation*. London: John Murray.
- Mander, W. J. 2020. *The Unknowable: A Study in Nineteenth-Century British Metaphysics*. Oxford: Oxford University Press.

- Marshall, Catherine, Bernard Lightman and Richard England, eds. 2019. *The Metaphysical Society (1869–1880): Intellectual Life in Mid-Victorian England*. Oxford: Oxford University Press.
- Martineau, Harriet. 1853. *The Positive Philosophy of Auguste Comte*. 2 Vols. London: John Chapman.
- Martineau, James. 1874. *Religion as Affected by Modern Materialism: An Address Delivered in Manchester New College, London*. London: Williams and Norgate.
- Mill, John Stuart. 1865. *Auguste Comte and Positivism*. London: N. Trübner.
- Newton, Isaac. 1999. *The Principia: Mathematical Principles of Natural Philosophy*. Translated by I. Bernard Cohen and Anne Whitman. Berkeley: University of California Press.
- Pearce, Trevor. 2010. "From 'Circumstances' to 'Environment': Herbert Spencer and the Origins of the Idea of Organism-Environment Interaction." *Studies in History and Philosophy of Biological and Biomedical Sciences* 41, no. 3 (September): 241–252.
- Pearce, Trevor. 2015. "Science Organized': Positivism and the Metaphysical Club, 1865–1875." *Journal of the History of Ideas* 76, no. 3 (July): 441–465.
- Pearce, Trevor. 2020. *Pragmatism's Evolution: Organism and Environment in American Philosophy*. Chicago: University of Chicago Press.
- Pickering, Mary. 1993. *Auguste Comte: An Intellectual Biography*. Vol. 1. New York: Cambridge University Press.
- Playfair, John. 1802. *Illustrations of the Huttonian Theory of the Earth*. Edinburgh: William Creech.
- Richard, Nathalie. 2018. "The French Philosophical Crisis of the 1860s and the Invention of the 'Positivist School.'" In *The Worlds of Positivism: A Global Intellectual History, 1770–1930*, edited by Johannes Feichtinger, Franz L. Fillafer and Jan Surman, 155–188. Cham: Palgrave Macmillan.
- Secord, James A. 2000. *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of "Vestiges of the Natural History of Creation"*. Chicago: University of Chicago Press.
- Sober, Elliott. 2011. *Did Darwin Write the "Origin" Backwards? Philosophical Essays on Darwin's Theory*. Amherst, NY: Prometheus.
- Spencer, Herbert. 1857. "Progress: Its Law and Cause." *Westminster and Foreign Quarterly Review* 67 (April 1): 445–485.
- Spencer, Herbert. 1862. *First Principles*. London: Williams and Norgate.
- Spencer, Herbert. 1869. "Spontaneous Generation." *Appleton's Journal of Literature, Science, and Art* 1, nos. 18–19 (July 31/August 7): 562–563, 597–598.
- Spencer, Herbert. 1870. *The Principles of Psychology*. Vol. 1. 2nd ed. London: Williams and Norgate.
- Spencer, Herbert. 1904. *An Autobiography*. 2 Vols. London: Williams and Norgate.
- Thomson, William (archbishop of York). 1868. *The Limits of Philosophical Inquiry*. Edinburgh: Edmonston and Douglas.
- Tyndall, John. 1864. "Vitality." *Reader* 4 (October 29): 545–546.
- Tyndall, John. 1867. "On Matter and Force." *Chemical News* 16 (September 13): 135–139.
- Tyndall, John. 1868. "Address to the Mathematical and Physical Science Section." *Chemical News* 18 (August 28): 101–104.
- Tyndall, John. 1870. *On the Scientific Use of the Imagination: A Discourse Delivered Before the British Association at Liverpool*. London: Longman, Green.
- Tyndall, John. 1871. *Fragments of Science for Unscientific People: A Series of Detached Essays, Lectures, and Reviews*. London: Longmans, Green.
- Tyndall, John. 2016–. *The Correspondence of John Tyndall*. 14 Vols. Edited by James Elwick, Bernard Lightman and Michael S. Reidy. Pittsburgh: University of Pittsburgh Press.
- Uebel, Thomas. 2019. "Mach, Jerusalem and Pragmatism." In *Ernst Mach – Life, Work, Influence*, edited by Friedrich Stadler, 501–523. Cham: Springer.
- Verburgt, Lukas M., ed. 2025. *The Early Years of "Mind": Making Contemporary Philosophy and Psychology*. Oxford: Oxford University Press.
- Weiss, John. 1852. *Modern Materialism: A Discourse at the Ordination of Mr. Charles Lowe as Associate Pastor over the First Congregational Society, New Bedford*. New Bedford, MA: Benjamin Lindsey.