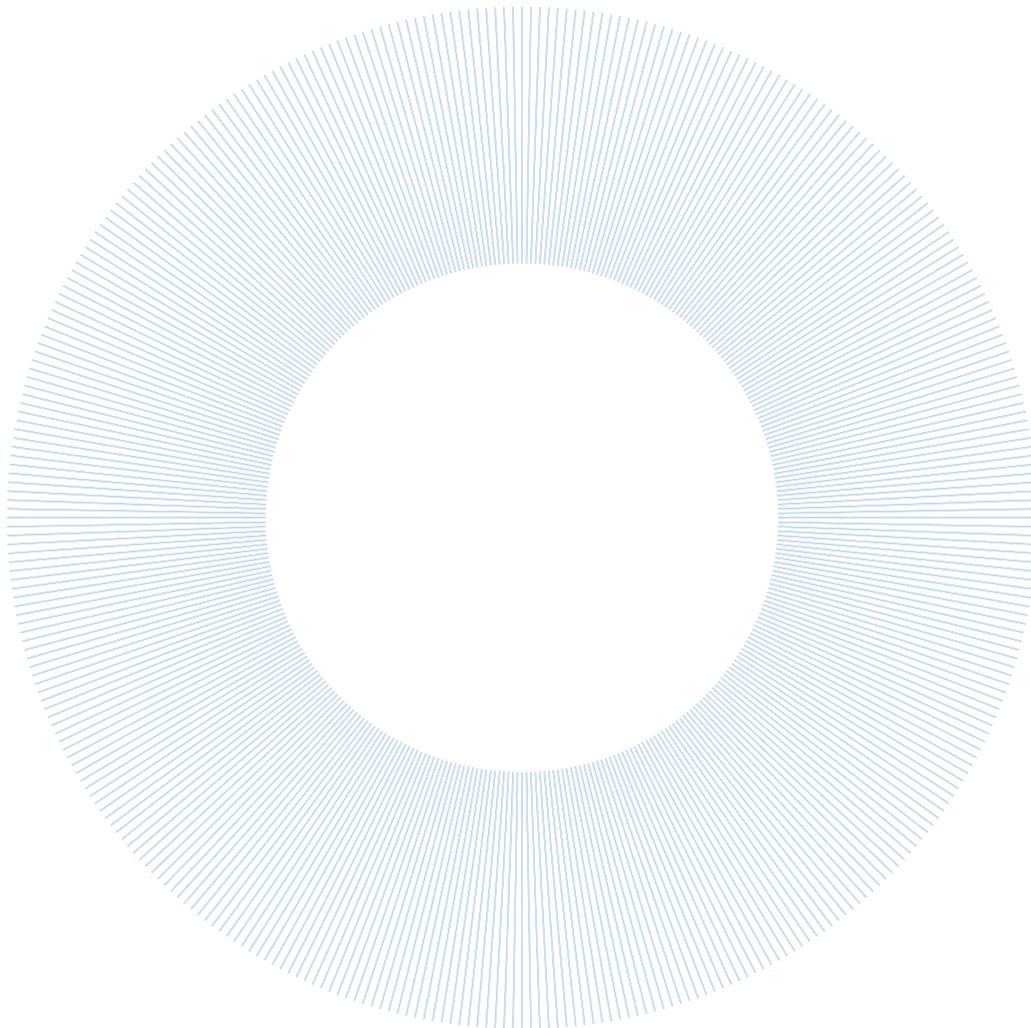


# Can Scientific Discovery Be a Religious Experience?



John Hedley Brooke

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## CAN SCIENTIFIC DISCOVERY BE A RELIGIOUS EXPERIENCE?

*The exploitation of science in attacks on religious belief is a familiar phenomenon and contributes to the popular but simplistic view that science and religion are necessarily in conflict. But is it possible that the experience of scientific discovery may, in certain respects, resemble a religious experience? This question is introduced by addressing the preliminary issue whether scientists are wise to devote themselves to an offensive against some generalised abstraction called religion. Historically the quest for scientific understanding has often been associated with an appreciation of beauty in nature and elegance in the theories that describe it. For scientists with religious convictions this has permitted a graduation from aesthetic to religious discourse, however problematic this may be for non-believers. The great astronomer Kepler confessed to ‘unutterable rapture at the divine spectacle of heavenly harmony’, having discovered one of his planetary laws. Newton celebrated a deity highly ‘skilled in mechanics and geometry’. Einstein wrote that the emotional state that enables great scientific achievements to be made is ‘similar to that of the religious person or the person in love’. It is therefore appropriate to explore the analogies and disanalogies between moments of disclosure in science and religion. The analysis is also prompted by the observation that in questionnaires on religious belief, a crucial facet of the religious life is routinely obliterated. Those who admit to searching for spiritual meaning are assigned to an agnostic category in contrast to those who may have a definite church affiliation or hold definite convictions. The dynamics of the spiritual life are lost as a consequence. And yet it is the questing spirit that perhaps bears the closest analogy to the scientific quest, understood as a process of enquiry rather than as a set of inviolable results.*



Should scientists contest religious beliefs? One answer to this blunt question could scarcely be controversial. When religious beliefs (whatever they may be) masquerade as science, as in claims for a *creation science*, it seems perfectly obvious that scientists committed to the principles of neo-Darwinian evolution should have the right to retaliate and to give the reasons why Charles Darwin’s theory provides a more compelling explanation for otherwise disparate natural phenomena than would recourse to independent acts of creation. Darwin brilliantly summarised those reasons in the last chapter of his *Origin of Species*. Whether belief in separate creation should be called an intrinsically religious belief is, however, a moot point. Certainly it is a belief sustained by a particular strand of Protestant Christianity. But it is interesting that Darwin called this model a *theory* of creation and it is a model not required by the classical Christian doctrine of creation, which stresses the dependence of the entire universe, and all processes within it, on a transcendent power.

Another response to the question might also be relatively uncontroversial. If a particular religious belief (whatever that may be) can be shown to be both ill-founded and dangerous to others, we would expect responsible people (not only scientists) to contest it. The difficulty, however, is that though we might readily produce specific examples of damaging beliefs from specific religious traditions, this is a long way from showing that there is some essence to religion that makes it the root of all evil, or indeed that in any one faith tradition there is a preponderance of damaging beliefs over others that may be beneficial to those who hold them.

As soon as we start looking for difficulties with the question, they rain down on us. Behind it there lurks the notion that beliefs derived from sacred texts and from faith traditions, or held on the basis of intuition or trust, are inherently suspect compared with those for which scientists can produce empirical evidence. It is easy to forget, however, that for those who choose to live their lives *as if* something were true that might not be directly verifiable, there can be a *coherence* between what they believe and their experience, which they find life-enhancing. Notoriously, religious beliefs can reinforce unhealthy segregation, yet few would now deny their role in binding a community together, in reinforcing moral codes and in endorsing particular values. This makes it especially difficult to generalise about the propriety of attacking religious belief because one could find oneself attacking that without which particular societies would be disadvantaged not ameliorated. In Darwin's own day there was a moral revolt against certain Christian teachings, notably the belief in eternal damnation for those outside the fold. And yet there was also a powerful etiquette, which recognised that to deliberately contest the beliefs of those whose faith was precious to them was decidedly churlish.

There are deeper questions. Religions are not just about beliefs, warrantable or not. They are about practices, ranging from prayer and meditation to formalised prescriptions for group and individual behaviour. Christianity has arguably been the exception in being so creedal. Even when belief becomes the principal focus of attention there is still the problem, as I have already hinted, concerning what it is that makes a religious belief religious. Isaac Newton believed that the universality of the laws of nature was a consequence of the fact that the universe and its laws were created by a single Mind. Was this a religious belief? If so, to contest it would have been to pull the rug from under the metaphysics that supported his physics. To characterise religious belief as belief in supernatural agency may capture an aspect of some of the world's religions but it is easy to overlook at least three complications. The characterisation does not fit them all. Secondly, it fails to discriminate between a belief in God or gods that is purely philosophical and one that is associated with worship or other forms of piety. And thirdly, it overlooks what for the historian of science is one of the most fascinating issues – the way in which boundaries between the natural and the supernatural have changed with time. To describe an occurrence as supernatural one has to know the limits of the natural – and it is precisely those limits that have changed with the progress of science itself. The nature/supernature dichotomy is not a timeless given.

In this brief essay I ask whether the experience of scientific discovery might itself, in certain circumstances, qualify as a religious experience. If it can, to locate the experience in some kind of contest *between* science and religion would be incongruous. The claim that all-that-is is *natural* goes beyond what science itself has established or possibly could establish concerning the scope of naturalistic explanation.

A mistake is often made – perhaps by scientists more than by their colleagues in the humanities – when it is asserted that the primary function of religious systems is explanatory. When it becomes so, the risk of a territorial struggle with the sciences is magnified. This is not inconvenient for those who wish to trump the triumph of a scientific rationality. But the great religions of the world have offered something rather different – spiritual transformation, hope, resources for coping with suffering, and ways of understanding and *interpreting* (not simply explaining) human existence. It can be misguided for a scientist to contest religious beliefs if the attack is launched on the premise that religions can be reduced to sets of explanatory hypotheses. For this same reason there is also a pragmatic consideration. It may be counter-productive to insist on a general contradiction between religious beliefs and the conclusions of science. The vast majority of scientific theories are ultimately descriptive of

natural processes and need not impinge on religious sensibilities. The fact that naturalistic explanations are possible for once-mysterious phenomena would not be perceived as a threat by any thinking theist, yet evangelists for atheism often assume that it should be. But more to the point, if members of the public are told they have to choose between religious beliefs embedded in their local cultures, which give meaning and orientation to their lives, and statements embedded in scientific theory, their reaction may well be to reject the latter because, however firmly corroborated, they rarely offer comparable existential solace. If the goal is to proselytise on behalf of Darwinian science, to transform it into an atheistic ideology can be to shoot oneself in the foot.

If Richard Dawkins is taken as representative, it is worth noting, however, that despite his penchant for attacking the worst features of organised religion, he has attempted to discriminate between beliefs that he cannot respect and those he considers more tolerable. He has, for example, declared that while he has no respect for the idea of an intervening deity who might be supposed to hear intercessory prayer and to change what would otherwise have happened, he might bring himself to respect the god of the deists, one who set the universe up with an initial configuration of laws and capacities that would eventually produce human beings. Not that he shares belief in that god, but Dawkins recognises, as did Thomas Henry Huxley in the nineteenth century, that it is not necessarily ruled out by scientific knowledge. Darwin himself does appear to have held that belief at the time he wrote his *Origin of Species*, referring to 'laws impressed upon matter by the Creator' (Darwin, 1859, p. 488) and regarding the outcomes of biological evolution as the result of 'designed laws' but with the 'details left to chance' (Darwin, 1993, p. 224).

### *Religious Language in Science: Darwin in 1859/60*

In November 1859, on the brink of publication and eagerly anticipating the reaction of the naturalists he most respected, Darwin confided to Alfred Russel Wallace: 'If I can convert Huxley I shall be content' (Darwin, 1991, p. 375). A month later he had apparently succeeded. To Joseph Hooker he reported that Huxley 'says he has nailed his colours to the mast, and I would sooner die than give up, so that we are in as fine a frame of mind [...] as any two religionists' (Darwin, 1991, p. 432). Religious metaphors were useful to Darwin as he tested the reactions of those whom he wished to count as his inner circle of converts. Both playfully and not so playfully he would describe his theory as a 'damnable heresy' (Darwin, 1991, p. 434). After a stinging reproach from his old Cambridge friend Adam Sedgwick he deemed himself a 'martyr' (Darwin, 1991, p. 430). There were elements of his theory for which he chose the word 'dogma' (Darwin, 1991, pp. 462-3).

Darwin is also interesting in this respect because, late in life, he wrote that the beauty he once experienced in nature had been connected in his mind with belief in God (Darwin, 1958, pp. 91-2). It was during his later agnostic period that he had become anaesthetized. In 1832, when he had first tasted the sublime in nature, experienced in the luxuriance of the Brazilian rain forest, his language had something of the religious about it: 'twiners entwining twiners, tresses like hair, beautiful Lepidoptera, silence, hosanna' (Desmond and Moore, 1991, p. 122). The progression is interesting because it invites the question whether responses to the beauty of a scientific theory, as well as to the realities such theories purport to describe, might spark religious reflection. By religious here I mean having to do with a sense of the transcendent, of being in touch, however tenuously, with a reality greater than the sum of nature's forces and the mundane events that routinely shape our lives. I believe (!) there is sufficient evidence from the history of science to suggest there can indeed be a

trajectory from an appreciation of beauty in creation to deeper reflections on human destiny. In propelling that suggestion there are, however, several hurdles to jump (Brooke and Cantor, 1998, pp. 207-43).

### *Two Immediate Complications?*

Is it not the sciences, steeped in what Keats described as their cold philosophy, which led to the desacralisation and disenchantment of nature? Is it not the sciences, with their ever-increasing scope, that have driven the gods from the world? These are commonly held assumptions, but they are not the whole truth. There is much to be said for the converse argument, recently urged by Peter Harrison, that it was the disenchantment of the world that made science possible (Harrison, 2006, p. 131). Critically the disenchantment came largely from within religion itself, through the medium of the Protestant Reformation.

A second complication is this: whether an experience of scientific discovery is to count as a religious experience can really only be decided by the subject. It would surely be presumptuous of an outside observer to judge either way? How an experience is interpreted depends, however, on the conceptual framework of the person concerned. If the subject does not interpret the experience in religious terms, it can hardly be for others to do so on his or her behalf. But, by the same token, we must surely then allow that when scientists with religious convictions claim to have had something akin to religious experience in their work, their own interpretation cannot simply be brushed aside. The language in which scientific discoveries are delivered to the world can be surprising and revealing.

### *The Language of Discovery*

The case for pursuing the question gains strength from what Ian Ramsey called moments of *disclosure* when a problem is suddenly seen in a new light (Ramsey, 1964, p. 24). These are moments when 'the penny drops,' which have been a recurring feature of the sciences. A telling example comes from Europe around 1860, when there was no unequivocal method for fixing atomic weights, and as many as sixteen different formulas existed for a compound as simple as acetic acid. By the electrochemical theories of the day, the idea of polyatomic molecules was practically unthinkable since repulsion between identical atoms was thought to make them unstable (for similar reasons, Avogadro's hypothesis of some fifty years earlier – that equal volumes of gases at the same temperature and pressure would contain the same number of molecules – had yet to be accepted). Following a chemical congress held in Karlsruhe in 1860, at which Cannizzaro resuscitated a viable distinction between atom and molecule, two Russian chemists had almost identical moments of insight. Both Mendeleev and Lothar Meyer described their experience as one in which scales fell from their eyes, Meyer adding that 'doubts vanished, and a feeling of calm certainty came in their place' (Partington, 1964, p. 489).

The language employed in such circumstances has sometimes been explicitly that of a conversion experience. Here is just one account, from Darwin's contemporary Alfred Newton. He is referring to that issue of the *Journal of the Linnaean Society* in which the innovative papers by Darwin and Wallace appeared together:

Never shall I forget the impression it made upon me. Here was contained a perfectly simple solution of all the difficulties which had been troubling me for months past. I hardly know whether I at first felt more vexed at the solution

not having occurred to me, than pleased that it had been found at all. [...] All personal feeling apart, it came to me like the direct revelation of a higher power; and I awoke next morning with the consciousness that there was an end of all the mystery in the simple phrase, 'Natural Selection' (Cohen, 1985, p. 595).

It was like 'the direct revelation of a higher power'. This is the resonance with a religious experience that deserves attention. Of course, in this particular case there is an irony because the conversion is arguably from a religious to a scientific understanding. A problem therefore remains: can one not say that in the religious case a sense of mystery is heightened, whereas, in a disclosure that we might call scientific, mystery is dispelled?

### *The Problem of Disanalogy*

It is true that in standard accounts of religious experience, we rarely find reference to the sense of awe that can come from the intense study of nature. For example, in her book *The Evidential Force of Religious Experience*, Caroline Franks Davis presents a taxonomy in which the disclosure experiences I have mentioned do not obviously fit (Franks Davis, 1989, pp. 29-65). She includes the sense of a spiritual presence, which may have no equivalent in the scientific context. The union of the mystic with a transcendent *other* would again be an experience different in kind from that experienced in the scientific quest. There might just be a tenuous analogy between the 'dying to oneself' of the mystic and the renunciation of subjectivity in traditional ideologies of science; but the disanalogy again intrudes. In the one there may be a renunciation of this world; in the other a positive embracing of it as a source of mental stimulus and delight. Under religious experience one could subsume the regenerative experiences associated with the language of salvation; but again this seems distant from what the scientist might experience in dialogue with nature. And if the focus shifts to feelings of the numinous, to a sense of being overpowered by a majestic holiness, this again seems not to chime with the scientist's own quest for *power over* nature. We are surely left with a fundamental disanalogy between the incomprehensibility at the heart of religious experience and the rational quest for comprehensibility epitomised by the sciences?

For all his delight in moments of disclosure, Ian Ramsey himself had to admit that different logics of verifiability were obtained in the two cases. A proposition of the form *God is love* could not be tested in the same manner as propositions about the workings of nature. Do these several considerations then mean that our original question must be abandoned? Do the disanalogies carry the day? Or should our taxonomies of religious experience be expanded to include the kind of revelation of which scientists sometimes speak? In favour of the latter it should be noted that the scientific and the mystical are not always placed in opposition. For example, the modern physicist Frank Close was once asked to describe the most thrilling moment his research had given him. He replied, the 'first time an experiment confirmed my theory and I felt humbled by having "caught Nature at it."' He proceeded to say the fact that Nature already 'knew' about his equations was an 'eerie and mystical experience.' It was 'an incredible surprise that quarks were for real!' And so, from the interviewer came the inevitable question: 'Do you believe in God?' To which came the conventional reply: 'not in a conventional sense' (Close, 1993).

## *Rapture Within the Sciences*

From the history of science, it is possible to find many other examples of scientists whose theology may not have been conventional but who expressed a comparable rapture at having ‘caught nature at it.’ When the seventeenth-century astronomer Kepler discovered what we know as the third of his planetary laws – that the square of the orbital period is proportional to the cube of the mean diameter – he confessed to ‘unutterable rapture at the divine spectacle of heavenly harmony’ (Caspar, 1959, p. 267). That the planets of our solar system had gone into closed orbits rather than veering off tangentially confirmed Newton’s belief in a deity ‘very well skilled in mechanics and geometry’ (Newton, 1692, p. 49).

In a more recent period, physicist Werner Heisenberg spoke of the humility in which one had to accept the gift of ‘an incredible degree of simplicity’ in the mathematical abstractions of physical theory. These beautiful interrelationships could not be invented: in his words ‘they have been there since the creation of the world’. That confidence in the very possibility of scientific discovery was once again associated with a religious reference. Heisenberg’s wife records that he had once said to her: ‘I was lucky enough to look over the good Lord’s shoulder while he was at work’ (Brooke and Cantor, 1998, p. 228).

Striking examples are also to be found in early geology and life sciences. Here is the nineteenth-century Scottish evangelical Hugh Miller describing his first encounter with fossil forms: ‘I was lost in admiration and astonishment, and found my very imagination paralysed by an assemblage of wonders that seemed to outrival, in the fantastic and the extravagant, even its wildest conceptions’ (Brooke, 1996, p. 182). His own appreciation of the beauty of fossil forms was later crafted into a defence of the proposition that with his Maker he shared the same aesthetic sensibilities. Miller and his God were of one mind.

As Dawkins has made clear, one can appreciate the beauty of nature and of a scientific theory without extrapolating into religious affirmation. And yet the graduation from aesthetic to theological language has repeatedly occurred in the history of science, even in those without belief in a personal god. For Einstein, the frame of mind in which great scientific discoveries were made was like that of the religious person or the person in love (Pais, 1982, p. 27). For many scientists who have believed in a personal god, the discovery of elegant mechanisms in nature has usually corroborated rather than subverted a pre-existing faith. The range of emotion typically experienced by research scientists, includes this innocent testimony by the American physicist Robert Wilson:

You go through this long period of filling yourself up with as much information as you can. You just sort of feel it all rumbling around inside you [...]. Then [...] you begin to feel a solution, a resolution bubbling up to your consciousness. At the same time you begin to get very excited, tremendously elated – pervaded by a fantastic sense of joy [...]. But there’s an aspect of terror too in these moments of creativity [...] being shaken out from your normal experience enhances your awareness of mortality (Söderqvist, 1996, p. 65).

Such experiences might not warrant the description religious, but the similarity in sentiment can hardly be denied. For Richard Dawkins, the plotting of planets or the unweaving of rainbows may indeed generate a genuine sense of beauty and harmony (Dawkins, 1998). Scientific discoveries, however, are rarely described nowadays as spiritual or religious experiences, because any slippage from aesthetic to religious discourse is viewed, certainly by Dawkins, as a lamentable confusion. Some of the dynamics of spiritual life may, however, be lost as a consequence.

In popular questionnaires on religious belief, those who confess to *searching* for spiritual meaning are usually assigned to an agnostic category, in contrast with those who may have a definite spiritual belief or church affiliation. And yet it is the questing spirit that perhaps bears the closest analogy to the scientific quest, understood as a process of enquiry rather than as a set of inviolable results.



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*Insights*

Insights is edited by Susan J. Smith, IAS Director and Professor of Geography  
Correspondence should be directed to Audrey Bowron (a.e.bowron@durham.ac.uk)