3

Brave New World:
An Introduction to Part Two

[Religion first became possible for a reasonable scientific man about the year 1927.


The 20th century dawned with an extraordinarily productive phase in the history of science. An unprecedented number of discoveries were made in the period between 1890 and 1940; new theories were advanced and hypotheses tested, leading to radical changes in the scientific understanding of the composition and nature of matter, the development of life and organisms, the relation between mind and body, and the shape, size and history of the cosmos itself. Classical disciplines such as physics, chemistry, and biology were undergoing rapid developments in uncertain directions, developments which reverberated in the culture at large. Not only were the emerging fields of inquiry connected with new technologies that impacted on the lives and expectations of people, from the radio to the atomic bomb; they also excited the imagination and speculative faculties of philosophers, theologians, journals, authors of fiction, scientists, and the general reading public.

One result of the cultural interest in scientific changes was that entrenched perspectives on the supposed conflict between science and religion were destabilised.¹ It was becoming increasingly clear that the worldview of scientific naturalism, which, as we have seen, had been professed and preached by a coterie of educators, popularisers and professionalisers of science in the late-Victorian period, had been built on shaky foundations. The worldview of Victorian naturalism had been erected on three nineteenth century theories, namely classical thermodynamics, the Daltonian atomic

¹ The British context of this development has been thoroughly documented in Peter Bowler, *Reconciling Science and Religion*. 
theory of matter, and (mostly Darwinian) evolutionary theory. During the early
decades of the 20th century, two out of three of these pillars were about to fall. The
structure of the atom was redrawn by people such as J. J. Thomson, Ernest Rutherford,
and Niels Bohr, and new conceptions of matter were hotly debated in scientific journals
and conferences, as well as in the public sphere. Meanwhile, the foundations of biology
were opened up: vitalism and organicism were discussed in scientific circles in Europe,
posing views on life, mind and the organism that questioned the mechanistic theories
that had been popular among the scientific naturalists. Darwinism was facing
difficulties in the scientific discourse on evolution, to the extent that contemporary
biologists characterised the period as an ‘eclipse of Darwinism’. Debates were raging
about the precise mechanisms of evolutionary change and selection, and research in
defence of the Lamarckian, teleological theory of evolution was published in peer-
reviewed scientific journals as late as the 1920s. It was only with the “Modern
Synthesis” of evolutionary biology, genetics, and population statistics that a consistent
form of Darwinism really settled – a process which culminated in the 1940s. All in all,
these decades saw the loosening up of established scientific and philosophical
structures, resulting in an open engagement with the problem of disenchantment in
scientific milieus.

8-37.

3 For the developments in physics, particularly the debates surrounding the concept of matter, see e.g.
Helge Krag, *Quantum Generations*, 3-12, 44-57, 105-119; cf. Russell McCormmach, ‘H.A. Lorentz and the
Electromagnetic View of Nature’. See also Mark S. Morrisson, *Modern Alchemy*, 5-10, 97-134; Asprem,
‘Pondering Imponderables’.

4 See e.g. G. E. Allen, ‘Mechanism, Vitalism and Organicism in Late Nineteenth and Twentieth-Century
Biology’; cf. Anne Harrington, *Reenchanted Science*; Scott Gilbert & Sahorta Sarkar;‘Embracing Complexity’;
Heather Wolfram, ‘Supernormal Biology’.

265.

6 For the scientific debates over evolution in the early 20th century, see especially Bowler, *The Eclipse of
Darwinism*; idem, *Theories of Human Evolution*; a discussion of the American context is available in
139-140.

While scientific milieus discussed new observations, experimental results, conceptual frameworks and their interpretations, visions of the brave new world of modern science were drawn up and disseminated to the rapidly growing reading public. The growth of science fiction literature in this period bears witness of a shift in the plausibility structures of the broader culture. Already in 1914, following discoveries and experiments with radiation and nuclear transmutation, it was possible for H. G. Wells to imagine the consequences of nuclear war in *The World Set Free*. Meanwhile, pulp science fiction magazines published stories about the emergence of a modern transmutational alchemy – and about its possible catastrophic effect on a world economy regulated by the gold standard. As Jeffrey Kripal has argue in a highly original recent work, science fiction became an important locus for modern mythology, often bridging the realms of science, magic, and myth in new and imaginative ways. But while science fiction was generally produced by non-scientists, the growing literature of *popular* science was written for the most part by professional scientists of high stature. This literature focused on amazing discoveries and possible technological applications, but it also touched frequently on science’s implications for religion, philosophy, and worldview. Popularisation proved to be a powerful and important strategy for scientists to fight off rival theories and interpretations, and aimed to stimulate a greater public interest that might lead to the funding of new research. Popular science was not a sober representation of facts, but not simply a fantastic popular exaggeration without connection to actual research either – more than any of these, it took the shape of ‘a battleground both for rival ideologies and rival worldviews’, populated by scientists with differing viewpoints.

---

8 See e.g. Mike Ashley, *The Time Machines*, for the development of science fiction in the context of pulp magazines from the 1920s to the 1950s. The roots of modern science fiction in Victorian discourses on science, technology, and popular belief are explored in Martin Willis, *Mesmerists, Monsters, and Machines*.  
9 Various utopian and dystopian views on atomic technology and a revived alchemy in the science fiction pulp literature of the 1920s and 1930s are explored in Morrisson, *Modern Alchemy*, 168-183. For early scientific work on radioactive transmutation, see Thaddeus Trenn, *The Self-Splitting Atom*. See also Richard E. Sclove, ‘From Alchemy to Atomic War’.  
11 See Bowler, *Science for All*.  
12 Ibid., 24.
The question of how science was related to religion figured sometimes quite prominently in popular-scientific battles over worldviews. While the popularisers of the 19th century had focused on making a sharp distinction between science and religion, emphasising the epistemic superiority of the former over the latter, the debates of the new century is riddled with spokespersons attempting to connect the two. As has been argued by historian of science Peter J. Bowler, a “new natural theology” emerged out of such discussions in Britain, created and disseminated by a mix of scientists, philosophers and clergymen through media such as popular lectures, articles and books intended for a broader public. Prior to the professionalization of the sciences in the 19th century, natural theology had been a branch of natural philosophy, and a rather significant one at that. It was only with the professionalization and institutionalisation of the natural sciences, and the accompanying public campaigns of the new naturalists that a clear separation of, and antagonism between, science and religion was put in place, as an important phase of boundary-work on behalf of the emerging profession. What we see in the early 20th century is the attempt by philosophically minded scientists and popularisers to reinvent the religious ambition of natural philosophy in the context of a new and unsettled scientific discourse on nature.

The following chapters examine the connections between conceptual developments in the natural sciences, struggles with the problem of disenchantment, and the invention of new natural theologies. The chapters engage critically with Peter Bowler’s work on the relation between science and religion in the early 20th century.

---

13 See ibid., 23-4; cf. idem, Reconciling Science and Religion, passim.
14 In a broad sense, “natural theology” is understood as arguments regarding deity and its relation to humanity and the world that spring from the empirical study of nature, on a basis of rational thought. This undertaking can be seen as a longue durée in Western intellectual history, stretching back to antiquity; in the Christian theological tradition we recognise it, for example, in the teleological arguments for the existence of God, as formalised by Thomas Aquinas. In a more restricted sense, natural theology may refer to certain theological arguments advanced during the Enlightenment period, connected with the rise of deism in England and France, and the concept of “natural religion”, independent of revelation and grounded solely in reason and ordinary experience. Classic examples and discussions of the latter include David Hume’s ‘Dialogues concerning Natural Religion’ (1779), Thomas Paine’s The Age of Reason (1794-1807), and, above all, William Paley’s Natural Theology (1802).
The central objective of this engagement is to show how framing some of the central debates about science in the context of struggles with the problem of disenchantment can help us extend, corroborate, and supplement Bowler’s analysis. For Bowler, “religion” really refers to “Christianity”, and the new natural theology is portrayed as essentially a liberal Christian reform movement. Challenging this reading, I will suggest that the new speculations on nature and religion also drew upon resources and strategies from the broader historical reservoir of “esotericism”. In fact, I shall argue that some of the “liberal Christian” theologies postulated in this context made use of natural-theological arguments that were essentially heretical or at the very least deeply heterodox when viewed against the canon of mainline Christian theology. Emphasising the many conceptual shifts in the special sciences of the first four decades of the 20th century, and the multiplicity of theoretical frameworks built on them, I find that the plural “new natural theologies” is more appropriate than Bowler’s singular. I suggest that one can sensibly differentiate between five different schools of natural theology during this period, arising from the engagement with different scientific fields. These points are explored in chapter six, which besides introducing, describing and discussing the five schools of new natural theologies and the institutional spaces in which they were produced culminates in a full discussion of their theological foundation.

Before we get there, however, chapters four and five chart out the connections between actual scientific work and the worldview implications drawn from them. My main argument is that the new natural theologies were created out of perceived solutions to the problem of disenchantment. While the solutions certainly differed, they all amounted to a rejection of the intellectual sacrifice.

British scientists and popularisers seem to have been more willing than their colleagues in other countries to be explicit about the possible religious implications of their work. This willingness was even accommodated by institutional platforms where such ideas could be expressed and disseminated. Besides respected intellectual journals discussing such issues, notably The Hibbert Journal (1902–1968), there were societies and lecture platforms that provided institutional spaces hospitable to new natural theologies. In chapter six I will discuss three of these platforms in some detail. The most significant and deeply influential of them is the Gifford Lectures in Natural Theology,

---

which deserve a brief introduction already at this stage, since it will figure in the following discussion of developments in the scientific disciplines.

The result of a considerable private financial endowment, the Gifford Lectures have been held in Scottish universities since 1888 to the present day. Looking at the lectures given by prominent scientists, philosophers, and scholars in this institutional framework, we are presented not merely with a mirror of major trends in the construction of new natural theologies: since many of the lectures were turned into successful publications in their own right, we also localise an important site of production for ideas that have since been highly influential in the “religion-science debate”. In fact, the Gifford Lectures continue to be one of the central forums for this apparently never-exhausted debate. It is for example instructive that one of the classic textbooks of the interdisciplinary academic “field” of “religion and science”, Ian Barbour’s *Religion and Science: Historical and Contemporary Issues* (1997), itself started off as Gifford lectures in 1989-1990. Other historical works on the religion-science debate have come out of the same platform in recent decades, notably John Brooke and Geoffrey Cantor’s important *Reconstructing Nature: The Engagement of Science and Religion* (1998). In general, but particularly in the period that concerns us here, the Gifford Lectures have had a broad outreach beyond the scientific disciplines from which the particular lecturer and author was writing, and have hence been influential in popularising certain views of science to an educated readership of non-specialists. This is very significant for understanding the public perception of science, and the origin of popular notions that modern science is somehow vindicating a spiritual dimension of reality.

The emphasis on Britain when it comes to popularisation and extrapolations from science to natural theology should not occlude the fact that many deeply significant intellectual developments first took shape on the Continent, particularly in Germany and France. In fact, it does not seem coincidental that some of the major revolutionary conceptual developments in physics took place in the German cultural

---


18 For a criticism of the claim that “religion and science” in any meaningful way constitutes an autonomous academic “field”, see the excellent review article of the *Oxford Handbook of Religion and Science* (2006), David Knight, ‘Religion and Science: A Field of Study?’. 
sphere. In the next chapter I will argue that some of the basic philosophical and religious implications extracted from the new sciences are best understood in light of the cultural context of the Weimar era.\textsuperscript{19} Moving on to consider some of the major conceptual issues involved in the drastic changes across the spectrum of scientific fields in the early 20\textsuperscript{th} century, I will consider additional relevant contexts and engage in an extensive review and synthesis of previous scholarship in the history of science. The “Forman thesis” in the history of quantum physics is of particular interest to our concerns, and will be developed further in the service of providing an account of the relevant developments in physics and the cultural significance they were given. Thus, the main focus in chapter four is on debates concerning causality and determinism in physics and chemistry, obviously connected to the epistemological dimension of disenchantment as discussed previously, and, as I will argue, to the very cultural context in which Weber formulated the disenchantment thesis in the first place. In the sciences of life and mind, which will occupy us in chapter five, we will particularly pay attention to the interrelated debates about vitalism, organicism, evolution, and the mind-body problem. These debates can all be related through the problem of disenchantment – especially in the form of the relation between mechanistic materialism on the one hand, and teleology on the other. This was a deep philosophical conflict that cut across the fields of biology and psychology in the early 20\textsuperscript{th} century, with obvious implications for the understanding of human life and experience.

Together, the chapters of Part Two aim to give a comprehensive overview of the core conceptual issues and disciplinary formations in the natural sciences in the period between 1900 and 1939. There is a clear focus on conceptual controversies, particularly controversies that relate to the problem of disenchantment in one way or another. In the final chapter, we will see how such conceptual issues were linked with the attempt to craft new natural theologies, which sometimes influenced further scientific developments. This, I will argue, was particularly the case in some of the discussions surrounding biology and psychology, where the concept of “emergence” became

\textsuperscript{19} Cf. Paul Forman, ‘Weimar culture, causality, and quantum theory’; idem, ‘Reception of an Acausal Quantum Mechanics in Germany and Britain’; idem, ‘Kausalität, Anschaulichkeit, and Individualität, or How Cultural Values Prescribed the Character and Lessons Ascribed to Quantum Mechanics’. See my discussion of Paul Forman’s thought provoking account of the conceptual developments in quantum mechanics in the following chapter.
important as a philosophical support for organicist and holistic models in the 1920s. The concept was, however, first introduced in the framework of highly elaborate natural theologies, formed precisely in order to allow for new theological positions in science.\textsuperscript{20} These interlinked discussions provide a bridge to Part Three, where we shall look closely at the development of psychical research and parapsychology in the early 20\textsuperscript{th} century.

\textsuperscript{20} The two major authors here are the philosopher Samuel Alexander, \emph{Space, Time, and Deity}, two volumes, and the psychologist and zoologist Conwy Lloyd Morgan, \emph{Emergent Evolution}, two volumes. Both these works were the outcome of Gifford Lectures in natural theology. More on this in chapter six.