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CHAPTER T H R E E

Does Science Discredit Religion?

In this debate, John Worrall argues that there are irreconcilable differences between science and religion. A fundamental difference pertains to methodology: science evaluates candidates for belief only on the basis of evidence, while religion patently does not. So, Worrall concludes that a properly scientifically minded person cannot give credence to religious belief. Del Ratzsch argues that the relation between religion and science is much less clear than that, and that the arguments that science discredits religion are not nearly so powerful as some have believed.

Science Discredits Religion

John Worrall

We get the ages of rock, and they get the rock of ages; we work out how the heavens go and they work out how to get to heaven.

– Old saying amongst *some* scientists

*Strong Son of God, immortal love,
Whom we, who have not seen Thy face,
By faith, and faith alone, embrace,
Believing where we cannot prove.*

– Tennyson, *In Memoriam*

1 Introduction

Science and religion are in irreconcilable conflict – or so I shall argue in this chapter. There is no way in which you can be *both* properly scientifically minded *and* a true religious believer.

This might seem a surprising thesis in view of the undoubted fact that many scientists (even some of the most eminent ones) were or are also religious believers of one sort or another. But this results, I hold, from a mixture of three factors: (i) a simple failure to think things through fully; (ii) a failure to be properly scientific (as I shall explain, this involves more than simply giving due weight to well-accredited scientific results and theories, it also involves bringing a scientific attitude to the appraisal of claims and the weighing of evidence in general); (iii) adopting the attitude hinted at in the first of my epigraphs – one that holds that science and religion not only do not conflict, they *cannot* conflict, because they cover quite different domains.

The structure of my argument is very simple. I begin by analyzing the attitude just mentioned in (iii), arguing that, when properly understood, that attitude is (essentially) untenable for a religious person – the cost of adopting it is too high. This entails that both the scientist and the religious believer are playing the same game; they are both making substantive, descriptive, “explanatory” claims about the way the world is. But then they must surely also play by the same rules – all such claims must be judged by how well they stand up to the evidence. This, of course, is indeed how claims in science are appraised and accredited. When religious claims are appraised in this way, however, they all turn out to be untenable. Science, or rather a scientific attitude, is incompatible with religious belief.

2 Two Separate Domains?

The view is perhaps increasing in popularity that science and religion are about different domains, are two different “non-overlapping magisteria” (NOMA), as the eminent biologist Stephen Jay Gould recently put it,¹ and hence that, when properly understood, there can be no conflict between them. I can see three ways in which that view might be interpreted.

On one interpretation the view simply attempts to legislate away any clash by creating a separate, “spiritual reality,” alongside ordinary “material reality” – science teaches us about the latter, religion about the former. But this is based on a confusion – it elevates a (perhaps natural, but clearly sloppy) way of speaking into an obviously untenable ontological doctrine. There is only one reality; that reality either does or does not contain a god, an afterlife, or whatever, just as it either does or does not contain quarks or superstrings or whatever; and the question that needs to be addressed about both sets of equally unobservable (alleged) entities is what evidence

¹ See S. J. Gould, *Rocks of Ages: Science and Religion in the Fullness of Life* (London: Jonathan Cape, 2001).

we have for their existence.² To take an analogy: defenders of the paranormal, like Uri Geller, may speak loosely of “another reality” beyond the mundane one, but what they really mean of course is that extrasensory perception and psychokinetic powers are aspects of *this* reality – what else could they mean? If what they claim to be true is true, then ESP and psychokinetic powers are parts of this reality (what else?). The question is simply whether what they say *is* true (or rather, since they are talking about (alleged) things that are not directly observable, whether there is good evidence that what they say is true). If religion is committed to making allegedly factual assertions about the world, whether about its material *or* (supposed) spiritual aspects, then science and religion seem to be two competing “magisteria,” not distinct ones.

Or are they? On a second way of understanding the NOMA view (perhaps to be thought of as a refinement of the first), religion does indeed make descriptive, factual assertions about the universe – even about some of its “material” aspects – but there is no conflict because religion kicks in only once science has gone as far as it can. Newton’s theory may have given a perfect explanation of the movements of the planets (let’s suppose), but of course it gives no explanation of how those planets were created. Religion should avoid interfering in the law-governed “mundane” reality of planetary motions (religious sentiments led even Newton himself to make a mistake here), but it comes into its own at the level of creation. One problem with this version of the view, as the example illustrates, is that the line between what science can explain and what it cannot has a habit of shifting – we do now have well-accredited theories of the formation of the solar system, ones radically at odds with those invented earlier by theists.

But, shifting or not, there always *is* a line – at any stage in science, there will be features of the universe (those described by the most fundamental theories then available) that science treats as “bottom line”: being most fundamental exactly means that those theories cannot (to repeat: cannot *at that stage in science*) themselves be explained. The suggestion, then, might be that religion can penetrate to a deeper level, by explaining why those scientifically basic theories are true; and that there is no clash because, by definition, science has nothing to say at that deeper level. But think what such a claim would entail. Surely, in order to count not as mere speculative assertions, but as genuine *explanations*, any such ideas presented by religion would have to carry some rational warrant. But, on the assumption that there is only one set of standards for appraising substantive explanatory claims about the world in the light of evidence, this makes this second interpretation of the NOMA view incoherent. If all explanations involving substantive, synthetic claims about the world must satisfy the same criteria, then it is simply nonsense to claim that religion can explain the scientifically inexplicable. To deny the assumption and assert instead that there are different standards of explanation in the different fields is simple relativism. And I assume that this is acceptable to no one in this debate. For one thing, if we allow

2 Those of you who may have heard of “multi-universe” interpretations of quantum mechanics should not be confused. According to such interpretations (which, by the way, have precious little to recommend them), *the* universe has many (causally non-connected) sub-parts. (Again, there is nothing else they could mean!)

different standards for explanations in religion, why not also in the study of the paranormal, or voodoo or scientology or . . . and so the list goes on? (I will address this view again, from a somewhat different angle, later.)

I take it, then, that the only coherent version of the NOMA doctrine, the only one that thoughtful commentators might really want to defend, is quite different from the two so far considered. This third version sees religion as advancing no *descriptive* doctrine at all, as making no real claims about the way the world really is, but “only” as making claims about what is and what is not valuable, what is and what is not a worthwhile life. This view concedes to science exclusive rights to inform us about the world of fact (understood in the broad sense to include general structural features) and accepts that religion is restricted to the world of value. This is certainly the version advocated by Gould:

Science tries to document the factual character of the natural world, and to develop theories that coordinate and explain these facts. Religion, on the other hand, operates in the equally important, but utterly different realm of human purposes, meanings and values – subjects that the factual domain of science might illuminate, but can never resolve.³

Obviously, this view of religion does indeed eliminate any possibility of a clash between it and science.⁴ But at what a price! (My advice here to religious people would be to avoid scientists bearing gifts.) For one thing, the religious person who adopts this view cannot call on any of the usual justifications for whatever value system she endorses. She cannot, for example, claim that one ought to “love thy neighbor as thyself” *because* this is what pleases our loving creator. This justification, of course, along with any of its ilk, involves a claim of exactly the sort from which she must now abstain. Avoiding the conflict in this way means abstaining from asserting *any* descriptive claim – not just specific claims about Adam and Eve or the Virgin Birth or the like that thoughtful religious people often have difficulty with in any case, but also more general ones about our possessing souls, or even about the universe being the creation of a superhuman “entity” or “force” – and treating all such claims as, at best, merely metaphorical.

I concede to no one in my appreciation of the importance of issues about what sorts of lives are valuable, and about ethical issues more generally. But coming to a view on such issues is surely not the exclusive prerogative of religious people. (Gould acknowledges this and in fact quietly takes the “magisterium” of “religion” to consist in the discussion of ethical issues, whether or not based on religion in the more usual sense.⁵) More centrally for current purposes, it seems very doubtful that a religious faith stripped of any substantive descriptive claim about the universe, its history, and its creation can really count as a religious *belief*. The theologian Ian Barbour surely has it right:

3. Gould, *Rocks of Ages*, p. 4.

4. Actually it isn’t so obvious – there is a substantial literature examining the issue of whether the domains of fact and value are logically distinct. Nonetheless, it is true.

5. “[I] construe as fundamentally religious (literally, binding us together) all moral discourse on principles that might activate the ideal of universal fellowship among people” (Gould, *Rocks of Ages*, p. 62).

[R]eligious language does indeed express and evoke distinctive attitudes. It does encourage self-commitment to a way of life; it acknowledges allegiance to ethical principles and affirms the intention to act in particular ways. But . . . these *non-cognitive uses* presuppose *cognitive beliefs*. . . . [R]eligious faith is not simply assent to the truth of propositions; but it does require the assumption that certain propositions are true. It would be unreasonable to adopt or recommend a way of life unless one believes that the universe is of such a character that this way of life is appropriate.⁶

And once a religious faith “requires” such beliefs about the universe, then the clash with science (or more accurately the scientific attitude) is inevitable. Or so I now go on to argue.

3 Three Types of Religious Belief, Three Types of Clash with Science

Many beliefs about the world, its origins, and structure have been, and are, held in the name of religion. In order to examine carefully the issue of whether science and religion clash, we need to differentiate at least three types.

Into the *first* category fall quite specific beliefs about the universe and its history that some believers have certainly held (and in some cases presently hold) on the basis of their religion, but which are directly inconsistent with well-accredited scientific theories. One example is the claim that the earth is stationary in absolute space and that the sun and other planets orbit it; another is the claim that there were two humans, Adam and Eve, who had no ancestors, either human or human-like, and of whom all humans are descendants (or, more generally, the claim that the universe was created with essentially the same flora and fauna it presently exhibits in 4004 BC). I shall take it that no one seriously disputes that such claims are indeed inconsistent with well-accredited scientific theories.⁷ However, no serious thinker any longer feels the need to defend the first claim on biblical grounds – even the Vatican now thinks that its attack on Galileo, and his Copernican allies, was a mistake (though it did take it until 1820 to remove Copernicus’s *De Revolutionibus* from its Index of forbidden books). And none but a few (though very noisy) fundamentalists still feel the need to defend the second claim on biblical grounds. Again, even the Vatican seems to have reconciled itself to the idea that evolutionary theory is more than a mere “hypothesis.”

I shall not go into details about either of these particular claims or others of similar status. There is, of course, an enormous literature on such matters. I shall simply assume that the upshot of this literature is that,

(1) on the one hand, such claims *are* directly inconsistent with well-accredited scientific theories (and indeed that where this is true it is the erstwhile religious claim that must, from a rational point of view, give way);

6 Ian G. Barbour, *Myths, Models and Paradigms: A Comparative Study in Science and Religion* (San Francisco: Harper and Row, 1974), p. 58.

7 Anyone in any remaining doubt about the ineradicable clash between so-called scientific creationism and real science should consult Philip Kitcher, *Abusing Science* (Cambridge, Mass.: MIT Press, 1982).

(2) while on the other hand, there is no need for a religious person to commit herself to any such precise claim. A person may remain, in a clear sense, a religious believer without committing herself to any such claim that is (or at any rate is so obviously) inconsistent with well-accredited scientific theories.

While having seemingly reconciled itself to the (likely) truth of Darwinism, the Vatican, if I have understood its position correctly, continues to insist that there is some point along the branch of the evolutionary tree from chemical molecules to current humans at which “souls” were “infused” into some organism.⁸ Such a belief, along with other relatively general beliefs about souls and like “entities,” falls into a *second* category. This, I suggest, is the category of beliefs that while not, perhaps, directly inconsistent with any well-accredited theory in science nonetheless seem to be in a clear and strong sense contraindicated by science.⁹

Nothing in neurophysiology is directly inconsistent with the claim that alongside the 10^{11} or so neurons in the human central nervous system with their chemically governed activity there is another entity called the “soul.” (Any more than that Newtonian gravitational theory is directly inconsistent with the claim that the reason why every particle of matter in the universe attracts every other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them is that each such particle possesses an immaterial mind which happens to will this to be the case.) It is just that neurophysiology has no need for such a hypothesis – the “soul” simply and increasingly has no role to play (any more than those particulate “minds” would have any role to play in gravitation theory). Neurophysiology is, of course, a science still very much in its infancy, but it has already made impressive strides in explaining, in its own – “purely material” – terms, phenomena such as memories and pains that earlier thinkers held were in some irreducible sense “mental” and hence required some sort of “mind” or “spirit” whose properties and states they were. The religiously inclined could, then, readily identify the “soul” with such a “mind” or “spirit.” But minds or spirits separate from bodies are no longer seriously available. There remain interesting and challenging issues about whether or not human psychology is fully “reducible” to the laws of nature governing matter. But these are to do with whether or not mental *properties* can be reduced to material properties – no serious scientist (even if religiously inclined) still holds any version of the Cartesian dualist view of a mental *substance* that is separate from the matter of the brain and central nervous system.

The reason why the soul can play no role, and why the idea of it gets in the way of proper scientific theorizing, is that the idea not only has no empirical support, it inevitably – in principle – can have no such support. There is reason to think (from the way that progressive science is going) that all the observable effects here are produced by neurophysiology, and that the “soul” can therefore itself have no observ-

8 See again the sympathetic treatment in Gould, *Rocks of Ages*.

9 Of course, I take it here that talk of souls and the like is to be understood in some “literal” sense – one that, if true, would make a factual difference to the way the world is – and not in any “metaphorical” sense, or sense that makes claims about the existence of souls some sort of hidden moral injunction. As already indicated, I readily concede that all “conflict” between science and religion can be eliminated by going fully “metaphorical” or restricting religious claims entirely to claims about values.

able causal effects. There is a principle of good scientific reasoning, sometimes called “Occam’s razor,” that is incorporated in one form or other into every sensible system of scientific confirmation, and which states that if some notion plays no role in – if it can be excised without cognitive loss from – our system of knowledge, then it should be so excised. This principle is uniformly applied within science itself. The nineteenth-century idea of a space-filling aether – a mechanical medium that was alleged to be the seat of the electromagnetic field (and earlier the carrier of the disturbances that constitute light) – is now rejected by physics. But the notion was rejected not because it is actually inconsistent with any new, well-accredited scientific theory, but rather because it is – provably – otiose. Once we have the real science, in this case the special and general theories of relativity, then further postulating the aether makes no empirical difference – not only is there no empirical evidence of its existence, there *cannot be* any such evidence. The same applies to this sort of intermediate second category of religious claim, exemplified by the idea of the soul.

This second category of religious belief slides over into a third. Beliefs in this third category are the most general of all. One example would be a general belief that the universe was created by (whatever that might actually mean) a superhuman power (whatever that might actually be). A retreat to claims in this third category may bring with it, for the religious person, the advantage of avoiding the need to account for why two religious persons selected at random from the world’s population are likely to have apparently quite different specific beliefs – those differences being clearly correlated with accidents of birth, culture, and geography. What you are likely to believe about the speed of light or the half-life of particular isotopes of uranium, if you hold any such beliefs at all, is unlikely to depend on whether you were born and educated in Shanghai, Sydney, or Suez. But what *specific* religious beliefs you are likely to hold, assuming you hold any, *are* highly dependent on where you were born and educated. This fact, which surely ought to be disturbing for the thinking believer, may, perhaps, be nullified if one resorts to the very general level of belief – perhaps all religious people agree that the universe is the creation of some sort of superhuman power, and perhaps all the more specific claims should be thought of as merely metaphorical (and it must be said, then, pretty misleading) ways of endorsing that general one. (I take it that something like this is what J. S. Haldane had in mind when he claimed that “behind the recognized churches, there is an unrecognised church to which all may belong.”¹⁰)

A general claim of this kind not only fails to be inconsistent with any scientific claim, the structure of science itself guarantees its consistency. Let me first explain why this is so, and then why I, nonetheless, hold that belief in even such general claims is unscientific.

Explanation in science is essentially derivative. In order to avoid unnecessary complexities, assume we are back in the nineteenth century before relativity theory superseded Newtonian “classical” physics. If you had asked a scientist at that time why it is that the planets move in the way they do – why, for example, they move in (somewhat perturbed) elliptical orbits around the sun – he would have had a ready answer. He could show that the assertion that the planets move in that way follows logically

¹⁰ Gifford Lecture, 1927; quoted from Gould, *Rocks of Ages*, p. 92.

from Newton's theory of mechanics plus universal gravitation (actually together with an “initial condition” about the planet's velocity). *Given* that every material particle in the universe attracts every other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them, then it follows that a planet must move in a (roughly) elliptical orbit around the sun. But suppose you asked such a nineteenth century scientist to explain in turn the “given” in that initial explanation – to explain why Newton's theory itself is true, not why he *thought* it was true (a question about evidence) but, assuming for the sake of argument that it is true, why the universe obeys Newton's theory rather than any other. Why, for example, is the gravitational force inversely proportional to the square of the distance rather than, say, to the cube of the distance? Our nineteenth-century physicist would be nonplussed by this question. Again, he can readily explain how he “*knows*” that it's the square of the distance – that assumption and only that assumption yields the right observational results – but we are now considering an ontological question, not an epistemological one: that of why the universe happens to obey this particular law (assuming that it does) rather than any other. And the only answer to that question that our physicist could give would be some variation on the theme of “that's the way the cookie crumbles.” Relative to the state of science at the time, it had to be taken as just a “brute fact” that the universe instantiates Newton's theory.

Nothing, of course, prevents a scientist from *attempting* to go deeper, from attempting to explain why Newton's theory holds. Indeed, one eminent scientist who endorsed that attempt was Isaac Newton himself – he famously denied that gravity could be an “essential property” of matter, and hence denied that his theory could be the *ultimate* explanatory “bottom line.” Newton was tempted by a Cartesian-style explanation of gravity in terms of some pressure gradient in an all-pervading elastic aether (though he himself established that Descartes's own particular explanation along these lines was hopeless). Suppose that Newton had succeeded, that he had produced a theory about the constitution of a space-filling plenum, pressures in which gave bodies a tendency to move towards one another in accordance with his principle of universal gravitation. The logical point would of course remain: while we would then have an explanation for the state of affairs described by Newton's theory, the facts about this plenum and its properties that did the explaining would then themselves be unexplained; *those* facts would be – as science would then have stood – unexplained explainers. Explanation must always start somewhere, no matter what stage science has achieved. Yesterday's “brute facts” may indeed become today's explained facts – if so, then science has made progress; but the logic of scientific explanation makes the existence of some “brute facts” inevitable at any stage.

This is what provides the (logically inevitable) latitude for the religiously inclined. Since the attempt to reduce gravity to the actions of an aether failed, the poor scientist cannot explain why the force of gravity between two bodies happens to be inversely proportional to the square of the distance between them; but the religious person, it seems, has no problem – that's how the creator willed it to be. Or, to take a more up-to-date example, the scientific cosmologist cannot explain why it was that the so-called escape velocity of matter at “Planck time” shortly after the Big Bang had the value it did – she must just take it as a “brute fact” (in that case a brute fact

reflecting an “initial condition” rather than a law of nature). The religious person can, as always, “explain” that value by invoking a creator and his wishes – and indeed can, in that case, add a little more to the story, as we “know” on scientific grounds that if the value of that escape velocity had been just a little different than it in fact was, then galaxies (and hence humans) could never have formed. God fixed the value of the escape velocity because he wanted it to be possible for humans to evolve.

Although the structure of science inevitably leaves religion free to *claim* it can give “deeper” explanations than science, what could *warrant* such claims? As I explained earlier, a version of the “no conflict” (NOMA) account can be developed by allowing different standards for explanations in the two fields. But only, as we saw, at the surely unacceptable cost of adopting a purely relativistic viewpoint. If, as I urge, we refuse to pay that cost, then the credentials of these alleged religious explanations must be examined in the same way, by the same standards, as are scientific explanations; but if judged in that way, then those alleged explanations fail.

Notice, first, that once everyone is playing by the same (exacting) rules, then any claim that religion is in a superior position from the point of view of explaining the world is logically misplaced. A religious explanation in terms of a creator and his intentions is just another (attempted) explanation, and, even were it accepted, then, exactly as the request for an explanation of the latest scientific theory can always be made, so we can request an explanation of the religious claim: Why did the creator choose an inverse square law rather than, say, an inverse cube one? Why was the possibility of human evolution part of the creator’s plan? The idea that religion can do what science cannot by “explaining everything” is an illusion.

This shows that the religious “explanation” can, at best, achieve parity – in fact, parity is far beyond its reach. Let’s retreat just a little and ask why it was, for example, that the attempt to explain the law of gravity in terms of pressure gradients in a plenum was eventually deemed to be a failure. It could obviously and trivially simply have been claimed that there is an all-pervading medium and that – without specifying exactly how – there just happen to be pressure gradients set up in it that account for the gravitational attraction. But such an “explanation” would never be accepted in science because it is entirely *ad hoc* (in the pejorative sense) – it permits no independent test. All the alleged explanation does is to deliver what we already know – indeed, in the form I gave it, it was precisely designed so as to deliver that and only that.

A successful explanation, one that will be accepted in science, on the contrary, is independently testable and passes independent tests – that is, it not only entails the results it set out to entail, it also makes, often surprising, and hitherto unsuspected, empirical predictions which turn out to be correct. Independent testability and success in independent tests are the key to scientific progress.¹¹ The explanation of Kepler’s laws of planetary motion by Newton’s theory was a scientific success (and the theory was correspondingly regarded as empirically highly confirmed), because that theory turned out to entail not only those laws (or rather, in fact, a modified version of them) but also a range of other testable predictions – about the precession of the equinoxes,

¹¹ See, e.g., Lakatos, “Falsification and the Methodology of Scientific Research Programmes,” repr. in *Philosophical Papers*, vol. 1 (Cambridge: Cambridge University Press, 1974).

the return of Halley's comet, and so on (and later of the existence of a hitherto unsuspected planet), all of which turned out to be correct. The wave theory of light, developed by the French physicist Fresnel in the early nineteenth century, not only explained known optical effects, like reflection and refraction, it also turned out correctly to predict the existence of hitherto unsuspected and surprising phenomena – such as that the center of the (geometrical) shadow of a small opaque disc held in light diverging from a point source is illuminated, and illuminated just as strongly as if no obstacle were held in the light's path.

The “explanation” of, say, the facts revealed by Newton's theory or the value of the “escape velocity” of matter (or, of course, of any other feature of the universe) by the postulation that those facts reflect the wishes of a creator is, on the contrary, essentially non-independently testable. It is not just that such postulations happen to fail to be independently testable as yet. They can never in principle be subjected to independent tests – precisely because, unlike real successful explanations, they are explicitly designed to yield the already known facts (inverse square attraction, value of the “escape velocity”) *and nothing more*.

Science not only declines to accept theories that fail to be independently testable, it positively rejects them. When a whole series of investigators, including, as I mentioned, Newton himself, consistently failed to produce any deeper account of gravity in terms of pressure gradients in a mechanical medium that was independently testable, then science adopted the view that there was no such deeper account to be had, and, despite initial reservations, accepted that matter just does act on other matter at a distance. Similarly, the initial reaction to Maxwell's postulation of the electromagnetic field was that such a field could not simply be a mysterious, primitive feature of the universe; the electric and magnetic field strengths at each point of space had to reflect the contortions of some underlying mechanical space-filling medium (our old friend, the aether). But when a whole series of investigators (again including, interestingly enough, the chief scientific innovator, in this case Maxwell) tried and failed to produce “mechanical models” of the field that were independently testable and independently confirmed, science came reluctantly to the view that the field is indeed a *sui generis*, independent, primitive part of the furniture of the universe – that is, the mechanical aether, at least as an underpinning of the electromagnetic field, was rejected.

I conclude that this third and most general type of religious belief, although not actually inconsistent with any substantive scientific theories, nonetheless runs counter to the practices that have informed successful science; and hence such beliefs, too, are unscientific. Some particular religious beliefs are inconsistent with well-accredited scientific theories, but all are inconsistent with a scientific attitude. Religious belief must, as Tennyson so eloquently reminds us in the second of my two epigraphs, rely on faith; and faith is unscientific.

4 Objections, Complexities, and Some Food for Further Thought

Not everyone who has contributed to the – very extensive – literature on the relationship between science and religion is likely to be convinced by the above

argument. (Indeed, this may count as one of the all-time understatements, even by customary English standards!) In a longer treatment, objections would need to be met, complexities unraveled, and, above all, further confusions exposed and clarified. Let me end by indicating – in rough outline – some of the necessary elaborations, if only in an attempt to facilitate further thinking about the issue.

4.1 Belief in science

I have talked so far as if science and religion were two (conflicting) ways of generating beliefs about the world. In fact, however, the relationship between science and (outright) belief is not at all straightforward. As recent studies have underlined, it would be a bold thinker who, in view of the history of radical theory change in science, believed that our currently accepted best fundamental theories are true. If any sort of belief concerning those fundamental theories is rationally mandated, it is at best a belief in their *approximate* truth, which really amounts to the meta-level belief that those theories will be retained in “limiting-case form” in any future replacement theories. (Einstein’s relativity theory is logically inconsistent with Newtonian theory, but yields the latter as a fully adequate approximation for cases of bodies moving at velocities small compared to that of light.) Outright belief – if reasonable at all – would be reserved for statements of evidence and, perhaps, for lower-level theories (such as that matter has *some sort* of atomic structure) that seem so firmly entrenched that their replacement is inconceivable. (This is reflected in the currently most popular formal account of the relationship between theory and evidence in science – personalist Bayesianism. This sees rational agents as assigning probabilities (short of 1) to explanatory theories – probability 1 (effective certainty) being reserved for statements of evidence and of “background knowledge.”¹²) I need hardly say perhaps that this, if correct, *sharpens* the clash between science and religion: if outright belief at least in fundamental, explanatory theories is not rational – that is, not scientific – even in science, despite their enormous empirical success, then the same must apply *a fortiori* to religious explanatory claims, which have no empirical success at all.

4.2 Kuhnian “commitment” in science

In his interesting book *Myths, Models and Paradigms*, Ian Barbour suggests that developments in the philosophy of science – notably in Thomas Kuhn’s *The Structure of Scientific Revolutions* (1962) – have reduced the differences between science and religion to differences of degree, rather than kind. Barbour’s argument merits a more systematic rebuttal than can be given here. My response, however, is that it relies on

¹² See, e.g., C. Howson and P. M. Urbach, *Scientific Reasoning: The Bayesian Approach*, 2nd edn (La Salle, Ill.: Open Court, 1993). I should add that there are a number of Bayesian, probabilistic arguments for religious claims that I lack space to consider here – see, e.g., R. Swinburne, “Argument from the Fine-tuning of the Universe,” in J. Leslie (ed.), *Physical Cosmology and Philosophy* (New York: Macmillan, 1990). (Swinburne’s argument is subjected to heavyweight criticism by Adolf Grünbaum in “A New Critique of Theological Interpretations of Cosmology,” *British Journal for the Philosophy of Science*, 51 (2000), pp. 1–43. See also Swinburne’s reply in “Comments on Grünbaum,” *British Journal for the Philosophy of Science*, 51 (2000), pp. 481–5. The arguments are tied to ideas about what can, and cannot, possibly count as an unexplained “brute fact.” Those ideas are considered briefly below.

overinterpretation of Kuhn's views. Kuhn *does* suggest that successful, mature science requires "faith" in basic, paradigm-forming theories. Scientists must have faith in those theories in order, for example, not to promote "anomalies" into outright falsifications – holding that work within the paradigm will eventually solve them. However, nothing like religious faith is necessary here. Scientists' "commitments" are temporary, pragmatic, and defeasible. One needn't have believed in the absolute truth of Newton's theory in the nineteenth century to see that the anomalies for it posed by observations of Uranus's orbit were probably best dealt with within the Newtonian paradigm – ideas associated with that paradigm provided ways of approaching the problems with Uranus's orbit (perhaps, for example, there was another planet in the heavens, so far misidentified, and once its gravitational action on Uranus was taken into account, the anomaly would disappear). Whereas had a mid-nineteenth century scientist proposed to "abandon" Newtonian theory, he would have been left with absolutely no idea about how to proceed. Moreover, anomalies must eventually be resolved, and what counts as a resolution is clear and a fixed feature of science – scientific "faith" is temporary and eventually called to account (in this life!).

4.3 Worries about independent testability

My argument is oversimplified as it currently stands: not all accepted scientific explanations are independently testable. For example (there are many), the explanation of the failure to observe any stellar parallax that was (surely correctly) accepted in the seventeenth and eighteenth centuries was that there is indeed parallactic motion but available telescopes were not sufficiently powerful to observe it. (If we are on a moving observatory, the earth, then pairs of "fixed stars" ought to seem at least slightly further apart when we are at our nearest point to them than they do when we are furthest away.) This explanation itself was certainly not independently testable – it simply explained away the problem it was introduced to deal with. Is this not exactly like the religious "explanations" I have castigated as unscientific? But notice two things. First, the basic theories involved here – the Newtonian version of the Copernican view – were (massively) independently confirmed *in other areas, by other phenomena*. So the "faith" is underwritten. Moreover, the lack of independent testability of even the specific theory is again of temporary duration – if telescopes had continued to improve in accuracy and still no parallax was observed, then the Newtonian/Copernican view would have been in unambiguous trouble. The point about the difference between scientific and religious explanations therefore remains in tact.

4.4 Explanation as "understanding" or "making sense"

The discussion of the idea of scientific explanation has, in my view, been dogged from the beginning by certain associations of the word "explanation" that ought to be excised. It is natural to think that explanation has something to do with (human) understanding, or "making sense" of, the universe. The whole structure of scientific explanation surely shows, however, that this is a mistake – all such explanation is derivative, and that means that we don't ever really understand anything about the universe (why should we?). Instead, we simply attempt to describe it – eliminating

minor mysteries (why do the planets move in ellipses?) in favor of major mysteries (why do all bodies attract one another in a certain way?).

An objection to this that certainly merits consideration is that even scientists allow that some theoretical claims “make sense” (reflect what can reasonably be taken as “natural” states of the universe), while others cannot be simply accepted as “brute facts” but *demand* explanation. It can then be argued that there are certain claims that must always remain brute facts on any scientific account (one much discussed contender is the fact that “there is something rather than nothing”¹³), but which cannot rationally be taken as brute, and that this therefore gives rational credit to religious claims which can explain them (and hence remove their erstwhile brutish character).

I can in response here only state my own view: namely, that all conceptions about what “makes sense” or what are plausibly “natural” states of the universe are historically conditioned by the successful research programs at the time, and hence are themselves subject to change in the light of the always dominant criterion of independent empirical support. Aristotelians demanded an explanation for any motion, Newtonians only for any *change* in motion; pre-quantum theory explanation in physics demanded a determinist theory, now that is no longer taken for granted; once Newtonian theory was established (and the aether-reductionist approach had failed), scientists were happy (for a while!) to take hitherto barely thinkable, action-at-a-distance as a brute fact. I hold, then, that there is no such thing as a fact that “cannot be taken as brute” – the sort of assumption that a scientist is happy to take as reflecting a brute fact is historically conditioned and historically variable.

4.5 Am I the victim of an evidentialist prejudice?

Finally, I have made it clear that my whole argument rests on the assumption that a rational, scientific person needs good evidence before admitting God into her world view, just as she would before admitting, say, electrons into it. Alvin Plantinga has mounted a well-known defense of the striking claim that belief in God can be “properly basic” – that is, taken to require no evidence.¹⁴ Although again it requires detailed treatment which I cannot give here, I should at least indicate my response. This is that, on analysis, Plantinga’s view amounts to no more than the obviously true descriptive claim that *some people as a matter of fact take* belief in God as basic. But this is no news, the question of course is whether or not they are *justified* in doing so; and, insofar as Plantinga has anything to say about this issue, it seems to rest on the sort of simple-minded relativism that I have throughout taken to be eschewed. His response, for example, to the obvious question of why in that case one couldn’t take belief in a flat earth (or come to that, the innate superiority of the “Aryan” race) as “properly basic” seems to be simply that no Christian would in fact take – or is under any obligation to take – such beliefs as “properly basic.” This, however, is plainly not the issue. The question is what such a Christian would say to someone

13 I cannot resist here citing Adolf Grunbaum’s response to Richard Swinburne on this issue: “Surprisingly, Swinburne deems the existence of something or other to be ‘extraordinary’, i.e., literally out of the ordinary. To the contrary, surely, the most pervasively ordinary feature of our experience is that we are immersed in an ambiance of existence.” (“New Critique,” p. 3)

14 See, e.g., A. Plantinga, “Is Belief in God Properly Basic?”, *Nous*, 15 (1981), pp. 41–51.

who *did* assert as “properly basic” (that is, on no basis at all) a claim that she, the Christian, found abhorrent – and, assuming that she would want to challenge that claim, how she would deal with the *tu quoque* objection. Long live evidentialism!¹⁵

The Demise of Religion: Greatly Exaggerated Reports from the Science/Religion “Wars”

Del Ratzsch

The supernatural is being swept out of the universe in the flood of new knowledge of what is natural. It will soon be as impossible for an intelligent, educated man or woman to believe in a god as it is now to believe that the earth is flat, that flies can be spontaneously generated . . . or that death is always due to witchcraft.

– Julian Huxley¹⁶

This statement reflects a widespread intuition that the continuing triumphal march of science has resulted in religion gradually dissolving toward rational oblivion. In one of my earlier questing phases, that intuition seemed a welcome weapon against the demands of the particular religious beliefs I had been raised with. After a (sometimes rocky) reconciliation with the core of those beliefs, that intuition constituted a constant threat stalking the periphery of my world view. But neither weapon nor threat is genuine unless the picture of science inexorably destabilizing religious rationality is accurate. In what follows, I shall examine some of the justifications for that picture and will argue that they are inadequate. I come to this exploration with convictions contrary to, but not deeply hostile toward, that picture. I too have felt its force.

15 S. Wykstra, “Toward a Sensible Evidentialism: On the Notion of ‘Needing Evidence’,” in W. L. Rave and W. J. Wainwright (eds), *Philosophy of Religion: Selected Readings*, 3rd edn (Fort Worth, Tex.: Harcourt Brace, 1998), argues in response that Plantinga at least shows that we need a modified, more “sensible” evidentialism, because while everyone accepts that our access to electrons (if indeed they exist) is necessarily via inference, believers claim to have *direct access* to God. The important word here is “claim”: what they are really saying is that, given their – clearly theoretical beliefs – they *take themselves* to be, in certain circumstances, in direct contact with God. But, contrary to Wykstra, the situation is precisely analogous in science, at least with respect to some theoretical entities: because of theories we accept (both about the nature of light and about our physiology), we take ourselves to be in regular (pretty well) direct contact with photons of various frequencies. In both cases the “access” is, whatever someone might believe, inferential; it relies on accepting a theoretical premise, and reasonable acceptance of such a premise requires an inference from evidence.

16 Julian Huxley, *Religion without Revelation* (New York: Mentor, 1957), p. 62.

1 Refutation: Some Preliminaries

The direst difficulty science could pose for religious belief would be direct scientific refutation of essential religious principles.¹⁷ But refutation can emerge only out of genuine conflict, and that fact imposes some boundaries. For instance, many believe that science and religion operate in different domains or levels. If such positions are correct, there can be no genuine conflict. Any apparent conflict would represent trespassing or confusion. Furthermore, serious conflict between science and religious belief is possible only if *both* purport to be true. Consequently, if religious commitment is noncognitive or nonpropositional, genuine conflict seems impossible. It also follows that science taken anti-realistically (as in instrumentalism, social constructivism, etc.) poses minimal challenge. If the ultimate intent shaping science is mere empirical adequacy, or if the underlying engine of science is sexual dominance or the suppression of one's social competitors (as some allege), then whatever science says will have little rational force.

Suppose, however, that science can conflict with religion. Where would conflicts occur? For present purposes, we can separate religious claims into two rough categories: core beliefs shared by nearly every religion, and the more varied outlying beliefs constituting the specialized, characteristic beliefs of particular religious groups. The core usually includes the following:

- 1 A supernatural person – God – created the cosmos.
- 2 God cares about humans.
- 3 God ultimately controls cosmic and human history.
- 4 God can intervene in earthly events.
- 5 There is objective meaning/significance to human life, both now and after death.

There are only limited prospects of science contradicting that core. Plate tectonics, stellar and biological evolution, the periodic table, relativity, quantum mechanics, or other such results of science do not have even the appearance of contradicting any of the above. Evolution, for example, could be the means God used to achieve certain desired results, or the world could be quantum-mechanical because that is the way God wanted the cosmos to operate. If those claims are *coherent* (whether scientific or true), then the theories in question do not contradict (1)–(5).¹⁸

The typically cited “conflict” episodes nearly always involve specialized beliefs outside the core, such beliefs often being ascribed to special sources of information (e.g., revelation). For instance, many believers historically took the earth to be stationary, at the center of the cosmos. Some contemporary religious groups see the

¹⁷ Additional discussion of several relevant points can be found in my *Science and its Limits* (Downers Grove, Ill.: InterVarsity Press, 2000), and “Space Exploration and Challenges to Religion,” *Monist*, 70/4 (Oct. 1987), pp. 101–13.

¹⁸ It might be countered that this sort of reference to God is empirically empty and adds no *content* to the scientific claims in question. That may or may not be true, but if it is true, then the proposition that *God made the world to be quantum-mechanical* is logically consistent if the claim that *the world is quantum-mechanical* is consistent. Religious claims cannot be simultaneously empirically empty and empirically refuted.

earth as quite young. Others take the basic kinds of organisms to be unchanged since the creation. These and other specialized religion-inspired claims are widely perceived as having been discredited by science. But would that be problematic for deeper religious belief? How would an anti-religious argument proceed from there? One line of thought is that such refutations undermine the claims to “revealed truth,” and that since even the deeper core religious principles rest on that same source, they are thus rationally unsupported. A different line is that multiple consistent failures even of peripheral religious beliefs support an inductive case for the falsehood of religious principles in general, including the more fundamental core beliefs. Both will be discussed later.

2 Foundations: Deep Conflict?

Science would challenge religious belief were there principles essential to scientific method, scientific explanations, etc. which were thus presupposed in the very existence of science, and which conflicted with essential components of religion. For instance, Norman and Lucia Hall claim that there is a “fundamental incompatibility between the supernaturalism of traditional religion and the experimental method of science.”¹⁹ Is that correct?

2.1 The larger web

First, some cautions. Since most scientists historically were religious believers, we have to attribute intellectual blindness, self-deception, or hypocrisy to those scientists who missed this “fundamental incompatibility.” But classifying Copernicus, Galileo, Newton, Kepler, Boyle, Maxwell, Faraday, Herschel, etc. as imperceptive or as religious hypocrites violates substantial historical evidence.²⁰ And since about 40 percent of current scientists classify themselves as believers, and even many who do not nonetheless see no fundamental *conflict* here, the present charge would indict the majority of scientists who ever lived as not fully grasping what they were doing. That seems implausible.

Furthermore, any science-based case against the rationality of religion must presume the rational justification of science itself, including its foundational presuppositions – the uniformity of nature, the basic reliability of human observation, the appropriateness of human conceptual and cognitive resources, etc. But science cannot straightforwardly establish the legitimacy of the foundations upon which it itself rests. If science is the only source of rational justification, then the foundational principles upon which science itself rests must be simply accepted on brute faith – effectively undermining a key purported distinction between science and religion. Otherwise, science’s foundational presuppositions must obtain rational legitimization elsewhere.

19 Norman F. and Lucia K. B. Hall, “Is the War between Science and Religion Over?” *The Humanist*, May/June 1986, pp. 26–8; p. 27.

20 We cannot just let these scientists off the hook by claiming that the specific scientific facts and theories which generated problems were not yet known in their day, if the conflict flowed out of the very structure and necessary presuppositions of the scientific project itself in which they were intensely engaged.

Two things ensue. First, science could not be the *only* source of rational justification. Second, one question becomes inescapable: How does one give a non-circular *naturalistic* justification for the cognitive faculties we employ in science – that is, a justification, recognition of the rational adequacy of which does not itself rely on precisely the cognitive faculties whose justification is at issue?²¹ Christian scientists in the past proposed religiously based solutions to justification problems. For instance, human observation and intellection could be trusted if properly employed, *given* that those faculties had been deliberately created in us for cognition of this cosmos. Although there are debates over details, historians of science no longer question the foundational role which religion – specifically, the doctrines of divine creation and divine voluntarism – played in the birth of modern science itself.²²

Those foundations may be of more than merely historical interest. Despite centuries of development, science may not be disengaged from those roots even now. Physicist Paul Davies remarks that “Science began as an outgrowth of theology, and all scientists, whether atheists or theists . . . accept an essentially theological worldview.”²³

If Davies is right, prospects for anti-religious cases of the present sort are not promising, since science *still depends* upon foundational structures appropriated from its religious world view heritage, and thus seems unlikely to constitute a refutation of them.

2.2 Cases

Let us nonetheless look at two examples.

2.2.1 Naturalism: philosophical and methodological

Again, the Halls: “Science . . . assumes that there are no transcendent, immaterial forces and that all forces which do exist within the universe behave in an ultimately objective or random fashion. . . . [N]aturalism is the unifying theory for all of science.”²⁴ But does science require philosophical naturalism? Many scientists – believers and nonbelievers – argue that science requires only *methodological* naturalism (sometimes called “methodological materialism,” or “methodological atheism”). Advocates of this position argue that whether or not reality includes more than the natural realm, science by its very nature can deal only with the purely natural and must rigidly restrict itself to that realm. For instance, Eugenie Scott: “Science has made a little deal with itself; because you can’t put God in a test tube (or keep it [sic] out of one) science acts as if the supernatural did not exist. This methodological material-

21 Darwin himself worried about this. See his July 3, 1881, letter to William Graham, in *The Life and Letters of Charles Darwin*, ed. Francis Darwin (New York: n.p., 1889).

22 In fact, some historians of science believe that scientific method was developed as empirical and experimental precisely *because*, as early scientists saw it, given the doctrine that God had created *freely*, unhampered by substantive constraints, science had to actually *look* to see how the cosmos was structured and governed.

23 Paul Davies, *Are We Alone?* (New York: Basic Books, 1995), p. 138.

24 Hall and Hall, “Is the War between Science and Religion Over,” pp. 26–7 (lengthy ellipsis).

ism is the cornerstone of modern science.”²⁵ On this version of methodological naturalism, science must pretend that what it cannot control does not exist, and so must operate *as if* there is no supernatural realm.²⁶

It is evident that whether or not there is a nonnatural realm, the methods that science would employ and the results that science would obtain presupposing philosophical naturalism would be identical to those it would obtain employing methodological naturalism of this sort.²⁷ There is thus no *scientific* reason for insisting on philosophical, as opposed to this methodological, naturalism – whatever the *philosophical* rewards might be.

The critic might take a different tack here, claiming that science does require methodological naturalism, but that the continued success that science has achieved by thus insistently ignoring any alleged nonnatural realm constitutes indirect confirmation that the natural realm is, after all, the only reality – that is, that philosophical naturalism is true.

That move is sensible but not completely simple. First, science may not *require* even *methodological* naturalism. Science historically sometimes employed a nonnaturalistic conception of *law* as regularities in God’s immediate governance of the cosmos. Such views may even offer the *only* available explanation of unique logical characteristics of “natural laws.”²⁸ A second reason involves what *success* means in this context. Most scientists do take methodological naturalism as a working prescription. This means that methodological naturalism defines the terms in which acceptability of scientific theories is assessed. Thus, if a theory is inadequate, it will *as a matter of methodological policy* be replaced only by some alternative theory which also meets methodological naturalistic criteria. Nonnaturalistic theories – regardless of how explanatorily powerful – will simply be ruled out of consideration by fiat. Given this procedure, only “naturalistic” theories – whatever their problems

25 Engenie Scott, “Darwin Prosecuted,” *Creation/Evolution*, 13/2 (Winter 1993), p. 43. It is interesting that the deal that science purportedly makes is with *itself*. Shouldn’t science be making deals with *nature*?

A particularly forceful statement of methodological (at least) naturalism as a faith claim comes from Harvard biologist Richard Lewontin:

Our willingness to accept scientific claims that are against common sense is the key to an understanding of the real struggle between science and the supernatural. We take the side of science . . . because we have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our a priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counter-intuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door. (“Billions and Billions of Demons,” *New York Review of Books*, January 9, 1997, p. 44 (1))

26 As Steven Wykstra has pointed out to me, the range of what is considered “natural” could be different in theistic and nontheistic universes. That would imply that a principle that science can involve only what is *natural* is *not* equivalent to the principle that science must proceed as if the natural is all that exists, as Scott and others seem to believe. Wykstra is developing this point in a manuscript currently in progress.

27 Of course, if philosophical naturalism is not true, then assuming either philosophical or methodological naturalism in science may well lead science irretrievably off track, but that is a different issue.

28 See my “Nomo(theo)logical Necessity,” *Faith and Philosophy*, 4 (1987), pp. 383–402. Those unique characteristics include their being located between material generalizations and necessities, their support of counterfactuals, etc.

– can ever be candidates for “success.” The claim, then, that naturalism has a monopoly on scientific success is both unsurprising and of restricted evidential force. That is not to say that it has *no* force. But the situation resembles that of the ruling party in a one-party country citing its unbroken history of electoral success – where only party members are even eligible to appear on a ballot – as evidence of the voters’ high regard.²⁹

In any case, conflict does not automatically entail that religion is in trouble without additional principles – for example, that science and its presuppositions take precedence over religion and its presuppositions. That is a philosophical – not a scientific – assertion and will be discussed later.³⁰

2.2.2 *The larger conceptual matrix*

Richard Dawkins believes that religion’s foundational outlook is profoundly mis-oriented. Religion does have empirical content:

[Y]ou can’t escape the scientific implications of religion. A universe with a God would look quite different from a universe without one. A physics, a biology where there is a God is bound to look different. So the most basic claims of religion *are* scientific. Religion *is* a scientific theory.³¹

But, unfortunately for religion, the empirical expectations it generates are precisely wrong:

[I]f the universe were just electrons and selfish genes, meaningless tragedies . . . are exactly what we should expect, along with equally meaningless *good* fortune. . . . In a universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won’t find any rhyme or reason in it, nor any justice. The universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference.³²

29 It is worth keeping in mind that the evidence in question (the claimed success of naturalism in science) is not only contingent, historical, and problematic, but that the conclusion it is supposed to support – philosophical naturalism – is *philosophical*. Such cross-categorial moves are not straightforward even under the best of circumstances.

30 It is often argued that methodological naturalism acts as an important safeguard against scientific investigation being short-circuited by scientists being too ready to take the easy way out by citing supernatural explanations for phenomena for which genuine scientific explanations could be found were investigations to continue. This might be true, but even if it is, that justifies methodological naturalism only as a *pragmatic* strategy, which has no substantive implications in the present context.

31 Richard Dawkins, *The Nullifidian*, 1/8 (Dec 1994). (*The Nullifidian* is an e-journal). And Julian Huxley again:

The supernatural hypothesis, taken as involving both the god hypothesis and the spirit hypothesis and the various consequences drawn from them, appears to have reached the limits of its usefulness as an interpretation of the universe and of human destiny, and as a satisfactory basis for religion. It is no longer adequate to deal with phenomena, as disclosed by the advance of knowledge and discovery. (*Religion without Revelation*, p. 185)

32 Richard Dawkins, *River out of Eden* (Cambridge, Mass.: Perseus Publishing, 1996), pp. 132–3. See also Peter Atkins, *The Creation* (San Francisco: W. H. Freeman, 1981), pp. 17, 23.

The problem is not just that some specific scientific theory associated with religion is mistaken, but that the whole base orientation of religion is orthogonal to scientifically revealed reality.

It is not obvious that Dawkins is right. (Even many scientists disagree with him.) Some would deny that *empirical* results bear upon issues of *meaning* at all. In any case, we have experienced exactly one universe. Is this universe *precisely* what we'd expect of an undesigned, purposeless, blind, and pitiless one? I doubt that we know. Could we even reliably distinguish purposeless universes from designed, purposeful universes in which something has gone badly wrong (a familiar religious claim)? While Dawkins's intuitions here may be understandable, they are not rationally obligatory.

In any case, if we do form such expectations, and if we observe aspects of the world which clash with those expectations, the problems *may* lie in our expectations. It is worth noting that nearly every scientific revolution has involved reality itself violating our previous best *scientific* expectations concerning the natural. Our human expectations concerning the *supernatural* may be far off the mark. But if our expectations *do* bear some weight here, it must be kept in mind that the world also exhibits characteristics we would not expect *unless* it were supernaturally created. Science itself may have something to say on this side of the issue. Although controversial, cosmological fine-tuning is at least suggestive.³³

3 Epistemic Undertows: Dissolving Rationality

A number of “scientific” critiques of religious belief consist of

(a) citing purported causes of such belief,

then

(b) claiming that those causes are not rationally legitimate.

While such considerations would not show the *falsehood* of religious belief, wouldn't they undercut the *rationality* of religious belief?³⁴ Let us look briefly at two popular versions of this critique – roughly Freudian and Marxist respectively.

According to the Freudian proposal, religious belief represents wish fulfillment. We have deep, hidden psychological needs and terrors, and we construct emotionally comforting religious beliefs in response to them. But nonconscious, need-driven processes of forming beliefs are nonrational procedures for generating beliefs of any sort, represent profound immaturity (indeed, neurosis), and have no prospect of generating beliefs connected to the actualities of the world and ourselves. For Marx, religion is a reality-fleeing, empty promise of future compensation for present suffering whose

³³ None of this is to say that there is not a problem here for religious believers. In any case, religious believers, far from ducking this and related problems historically, have been among those most insistent on coming to grips with them.

³⁴ There are a number of technical qualifications that would be required even for that more modest project, but I shall bypass most of them.

true (societal) causes it deliberately conceals – an “opium,” as he famously labeled it. In both cases, the belief-generating process is oriented toward something other than truth. The governing aim of Freud’s wish fulfillment is psychological insulation. The governing aim of Marx’s opium is psychological compensation. Both processes involve belief misorientation, and consequently do not deliver rational justification.

Success, for this critique, requires two things. First, there must be a plausible case that the proposed source of belief is in fact its actual source. Such cases are not easy to come by. Freud produced speculative stories involving a hypothetical domineering prehistoric father and his conscience-ridden cannibal sons.³⁵ It is not clear that such unverifiable speculations constitute a scientific threat to religious rationality.

Second, such critiques require a case for thinking that the proposed religion-producing tendencies are indeed unreliable – that they were not, for instance, placed in us by God exactly for the purpose of alerting us to spiritual matters. Showing that is not trivial.

Several additional points are worth noting. This criticism cuts in both directions. Some people may embrace religion because of fear of death, etc. But it is equally possible that some people embrace anti-religion because they fear ultimate accountability, have difficulty dealing with the idea of some Being immeasurably superior to them, cannot cope with being mere dependent creatures, etc.

Furthermore, if Darwin is right – as most critics believe – then natural selection produced the faculties and cognitive structures with which we form beliefs and pursue science. The governing aim of natural selection is reproductive success – *not* theoretical truth.³⁶ But if the governing aim of a belief-production mechanism being other than truth undercuts the rational legitimacy of the beliefs so produced – as Marxist and Freudian critiques presuppose – then *exactly* the same principle poses potential problems for scientific beliefs *and for anti-religious arguments* produced by cognitive faculties developed by Darwinian processes ultimately directed toward enhancing reproductive fitness.

Finally, the present criticism categorizes religion as an explanatory hypothesis competing with other hypotheses, answering to scientific criteria appropriate to such hypotheses. Later I will discuss one ground for questioning that.³⁷

35 Freud, *Moses and Monotheism* (New York: Vintage, 1958), pp. 102ff.

36 Thus, Patricia Churchland:

There is a fatal tendency to think of the brain . . . as a device whose primary function is to acquire propositional knowledge. . . . From a biological perspective, however, this does not make much sense. Looked at from an evolutionary point of view . . . [t]he principle chore of nervous systems is to get the body parts where they should be in order that the organism may survive. . . . Improvements in sensorimotor control confer an evolutionary advantage: a fancier style of representing is advantageous *so long as it is geared to the organism’s way of life and enhances the organism’s chances of survival*. Truth, whatever that is, definitely takes the hindmost. (“Epistemology in the Age of Neuroscience,” *Journal of Philosophy*, 84/10 (Oct. 1987), pp. 544–53: pp. 548–9, emphasis original.)

37 Indeed, the implications apply even to the faculties Darwin employed in forming his own beliefs that evolution explained the existence of those same faculties. One might claim that the successful track record of the Darwinian-produced faculties has established their reliability, but that is not completely unproblematic, given that the judgment of “successfulness” essentially employs and depends upon *precisely* the cognitive faculties in question. Also, the recent dismal fates of both Freudian and Marxist systems might be worth pondering here as well. Other similar deconstructive critiques – e.g., postmodernism – also seem well on their way to dismal fates.

4 Conflicting Mind-Sets

Some cases involve psychological contrasts. For instance, Darwin's cousin Francis Galton remarked that "the pursuit of science is uncongenial to the priestly character."³⁸ The claim is not obviously true – at least, there are important exceptions (Copernicus and LeMaître, for instance). But what is it about scientific and religious mind-sets which is supposed to generate tension? The usual claim is that science requires an open, tentative, inquiring – even skeptical – mind-set, whereas religious belief requires a closed, dogmatic, authority-accepting, blinkered mind-set. One mind, it is claimed, cannot easily be of both sorts. Nobel physicist Richard Feynman describes as "a kind of conflict between science and religion" the "human difficulty that happens when you are educated two ways."³⁹

If different mind-sets operated in different areas, there would need be no conflict. The objection thus suggests that, ideally, one consistent mind-set should dominate one's character – especially if one is not to be riddled with inner tensions. But obviously, rational people have different traits in different areas. The first collection of traits might be inappropriate and even irrational in the interpersonal relationships even of a scientist. The second set might be inappropriate and even irrational in the practical pursuits even of a fervent religious believer. The exaggerated dichotomy may thus misrepresent both sides of the discussion.

Furthermore, the mind-sets are not as distinct as critics would have it. Kuhn and others have taught us that certain degrees of dogmatism and similar traits are absolutely essential to the effective operation of science itself. Many scientists accept what they see as scientifically essential presuppositions as virtually nonnegotiable faith commitments. Some hold specific theories pretty dogmatically – e.g., Richard Dawkins: "The theory of evolution by cumulative natural selection is the only theory we know that is in principle *capable* of explaining the existence of organized complexity. Even if the evidence did not favor it, it would *still* be the best theory available."⁴⁰

On the other hand, numerous religious traditions have valued – and devoted enormous effort to – reasoned justifications for their beliefs. In fact, basic theistic belief seems to be perfectly consistent with a "scientific" mind-set. There were those in the natural theology movement who refused to accept religious authority and revelation as legitimate and who undertook to accept beliefs about the supernatural *only* to the extent that such beliefs could be empirically substantiated, but who were convinced that God's existence and some of his properties could be so discovered. Perhaps their arguments were defective, but they were believers with no evident inconsistency within their overall mind-set.

38 Francis Galton, *English Men of Science: Their Nurture and Nature* (London: Macmillan, 1874), p. 24.

39 Richard Feynman, *The Meaning of it All* (Cambridge, Mass.: Perseus Publishing, 1999), p. 38. Even John Wesley noted this sort of difficulty (at least for some, including himself) in his sermon, "The Use of Money": "I am convinced, from many experiments, I could not study, to any degree of perfection, either mathematics, arithmetic, or algebra, without being a Deist, if not an Atheist."

40 Richard Dawkins, *The Blind Watchmaker* (New York: W. W. Norton, 1996), p. 317, emphasis original.

5 Historical Erosion

The problem which science purportedly presents for religion is perhaps most often seen not in terms of episodes of decisive confrontation between the two, but as a gradual historical erosion. Religion, the story goes, supplied prescientific explanations for otherwise inexplicable aspects of human experiences. Such purported explanations rested on religious conceptual foundations, constructed religious explanatory resources, and applied them to phenomena – both real and otherwise – countenanced within religious outlooks. These explanations might in their time have been rationally defensible, but, the story continues, science has progressively undermined all of those areas – religious conceptual foundations, explanatory resources, proposed explanations, and in some cases even the alleged phenomena “explained.” Science has irreversibly eroded the conceptual foundations by revealing a cosmos ever more strikingly out of sync with the expectations those religious conceptual foundations generate. The “substance” of explanatory resources harvested from such foundations has progressively evaporated, and there is increasingly little within scientifically revealed reality for them to apply to. The alleged explanations of even those phenomena which are real (e.g., diseases) have exhibited a growing causal irrelevance. And some of the “explained” phenomena themselves have simply melted away under objective scientific scrutiny.

5.1 Dissolution by induction

One continuation of this story goes as follows. The various bits and pieces which have crumbled away from the religious conceptual scheme might not, *individually*, have been essential to religious belief, but, added together over the longer haul, they constitute a track record of serial failure substantive, persistent, and consistent enough to establish that whatever religious beliefs in general might be alleged to reflect, they do not reflect anything remotely resembling reality or truth. As such, religion is now at best a free-floating irrelevance, at worst, worse.

Such objections are quite popular. Stephen Hawking suggests that explanatory appeal to God may no longer be appropriate even for the bare existence of the cosmos:

[T]he quantum theory of gravity has opened up a new possibility, in which there would be no boundary to space-time . . . The universe would be completely self-contained . . . But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end; it would simply be. What place, then, for a creator?⁴¹

5.1.1 Imploding the gaps

One common way of packaging this “What place?” challenge is the “God-of-the-gaps” picture. According to this picture, religious explanations flourished before science

⁴¹ Stephen Hawking, *A Brief History of Time* (New York: Bantam Books, 1988), pp. 136, 141. See also Atkins, *Creation*, p. 17.

began to conquer the vast plains of human ignorance. But, as that conquest got under way, religious “explanations” simply could not compete with the confirmable explanations produced by science and were increasingly displaced by them. The available field of operations for religious explanations inevitably shrank, reducing religion to fighting for its life in doomed rearguard actions from within whatever gaps in the broader scientific picture happened to be (as yet) unclosed. But even those temporary shelters are, if not exhausted, well within the current gun sights of scientific inevitability.

Such objections are not without surface plausibility, but they may be less powerful than their advocates believe. First, there still are gaps in our scientific pictures. Although there are recurrent claims that we finally have in hand all the necessary materials for completing the scientific picture (and such claims have a long and, to this point, unsuccessful history⁴²), such promises rest upon optimistic induction at best and prior philosophical commitments at worst, and share the hazards such processes embody. Second, Kuhn argued that revolutions and advances sometimes reopen scientific issues previously thought to be settled. Since there is no guarantee that closed gaps will stay closed, closed gaps may be an unstable launching platform for critiques.

Third, it is not clear that religion exhibits an unbroken record of being driven into gaps. For nearly two centuries, some scientists have argued that the fundamental empirically discovered structure of nature (governing laws, etc.) can best – maybe *only* – be sensibly explained in terms of deliberate design and adjustment. Indeed, theistic sympathies raised by “fine-tuning” considerations get progressively more pronounced, the *more* we know about nomic structures, incredibly tightly constrained natural constants, and so forth. Such positions have become noticeably stronger recently, and have attracted even some scientists who cannot by any stretch be classified as traditional religious believers.⁴³ There are, of course, proposed cosmologies which militate in the opposite direction – Hawking’s view above, many-worlds theories, etc. But such cosmologies are currently largely speculative, and speculative cosmologies have been quite unstable historically.⁴⁴ And it should not be overlooked that some cosmologies – perhaps including some many-world theories – have been embraced by some precisely *for* the purpose of escaping what otherwise look like broadly religious implications of competing cosmologies.

5.1.2 Creeping marginalization

I am all in favor of a dialogue between science and religion, but not a constructive dialogue. One of the great achievements of science has been, if not to make it

42 e.g., Atkins, *Creation*, p. 127, says: “Complete knowledge is just within our grasp.”

43 Furthermore, the initial emergence of this focus not on objects in nature but on design-friendly law structures underlying nature was not part of a retreat from Darwin (as it is frequently characterized), but predated Darwin by a number of decades.

44 The physicist John Archibald Wheeler reports one of his colleagues as advising people not to chase after a bus, a member of the opposite sex, or a cosmological theory – since, after all, in each case there will be another one along in about three minutes.

impossible for intelligent people to be religious, then at least to make it possible for them not to be religious. We should not retreat from this accomplishment.

– Steven Weinberg⁴⁵

The perception expressed here by Nobel physicist Steven Weinberg represents a variant erosion theme. Perhaps science has not rendered religious belief epistemologically pathological, but it does make explanatory appeal to any supernatural agency unnecessary if not downright pointless. Religion is superfluous because (a) its primary purported function is explanatory, and (b) any domain of actual reality it might lay claim to will ultimately be covered by science. That is guaranteed by science's potential explanatory completeness – a potential inductively supported by its continually expanding track record to this point. So perhaps one can still believe if one wants, but one should not be under the illusion that religious belief does any essential explanatory work or is otherwise rationally indispensable.

Contention (a) will be addressed shortly. Concerning (b), we may need to be a bit circumspect. We must appreciate the power which science has and the incredible things it has achieved. But we must not overlook the fact that perceptions of science's potential completeness are at this point projections involving surprising leaps, and some of the remaining gaps are worth reflection. For instance, few things are more familiar than the fall of a raindrop. Yet no scientist anywhere has ever accurately predicted – let alone observed, measured, and confirmed – the path of a single descending raindrop. There are, of course, readily proposed, perhaps perfectly correct, explanations for that. But the *fact* is that assertions of global scientific capabilities constitute an unfulfilled promissory note even for vast stretches of the most familiar, directly observable physical events.

One other point for reflection here. Those who advance an “erosion” picture assume that science drove the process. But that is a historical claim and may not be totally accurate. On a closely related issue, historian John Henry says: “Far from being the predominant driving force in secularization, the practice of science itself was secularized as a result of influence from the wider culture.”⁴⁶ The “credit” for the erosion may not be science's to claim – other, perhaps less than epistemically upright factors may have been driving the evolution of science itself.

5.2 Revelation

The claimed erosion also factors into another popular critique. Suppose that some person claims to have a special source of supernaturally revealed truth, but that the alleged revelation has a track record of frequent mistakes in readily testable areas. Suspicion of the claim to special access would certainly be understandable – maybe even proper. (There is, of course, the possibility that the mistakes result from misinterpretation of genuine revelation – not to mention the possibility that the alleged refuting scientific results are where the mistake lies.) But suppose that the revelation

45 Steven Weinberg, “A Designer Universe?” *New York Review of Books*, Oct. 21, 1999, p. 48.

46 John Henry, “Atheism,” in Gary B. Ferngren (ed.), *The History of Science and Religion in the Western Tradition* (New York: Garland, 2000) pp. 182–8: p. 186.

– even all revelation – were shown to be spurious. Would not religion have to abandon all pretense of rational justification?

That follows only if the core rests solely on purported revelation – now discredited – and is devoid of other possible rational justification. By “rational justification,” critics typically mean argumentation, evidence, experiences, observations, explanatory hypotheses, and the like. Of course, some believers (e.g., mystics) have cited special sorts of direct experience. Others, during nearly every historical period, have constructed formal arguments. Such attempts are generally rejected by critics as being either logically inadequate or somehow of the wrong sort – the experiences are non-reproducible; the arguments are contrived, fallacious, or rest upon empirically ambiguous foundations. The usual tacit presupposition is that any rational justification deserving of the title must conform to something like a scientific, explanatory, predictive model of rationality.⁴⁷ But is that presupposition correct? That question will be addressed momentarily.

6 Conflict and Rational Justification

6.1 Conflict: limited significance

As noted earlier, some argue that science and religion operate in different arenas and cannot even in principle conflict, meaning that science cannot possibly undercut religion. Perhaps that is true. But suppose that there is genuine, irresolvable conflict. What would the significance of that be? As noted, conflict would inexorably undo religious belief only given the epistemic priority of science – and establishing that may not be straightforward, for several reasons.

(1) Although we often speak of “scientific proof,” the logical structure of scientific investigation and confirmation precludes rigorous proof of scientific theories and results. That well-known fact is one reason why science is typically described as provisional and is always willing to give up specific positions when necessary. The possibility that specific scientific beliefs involved in science/religion conflict are mistaken should not be overlooked.

(2) Science is done by humans and reflects human limitations. For instance, scientific theories and results are of necessity limited to reasonings, concepts, observations, measurements, and other resources which native human faculties can, either directly or indirectly, connect to. Regardless of how far instruments, computers, and other aids can extend humanity’s scientific reach, that reach must have traceable ties ultimately to a fundamentally human bedrock. The anchors of human science must catch there, because our human faculties and capabilities are the only ones we have, and without such connections, we could neither grasp nor pursue our own science. Although we try – via the “scientific method” – rigorously to govern, correct, and

⁴⁷ Some – e.g., Nancey Murphy and Michael Banner – have argued that there are significant formal parallels between science and religious belief.

test our faculties, reasonings, concepts, and theories, we have no alternative but to employ – and ultimately to trust – inescapably human capacities and insights. Claiming that we subject them to *nature's* verdicts does not circumvent the loop. After all, we must ultimately rely on *our* convictions concerning what constitutes a *test*, what constitutes *passing* such a test, what the *evidence* of such passing does or does not include, what proper *evaluation* of such an attempt involves – and none of these matters are just dictated to us by nature. Careful, methodical, and responsible as we might try to be, those matters *inevitably* have human fingerprints all over them.

(3) Ultimately, then, we have no choice but to accept some deliverances of some basic human faculties as cognitive bedrock for any human enterprise. But the cognitive faculties and intuitions underlying science are not the only ones we humans have – or if they are, they also underlie other characteristic human projects which may thus have ultimate foundations just as legitimate as science's. If, then, there *is* any deep conflict between science and religion, each side may rest upon fundamental aspects of human nature, and each may have equally legitimate claims on us. In that case, science would have no more inherent claim to deeper allegiance than does religious belief. It may be that other dimensions of broader human existence – faith, loyalty, perseverance, love, religious commitment – *should* sometimes outweigh commitment to the abstract, provisional, inductive, theoretical, highly indirect, only partially confirmed theories and hypotheses of the scientific dimension of human existence – and on precisely the same ultimate grounds that science ought sometimes to overrule specific religious beliefs. That seems at least *possible*, and if so, then the mere fact of even genuine and irresolvable conflict would not automatically imply that religious belief should always give way to science.

(4) The history of science itself provides a caution here. Historically, the bulk of all scientific theories ever proposed or accepted by scientists have turned out to be incorrect, at least in detail. Anyone who risked all for nearly any scientific theory in the past would have lost all. Future generations may well say exactly the same about our present science. If so, then those who advocate the absolute primacy of science must either argue that at last, fortunately, *we* happen to be the lucky generation that finally got things right (which seems both unlikely and overly self-congratulatory), or else must base that claim on the prediction that although science has not yet gotten things quite right, it will someday. This means that theory-based scientific cases against religious belief rest partially upon faith in a promise for the future.

(5) The implications of inconsistency are not always straightforward even within science itself. (i) *Theory/data conflict*: nearly every successful scientific theory is proposed, developed, and accepted in the context of *known* contradicting data. That has been so prevalent historically that one historian of science remarked that *every* theory is *born* refuted. Were problematic data an automatic reason to reject scientific theories, we'd have to reject them all. (ii) *Theory/theory conflict*: General relativity and quantum mechanics – two of the best theories contemporary science owns – are mathematically inconsistent with each other. But science has so far – *perfectly properly* – refused to part with either. Logical ambiguity is where we flesh-and-blood humans – scientists included – must sometimes live.

6.2 Rational justification: sources

The conception of religious belief as constituting an explanatory hypothesis competing with science, whose rational credentials depend upon successfully meeting the criteria for such hypotheses, has arisen repeatedly in the foregoing. Is that conception correct? Very recently, some scholars have been struck by the fact that virtually none of our truly fundamental, commonsense, life-governing beliefs are generated by argumentation; nor are they merely provisional explanatory hypotheses or anything of the sort. Nor do we acquire or justify beliefs that those around us have minds, that there has been a past, that our reason applies to reality, or that there is an external world, on some ‘scientific’ model of argumentation, hypothesis, testing, and confirmation. *We could not do so were we to try* – as the long history of failed philosophical attempts amply attests. And belief that one’s spouse loves one is neither a hypothesis to explain otherwise puzzling behavior, some sort of induction, nor an empty irrelevancy. Furthermore, centuries of serious *skeptical* arguments from various philosophical movements have failed to make the slightest dent in commitment to such pervasive and persistent beliefs as that we know that there is a real external world. Yet, despite their lack of formal support and their unruffled immunity to contrary argumentation, such fundamental beliefs are surely rational if any of our beliefs are. Rational justification here must thus have some different and deeper source, and artificially limiting acceptable grounds to explanatory hypotheses, argumentation, and the like does serious violence to human rationality. That has led some “reformed epistemologists” to suggest analogously that artificially limiting possible grounds for rational justification of religious beliefs to a set of “scientific” procedures which is demonstrably inadequate, even for the world of ordinary experience, may be equally misguided. We may, they argue, have deep inbuilt faculties which generate religious belief, just as we apparently have deep inbuilt faculties which generate the bulk of our commonsense beliefs. (Indeed, the indispensable presuppositions of science itself may ultimately rest upon an exactly similar foundation.) Relevant assessments of rationality may in each case require an approach very different from more formal ‘scientific’ ones.

If that proves correct, then some common demands – e.g., that religious believers produce science-shaped arguments or hypotheses, or identify empirical arenas in which religion withstands all empirical comers – may simply be inappropriate. Any inability of believers to meet such demands may be of as little rational significance as the inability of everyone to produce arguments for the existence of the external world, the minds of their colleagues, the reality of the past – or for the legitimacy of bedrock presuppositions of science. In none of these areas would any such inability alone establish lack of rational justification.

7 Conclusion

I have not tried to show that a theistic world view is correct, that science supports such a world view, that there have not been historical tensions, that there is no present ferment, or anything of the sort. In fact, ferment seems to be the natural condition

of most truly open human projects – intellectual or otherwise. But making the case that science destabilizes fundamental religious belief is not so easy as some claims would make it seem. Furthermore, the force even of those critiques which may have substance is less than is often attributed to them. And if science really *is* to be our intellectual model here, as some critics suggest, then, given standard claims that science differs from blind religious dogma in being tentative, provisional, and always prepared to revise in the face of new information and insight, it would appear that some critics of religious belief are engaged in an existential inconsistency.⁴⁸

Reply to Ratzsch

Del Ratzsch alludes to any number of arguments. I think it is fair, however, to take his paper's central claims to be: (i) the clash between science and religion is by no means as clear-cut as is often supposed, and (ii) even where there is, let's say, *tension* between the two fields, it is not obvious that epistemic considerations unambiguously dictate that it is religion that should give way.

Since I already conceded that religious believers can – though with more difficulty than Ratzsch's treatment suggests – avoid outright inconsistency with the “results” of science, I concentrate on part (ii) of his argument. His most challenging points seem to be these. First, there is not even the appearance of a clash between science and religion unless we take it that science provides rational warrant for belief in the truth, or approximate truth, of its *theories*. And there are widely defended views of scientific theories that deny this. Secondly, the thesis that our beliefs (or degrees of belief) should be governed by the scientific method is itself a philosophical, rather than a scientific, claim. This implies – point three – that even those who support the epistemic priority of science cannot hold that science is the only source of knowledge. Are the nonscientifically endorsed beliefs that underpin the scientific method really any different from the nonscientifically endorsed beliefs that underpin religion? Fourth, and finally, he claims that there are things that everyone would accept that we know – such as that there exists a world external to our consciousness – that we do not know via the scientific method; but then we may know religious truths in this same “alternative” way.

1 Anti-Realism and Religious Belief

Even the standard conflicts between science and particular commitments inspired by religious views – for example, over Copernican or Darwinian theory – undoubtedly depend on taking a “realist” view of those theories. If, instead, theories are regarded simply as tools for organizing empirical data, then there can be no conflict.

⁴⁸ I wish to thank my colleagues in the Calvin College Philosophy Department, especially Steve Wykstra and Kelly Clark, and David Van Baak.

Now, whatever may be the case concerning “fundamental” theories, it is difficult to take seriously an anti-realist attitude to less-frontier, more well-entrenched theoretical claims such as that matter has *some sort* of atomic structure, the earth is not stationary, the fossil record is indeed a collection of the imprints or bones of now extinct species, and so on. But aside from this, it surely seems odd, to say the least, for someone defending religious faith to appeal to anti-realism. (Though it is, I admit, an oddity that frequently occurs.) After all, the motivation for that anti-realist view is the desire to go as little as possible beyond the evidence, beyond what we can reasonably take as certain. No matter how strongly our evidence from, say, cloud-chamber photographs and the like may seem to indicate the existence of electrons, that evidence can never be logically conclusive – so, the suggestion goes, stick to what is conclusive (namely, that electron theory makes true empirical predictions) and avoid commitment to the *truth* of electron theory. But this hard-headed, skeptical attitude is entirely at odds with the sort of credulousness required of religious believers, who advocate belief in substantive claims about the universe on the basis of no evidence at all. The anti-realist deist, having strained at a gnat, promptly swallows a camel with gusto.

2 *Tu quoque? No Thank You*

Believers through the ages have used the “tu quoque” response to those who try to use scientific rationality against them. The claim is that, when carefully analyzed, the principles that underwrite the canons of scientific rationality cannot themselves be defended rationally or scientifically, and hence that the defender of scientific rationality herself appeals to principles which must ultimately have the status of unproven (because basic) dogmas.

I agree with Ratzsch that the principles of scientific method cannot themselves be defended scientifically – all attempts to “naturalize epistemology” are circular.⁴⁹ Indeed, as Lewis Carroll showed,⁵⁰ – any attempt to justify even the simple principles of *deductive* logic, such as the rule of *modus ponens*, will inevitably presuppose those principles themselves. It follows that the principles of logic and of evidence underpinning science can ultimately only be defended “dogmatically”: we just know that the rule of *modus ponens*, for example, transmits truth; we just know that it’s a good idea to test claims against plausible rivals before accepting them, and so on.

This does not, however, entail, as Ratzsch asserts it does, that scientific “naturalism” is self-certifying. First, I cannot see, as explained in my essay, that it is coherent to contrast “naturalism” and “supernaturalism”: there is what there is, and *if* what there is includes *so-called* supernatural entities, then those entities are really natural – they are parts of the universe as a whole (again, what else could they be?). Secondly, science has no inbuilt prejudice against God (or against psychic forces or teleportation or whatever). The scientific approach is not inherently “naturalist,” but

49 John Worrall, “Two Cheers for Naturalised Philosophy of Science – or Why Naturalised Philosophy of Science Is Not the Cat’s Whiskers,” *Science and Education*, 8 (1999), pp. 339–61.

50 Lewis Carroll, “What the Tortoise Said to Achilles,” *Mind*, New Series, 4/14 (1895), pp. 278–80.

rather inherently evidentialist: it accredits claims about features of the structure of reality exactly to the extent that there is evidence for the existence of those features. The problem with God is *not* that there is no room for her in physics – the problem is that there is no room for her in physics *because* there is no evidence of her physical (what else?) reality.

I do accept, though, that the principles of evidentialism have to be “taken as read.” There is no way that someone could be rationally convinced that logic and evidence are essential parts of rationality unless they had already accepted logic and evidence! Does that mean, as Ratzsch intimates (without quite saying so), that in the end the pro-science and the pro-religion person are “equally dogmatic”? This would be like arguing that, because they both acted immorally, the hungry little old lady who steals a lamb chop from the supermarket stands on a par with Adolf Hitler. There are grades of wickedness, and there are grades of dogmatism – not all sins are equal, and neither are all “dogmas.” There is an obvious difference between, on the one hand, asserting that it is just a basic truth, one that cannot be justified on the basis of anything simpler, that if, if p then q, and p are both true, then so also must be q, and, on the other hand, asserting that it is just a basic truth, not one that can be justified on the basis of anything simpler, that there exists an omnipotent, omniscient, omnibenevolent god who “created” the universe. The “dogmas” that underpin the scientific method are formal, intuitive, of minimal content, and, once understood, universally accepted by all serious parties; the dogmas of religion make enormously contentful claims and are matters of heated and continued dispute between serious parties – hence they surely cry out for (but fail) evidential assessment. As it says in “the good book,” “Why beholdest thou the mote that is in thy brother’s eye, but considerest not the beam that is in thine own eye?” (*Matthew 7:3*, KJV).

3 Different Ways of Knowing?

Del Ratzsch echoes the view of the ‘reformed epistemologists’ that there are features of the universe (such as its existence independently of human consciousness) that we (i) know as firmly as we could possibly know anything and (ii) do not know on the basis of any scientific reasoning. Hence there are nonscientific ways of knowing, and who is to say that we cannot know religious truths in some such nonscientific way?

One way in which this sort of thesis can be argued relies on the sort of outright relativism that I am taking to be rejected on all sides: if there is a “religious way of knowing” alongside the scientific, why not a parapsychological or a scientological or a . . . way of knowing? Ratzsch is not endorsing such easy (and clearly unacceptable) relativism, but rather is claiming that *anyone* serious must acknowledge that we know certain things in a way not dependent on the procedures of science, as well (or better) than we know things through science.

Surely, however, we *do* know that there exists a world independent of our consciousnesses precisely on scientific grounds. That claim is so fundamental, such a core assumption in all our scientific theories, that we may not think of it this way, but we accept it because of its (immense) predictive success (unlike its idealist rivals, it successfully predicts that the tree that appeared to be there before we closed our eyes

will still appear to be there when we reopen them; we accept it because it is the best explanation of the evidence). Similar considerations of course apply to the case of the existence of other minds. Indeed, I would argue that all of our so-called commonsense knowledge is *either* flawed (and therefore not really knowledge at all) *or* based on scientific reasoning, very broadly construed (and hence in effect consists of well-confirmed hypotheses). I would certainly include here Ratzsch's example of the person who "knows" that his spouse loves him: *if* he knows this at all – and, sadly, the divorce courts churn out thousands of counterexamples a day – he knows it as a well-confirmed hypothesis (without of course formally thinking of it this way).

Notice that Ratzsch's argument for our not knowing of the external world or other minds in a scientific way is confused. He correctly remarks that *philosophical* attempts to *prove* the existence of the real world (and of other minds) fail. But the point is that we should never have expected a proof (science never offers these) even though the claims seem so evidently true. Exactly when we replace philosophy with science, we get the right answer: these claims are extremely well-confirmed hypotheses. Ratzsch's suggestion that all findings of science are "provisional," while the external world claim is not, again rests on concentrating – as much recent philosophy of science has done – on *fundamental* scientific theories. These, as cases of "scientific revolutions" have shown, are seriously fallible; but the same cannot be said of "lower-level" claims such as that the heart pumps blood around the body, that the earth is in motion, that DNA has a helical structure, and so on. The "external world" claim is even lower-level, even more deeply entrenched. Of course, being a synthetic claim, it is fallible *in principle*, but there is no reason to take its fallibility seriously.

The central thesis remains in tact: everything that we can legitimately claim to know about the world (as opposed to our methods) is based on the methods and rules of evidence employed in science, and there is no evidence for the existence of a god.

Reply to Worrall

Worrall has developed very clearly some intuitions which often underlie criticisms of religious belief but which are seldom explicated in such perspicuous form. Some of his views I agree with – for example, suspicion of NOMA, and that religious belief doesn't come to much if metaphorized out of all genuine substance. Furthermore, some of our disagreements do not involve matters of principle and could probably be resolved through further discussion.⁵¹ But we do have significant differences.

Fundamental to Worrall's case is the view that one single set of criteria defines *rational justification* and that (on pain of an invidious relativism) all substantive beliefs must meet those same criteria to be rationally justified. But it is surely possible that sufficiently different substantive facets of the world require appropriately

51 For instance, I read Alvin Plantinga quite differently than does Worrall, and I am not convinced that the demographics of religious belief have the negative implications that Worrall suggests.

distinct approaches.⁵² Were that the case, the demand that all evaluation be in identical lockstep terms might avoid relativism but produce conceptual chaos (or conceptual impoverishment). However, Worrall's initial candidate for this single evaluative structure is the plausible-sounding principle that substantive claims must be evaluated ultimately by reference to *evidence*.⁵³ Although that principle is actually controversial, one might accept it as a *general* evaluative requirement, then argue that different types of beliefs might be rationally justified in terms of appropriately different types of evidence. That would give a unitary underlying structure to rational justification (certainly plausible) while allowing specific sub-types of justification to reflect (sensibly enough) characteristic uniquenesses of distinct facets of reality. Such recognition of uniquenesses seems potentially crucial in the present case, since religious explanations are ultimately *agent* (person) explanations – involving God's actions, wishes, purposes, commands. Agent explanations are widely seen as having unique characteristics, and evidence concerning the wishes and purposes of other agents is often of a special sort – deliberate agent communication.

However, midway through his essay, Worrall's principle, with neither notice nor stated justification, mutates to the principle that such evaluation must be in terms not just of evidence, but of *empirical* or *observable* evidence. So not only is there only one admissible structure for rationality (that being a broad evidentialism), there is only one category of admissible evidence – the empirical. (Direct supernatural agent communication – e.g., revelation – is evidently ruled out by stipulation.) As Worrall sees it, then, all *rational* evaluation of substantive claims about the world becomes *scientific* evaluation⁵⁴ – the norms of empirical science simply *become* the norms of rationality, which substantive religious belief must then meet to be rational.

But extreme care is required here. Most scientists have believed that simplicity, mathematical beauty, explanatory power, systematizing capability, etc. – none of which constitute *empirical aspects of nature* – were essential evaluative criteria for scientific theories. Indeed, given the underdetermination of theory by empirical data, no realist conception of science can avoid nonempirical evaluative criteria, and thus evaluation could not be just in terms of *empirical* evidence, in any straightforward sense.⁵⁵

52 By “substantive,” Worrall may just *mean* “empirical.” If so, that would seem to involve an ontological presupposition which would require support.

53 Although I will not pursue the matter here, that principle requires great care. My belief that I have consciousness is a substantive, factual matter – the world would be importantly (I think) different were it not true. But that belief does not rest upon *evidence* which I note, evaluate, and test, only then accepting that belief.

54 That equating can be seen in such statements as: “If all explanations involving substantive, synthetic claims about the world must satisfy the same criteria, then it is simply nonsense to claim that religion can explain the scientifically inexplicable” and the phrase “not rational, that is, not scientific.”

55 Simplicity, for instance, is often taken as *evidence*, in some broad sense, for the simpler of two empirically equivalent theories. I am not sure whether Worrall would call that “evidence” – it surely isn't *empirical* evidence. Anyway, I am not at all sure that Worrall would disagree with the overall point here. Much would depend upon details of his view of the nature and exact role of the empirical, which, given length constraints, were understandably not covered in his main essay.

In any case, is this sort of evidentialism rationally fatal for religion? Couldn't a believer propose God's creative activity as *explaining* some observable phenomenon, then cite that as empirical evidence for God's existence and activity? Worrall's reply is that an *invariable* requirement of scientific method is the *rejection* of any explanatory proposal having no (possible) 'independent empirical support'.⁵⁶ A principle, purported fact, or theory proposed or hypothesized to explain some empirical phenomenon must not only successfully explain it, but must also have *additional* empirical implications beyond those it was specifically tailored to handle. Otherwise, it will be merely ad hoc. Thus, a proposed explanation offering no prospect of further corroboration of the hypothesized matters (e.g., novel predictions) is not genuinely scientific. Religious "explanations" of empirical matters, Worrall holds, invariably fail this invariable requirement of scientific practice.

Is that true? Long before the Big Bang theory, the doctrine of creation was taken as implying a beginning of the cosmos at a finite time in the past. That empirical implication is apparently right. (Some scientists *resisted* Big Bang cosmology precisely *because* it looked suspiciously like creation.) Furthermore, prominent early scientists insisted that investigation of nature must be empirical, because nature was *freely* created by God, and the only way to determine what God had done was to *look*. Scientifically essential confidence in the intelligibility of nature, and in the uniformity of nature, were historically given theological justifications. Does the subsequent success of science, and science's continuing corroboration of those implications of the doctrine of creation (which, long *predating* science, manifestly were not proposed just to explain science and its success) constitute independent support? Science as we conceive it certainly did not *have* to succeed – its success is a decidedly contingent, decidedly substantive fact. (As these issues suggest, religious explanations often focus not merely upon internal scientific matters, but on conditions essential for the very existence of science – matters which science itself is unequipped to address.⁵⁷ Worrall's examples of religious explanations of substantive matters (e.g., gravity operates by an inverse square because that's the way God wanted it) give a far too constricted view of the varying types of explanations involved – explanations which, again, are agent explanations.)

But is the stipulated "independent empirical support" requirement really invariable anyway? Contrary to Worrall's contention, even in broadly "scientific" contexts, it is not absolute. Suppose that you were the first human on Mars, and discovered an exact, full-scale replica of the Eiffel Tower, or a sign saying "Welcome, Delicious Earthling." The most *rational* explanation would be an agent explanation – aliens. And the absence of any additional "independent empirical support" for alien existence, activity, etc., would not have the *slightest* effect on the cogency of that explanation. Nor would our inability to tell – or even understand – why the aliens had done it. Nor would the fact that aliens were proposed specifically to explain only that

56 Whether or not there is such a thing as 'the' scientific method which is historically invariant is a matter of dispute among historians and philosophers of science. Prof. Worrall's reference to "the always dominant criterion of independent empirical support" suggests he believes there to be at least a core of invariability.

57 See my initial essay, especially the section entitled "The Larger Web."

one bit of empirical evidence render the proposal *ad hoc*.⁵⁸ The alien explanation would be an agent explanation designed to explain something made by that agent. Religious explanations are frequently, of course, of exactly that general type as well.

But suppose that Worrall had shown that religious belief did not conform to “the scientific attitude.” If religion *is* religion and not science, wouldn’t one expect it not to conform to norms definitive of something else – science? More importantly, why should that nonconformity be worrisome for religious believers? Should scientists worry if told that science does not conform to “the religious attitude”? Recall, furthermore, that Worrall warns us against thinking that *even our best* fundamental scientific theories are true, and says that not only does science not *logically* refute basic theistic beliefs, but that “outright belief at least in fundamental explanatory theories *is not rational*, that is, not scientific, even in science” (my emphasis). So why, we might ask Worrall, *should* science epistemologically rule all?

Superficially, Worrall’s answer might seem to be that, regardless of its limitations, science is still the best we’ve got – it has had “enormous empirical success,” whereas religion has had “no empirical success at all.” But his reason goes deeper than that. Recall that Worrall’s position constitutes an identification of the rational with the scientific – a form of *scientism*. (Note Worrall’s telling phrase: “not rational, *that is*, not scientific” (my emphasis).) Thus, if religious belief clashes either with well-accredited results of science or with the scientific attitude, it is thereby automatically in *rational* difficulty. In effect, if religious belief has *any* distinctive character *different* from that of science, it virtually *thereby* fails to conform to the requirements of rationality – making genuine religion rationally unacceptable almost by definition. In particular, “religious belief must . . . rely on faith; and faith is unscientific.”⁵⁹ It *must* rely on faith – that is purportedly essential to its character *as* religious belief. And faith evidently cannot demand independent empirical support – that is presumably essential to its character *as faith*.⁶⁰ And belief despite failure of independent empirical support constitutes failure to be *scientific* – that is, failure to be rational. Science trumps and triumphs because it very nearly just *is* rationality, and anything purportedly substantive but not scientific is *a fortiori* not rational. With the boundaries thus drawn, religion’s “clashes with science (or more accurately the scientific attitude) is inevitable,” and (at least when in conflict with established scientific theory) religious claims “must, from a rational point of view, give way” (my emphasis).⁶¹

Worrall’s argument, then, rests upon reduction of all evaluation of substantive matters to one preferred structure of evaluation (evidentialism), all legitimate evidence to one preferred sort of evidence (empirical), and all rationality to one preferred model of rationality (science). It seems to me that not only has Worrall not given adequate

58 This example might be far-fetched, but, as David Van Baak remarked to me, the *scientific* analysis of the first radio message recovered by a SETI program would have *precisely* this logical structure.

59 The reference here is to Tennyson, but Worrall clearly endorses the position.

60 This conception of faith would be deeply disputed by many believers.

61 So, as Worrall structures the issue, evaluation is stipulated as empirical, but religion will not get credit even when it happens to be empirically right. If a religious belief does have the proper empirical credentials, then it is *ipso facto science*, and not religion after all, and religion, again, does not get credit. One upshot here is that belief based just on, e.g., revelation is, by definition, not rationally justified – natural theology is in effect the only even possible justification for substantive religious belief.

support for that series of reductions, but that the specific picture of science presupposed may not be rich enough to accommodate either the history or the structure of science itself. And rather than declaring all that to characterize ‘the scientific attitude,’ the *true* scientific attitude might be to treat scientifically things discovered to fall within the proper domain of science’s competence and *qua scientist* to remain silent (versus blanket rejection) on issues (if any) beyond that domain – leaving the extent of that domain as a matter for discovery, rather than stipulation.⁶²

Worrall began by describing religious scientists as muddled in various ways. But that perception rests at least in part on Worrall’s philosophical preferences. Those philosophical preferences may or may not be defensible – but they are surely not rationally obligatory.⁶³

62 Some of Worrall’s own views may generate difficulties here. For instance, his key principle that any acceptable scientific explanation must be *independently empirically testable* seems substantive – neither empty nor necessary – but it is unclear what *observable* evidence that principle rests upon. For that matter, what is the *empirical* evidence for Occam’s razor?

63 I am indebted to David Van Baak and Stephen Wykstra for extremely helpful discussion of a number of issues raised here.



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