Foundations of Science manuscript No.
(will be inserted by the editor)

Science and Religion in Conflict, Part 1: Preliminaries

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Received: date / Accepted: date

Abstract Science and religion have been described as the "two dominant forces in our culture". As such, the relation between them has been a matter of intense debate, having profound implications for deeper understanding of our place in the universe. One position naturally associated with scientists of a materialistic outlook is that science and religion are contradictory, incompatible worldviews; however, a great deal of recent literature criticises this "conflict thesis" as simple-minded, essentially ignorant of the nature of religion and its philosophical and theological underpinnings. In this first part of a two-part article, I set out the wide-ranging background required for a proper understanding of the debate as a preliminary for the second part, in which Ian Barbour's influential four-fold typology of science-religion relations is critically assessed, leading to the conclusion that the conflict model is not to be so easily dismissed.

Keywords Science and religion · philosophy of science · philosophy of religion · theism · deism · atheism · scientism

1 Introduction

> *There is no art or discipline for which the nature of reality is a matter of indifference* (Marilynne Robinson, 2015)

According to Usó-Doménech and Nescolarde-Selva (2016): "Belief systems are structures of norms that are interrelated and that vary mainly in the degree in which they are systemic" (p. 147). Closely related to this is the concept of worldview—the perspective from which one experiences and understands the world contingent on a belief system. Religion and science represent the two outstandingly important belief systems that have shaped contemporary human thought about

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our place in the universe. Indeed, van Huyssteen (1998) has characterised them as the "'two dominant forces in our culture". Reflecting their outstanding cultural importance, the relation between science and religion has been a vital and lively topic of debate among theologians, scientists, philosophers, historians, sociologists and other scholars. Are they independent and complementary? Are they compatible or in conflict? These are foundational questions for understanding the nature of science, its epistomological status as a route to knowledge and its ultimate limitations.

One particularly well-known and influential way of categorising the possible relations between science and religion is the four-fold taxonomy due to Ian Barbour (1990, 1997, 2000). Barbour was reputedly the first person in the United States to teach in university departments of both physics and divinity (Mucci, 2018), and so was uniquely placed to contribute to the debate: see Russell (2014) for an appreciation of Barbour's pioneering life-work. He organised his discussions of science-religion relations around the four categories—or models—of *conflict*, *independence*, *dialogue* and *integration*, where the broad nature of each is reasonably self-evident from its label. It is fair to say that almost all of the subsequent literature discussing Barbour's typology is critical (even brusquely dismissive) of the conflict or "warfare" model and instead supports either some sort of rapprochement in the form of the dialogue model or more thorough-going, closer integration. To quote Dixon (2008):

> Although the idea of warfare between science and religion remains widespread and popular, recent academic writing on the subject has been devoted primarily to undermining the notion of an inevitable conflict. (p. 2)

For instance, historian of science John Hedley Brooke (1991) writes: "... it is impossible to be an informed citizen in the late twentieth century and to believe that ... neat dichotomies between science and religion can be sustained" (p. 445). Philosopher Alvin Plantinga (2011, pp. ix–x) characterises the conflict as merely apparent or "superficial"; the whole tenor of his extended tome is to argue that "there is deep concord between science and Christian ... belief". Theologian Ted Peters (2018) writes: "Public discourse today continues to propagate the simplistic idea that science and religion are engaged in a hopelessly unwinnable war. This is misleading." (p. 11).

The contrary view of irrevocable and irreconcilable conflict has recently been much popularised by the writings of the so-called "New Atheists", chief amongst whom count Richard Dawkins, Daniel Dennett, Sam Harris and Christopher Hitchens. A representative cross-section of their output is *The End of Faith* (Harris, 2005), *The God Delusion* (Dawkins, 2006), *Breaking the Spell* (Dennett, 2006) and *God is not Great* (Hitchens, 2007). Their popular reach is such that they have attracted the media label of "the Four Horsemen of the Non-Apocalypse" (Dawkins *et al.*, 2019). It is readily apparent, however, that these are essentially polemical works, with a heavy anti-religious, even proselytising, tone. As such, they make no real attempt at academic even-handedness of the kind one would hope and expect to find in peer-reviewed publications such as this one.

Barbour's *When Science Meets Religion* was actually written in advance of the appearance of the popular best-sellers referred to above, and a short time before the term New Atheist was coined (by journalist Gary Wolf in 2006). Nonetheless, the accusation that Barbour aimed at Carl Sagan in connection with his 1996

classic of scientific scepticism *The Demon-Haunted World* that "... he nowhere considers the writings of well-informed, university-based theologians who might be the intellectual counterparts of the scientists he admires" (p. 22) is a charge frequently targeted at the Four Horsemen themselves, and Dawkins in particular. In his best-selling 2007 critique of *The God Delusion*, eminent theologian Alister McGrath[1] castigates Dawkins for failing to take religion seriously, consequently failing to understand it properly, and thereby being unqualified to attack it. Further criticisms of this kind are not hard to find. For example, biologist-theologian Celia Deane-Drummond (2009, p. 88) writes: "Dawkins shows himself up as one who expresses almost complete ignorance of theology". The New Atheists also receive criticism from historians of science and/or religion for an apparent disregard of the historical background to the debate. As Numbers and Hardin (2018) write: "Given their vehement indictment of religion, their indifference to the history of the relationship between science and faith is a curious omission and one that has not gone unnoticed by their critics" (p. 220).

So what is the current status of the debate? Is it really the case that the idea of conflict between science and religion is "simplistic" and only tenable in popular culture? To what extent is it sensible, realistic and worthwhile to seek rapprochement of the two disciplines, or to work towards active partnership? The primary purpose of this two-part article is to answer these questions via a critical re-examination of the relation between science and religion in light of Barbour's typology, attempting to do so in an even-handed, scholarly way as befits a peer-reviewed journal such as *Foundations of Science*.

I should state at the outset that I will take traditional Christianity as my focus when discussing religion, for three reasons. The first is the pragmatic one that by virtue of my background and upbringing, it is the religion that I know most about. There is an attendant danger in this, since to quote Holland (2019): "To live in a Western country is to live in a society still utterly saturated by Christian concepts and assumptions". Therefore, it is incumbent on the careful commentator to be aware that immersion in the Christian tradition (as I was in my school life) is a potential source of bias. A more substantive reason is that Christianity in some form or another (and it has many forms) is unquestionably the world's major religion[2]. And as a close cousin of the other Abrahamic religions—Judaism and Islam—it can serve as a proxy for all the major monotheistic belief systems. My final reason for focussing on Christianity is that the vast majority of the science-and-religion literature also has a focus on western monotheism, so restricting myself in this way places this paper in the mainstream of the debate.

The remainder of this paper is structured as follows. In the next section, I deal with an issue that besets the science-religion debate, which I call the problem of prior commitment: *viz.*, the strong tendency to confirmation bias when discussing matters of personal conviction. Thereafter, I outline the scope of the debate by posing the questions "What is science?" (Section 3) and "What is religion?" (Section 4). It is an inescapable fact that neither of these questions has a clear and straightforward answer capable of attracting near-universal assent, and this has

[1] McGrath holds a doctorate in molecular biophysics, placing him in the category of scientist-theologians.

[2] In 2015, 31.2% of the world's population identified as Christian according to `pewresearch.org/fact-tank/2017/04/05/`, last accessed 30 January 2022. The next largest group was Muslims comprising 24.1%.

obvious implications for the relationship between them. I conclude by setting the scene for the second part of this article, which will examine Barbour's four-fold taxonomy of science-religion relations in some detail, and compare critically each of his four models.

2 The Problem of Prior Commitment

> *Books about science and religion generally fall into one of two categories: those that want to persuade you of the plausibility of religion and those that want to do the opposite* (Thomas Dixon, 2008, Preface)

There is a very particular difficulty that attaches to scholarly study of the relation between science and religion, which I call *the problem of prior commitment*—a kind of strong susceptibility to confirmation bias (Wason, 1960; Pinker, 2021). Given their status as the two dominant forces in our culture, the principles, doctrines, dogmas, etc. of each are bound to influence all of us in our upbringing to a greater or lesser degree. Our views on these matters, especially religion, come to be an essential part of our sense of self. Hence, by the time any of us is mature enough and educated enough to discuss the relationship in a well-informed way, we are almost certain to have acquired strong personal persuasions that inevitably condition our attitudes, opinions and interpretations of the world around us. It is therefore difficult for us to approach issues of belief in a properly detached way, shorn of prior commitment to a cherished position. As Daniel Dennett (2006) writes: "... it is just about impossible to be neutral in your approach to religion".

Of course, most scholars in this field will be aware of this problem and many (but as we shall see, certainly not all) will make honest attempts to mitigate it, by recognising their own prior commitments and—in spite of them—seeking to adopt as balanced and independent a position as they are able. I am bound to say, however, that my reading of the literature indicates that such attempts are rarely successful. Given this, it is probably more honest for authors to make their prior commitments explicit at the outset, so that readers are better able to assess what is written, by alerting them to premises, assumptions, claims or assertions that ought to be carefully justified but are inadvertently taken as granted—because they are such an inbuilt part of an author's worldview that they seem not to warrant it.

Accordingly, for purposes of honesty and to assist readers in assessing this paper, I set out here my own prior commitments. Regarding religion, I have long described myself as a militant atheist, but certainly not in the sense that the term was used to describe the League of Militant Atheists, a government-sponsored, anti-religious organisation active in the Soviet Union from 1925 to 1941. I do not believe there is anything whatsoever to be gained from state sponsorship of atheism nor from forcible attempts to suppress religion, any more than the state should privilege particular religions (as it does in my country).

I will not seek to justify my long-standing atheistic beliefs in any detail at this point since they are tangential to the purposes of this paper, but will content myself with mentioning the following: an increasing realisation during my teenage years that the bullying, insecure and frankly unpleasant God of the Bible who bestowed graces on arbitrarily favoured individuals was at irreconcilable odds with the notion of an all-loving deity; the inability of this allegedly omnipotent

all-loving God to save his chosen people from the horrendous suffering of the Holocaust; the observation that an individual's religious beliefs are almost entirely conditioned by their upbringing in a particular geographical locality and social setting, making it very hard to accept that they have any wider validity, indeed they have all the hallmarks of human invention (Feuerbach, 1854; Derricourt, 2021); my independent discovery (which came in a kind of epiphany) of what I now recognise to be a version of John Schellenberg's (1993) powerful "hiddenness argument" for atheism; the complete absence (as I saw it) of any evidence whatsoever for supernatural forces at work in the world; and a first reading as a student of Bertrand Russell's 1927 pamphlet "Why I am not a Christian", which demonstrated to me that atheism was thoroughly intellectually respectable. These were all formative experiences. Later, with the benefit of greater background knowledge and an increasing interest in logic (both formal and informal) and argumentation, I came to examine the classic arguments for the existence of God (e.g., Matson, 1965) and found them all wanting. In short, God appeared to me (and still does) as an entirely dispensable concept in understanding the world, leading a fulfilling life, and generally making one's way in human society.

For the purposes of this paper, however, what matters is not than I am an atheist but that I am a fair-minded academic (or trying hard to be) with extensive scientific (and engineering) training. That said, many of the conclusions reached will have a decidedly atheistic leaning; my contention is that this is a ineluctable consequence of sober appraisal of the facts and arguments rather than being born of prior commitment. I can only let the reader be the judge of this contention.

So much for prior commitment to religious belief (or disbelief). One can, of course, also harbour prior commitments to particular views of science. Regarding my own position on various relevant foundational issues in the philosophy of science, I will postpone stating this until such time as I have had more to say about the exact nature of science in the following section.

3 What is Science?

> *How can one speak about the relationship between science and religion, either as practices or as systems of belief, without first defining terms?* (John H. Brooke, 1991, p. 8)

If we are to examine relations between science and religion in any principled kind of way, we must have a sound understanding of the boundaries of these two belief systems. Setting firm boundaries, however, is far easier said than done. To quote Usó-Doménech and Nescolarde-Selva (2016): "the *boundaries* of a belief system are generally ... undefined" (p. 148); Thomas Dixon (2008) writes: "... neither 'Science' nor 'Religion' refers to a simple, singular entity" (p. 9). Nor are these entities historically stable. Certainly, we should be aware that what we mean today by 'science' and 'religion' has evolved and developed over centuries (Brooke, 1991; Harrison, 2015). It is salutary to reflect on the fact that the word *scientist* did not even exist until the 1830's, when it was coined by polymath William Whewell (Ross, 1962). Ideally then, in discussing relations between science and religion we should first come to some sort of agreement on what the terms mean. If universal agreement on precise definitions turns out not to be possible, I can at least make my own position clear.

> As a start point, consider the definition offered by the UK Science Council:
>
> Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence.[3]

According to this view, science—properly pursued—makes linear progress in elucidating greater objective truth about the nature of reality.

This seems straightforward enough until we probe a little deeper. Relevant questions and concerns are: is there a single, universal 'scientific method' as implied by the definition? if not, what constitute (different) valid methodologies? what counts as evidence? what qualifies as knowledge? are there limits to the knowledge and understanding that can be gained by scientific enquiry? if so,what are they? are there aspects of the natural and social world outside the scope of science? Also implicit in the definition is that science aims at objective knowledge yet is an inescapably human endeavour, carried out by individual scientists or small groups of collaborators, with the attendant danger of human idiosyncrasies, irrationality and vested interest (e.g., in professional reputation and/or career progression) all influencing the process. Then the results of scientific discovery have to be communicated in an acceptable form to a wider community of scientists (e.g., via anonymous peer review, workshop and conference presentations, and public debate) with further consequent scope for human fallibility, competition between (or collusion within) schools of thought, power structures etc. to come into play. Hence, science has to be seen, at least in part, as subject to historical, social and even political influences (e.g., Polanyi, 1946; Kuhn, 1962; Latour, 1987), a consideration absent from the above definition.

To start to answer the question "What is science?", let us first examine what can reasonably be said about the so-called scientific method.

3.1 Scientific Method

As is well known, strenuous efforts starting early in the 20th century by logical positivists (e.g., Ayer, 1936) to solve the *demarcation problem* of distinguishing science from non-science while maintaining its unity encountered great difficulties. The logical positivists were less concerned with the subjective process of generating theories, which appears to rely heavily on the creativity of individual scientists, than with an objective way of determining whether theories were true or not once they were in place. The cornerstone of their approach was to posit that the only true knowledge is that which can be verified either by formal logic or empirical observation—the *verification principle*. Any statement that could not be so verified was held to be meaningless (or 'metaphysical', intended in a pejorative sense). But very little of philosophical interest is amenable to proof by formal logic, and empirical observation encounters the ubiquitous problem of induction. Another difficulty is that the verification principle is not itself clearly verifiable by logical positivist means, i.e., it fails its own test. Various attempts to repair the principle, such as Ayer's *weak verification principle*, or replace it with something better, such as the *critical rationality* of Karl Popper (1935), fared little better.

[3] See `https://sciencecouncil.org/about-science/our-definition-of-science/`, last accessed 23 March 2021.

In any event, as argued by distinguished philosopher Willard V. O. Quine (1951), the scientist can only attempt to confirm or verify individual statements not in isolation, but rather as an inseparable part of a complete theory. Quine is here echoing earlier work by physicist-philosopher Pierre Duhem (1906) who made the similar point that an experiment in physics, no matter how carefully designed and conducted, can never be a simple test of a single hypothesis, but is instead at best a test of an interlocking network of theoretical assumptions and related hypotheses—what Quine called a "web of belief" and Norwood Russell Hanson (1958) called "theory-ladenness". This has come to be referred to as the Duhem-Quine thesis, although the meaning of this thesis has somewhat widened in recent usage to include also the notion of underdetermination of theory by data ... that a large number of possibly-conflicting theories are consistent with any finite set of observations (e.g., van Fraassen, 1989).

Unless we are in the realistically-unattainable position of having arrived at absolute truth in a theory, it will necessarily have at least some false consequences. Should it then be discarded when one is discovered? Surely it would be premature to do so if the theory is still serviceable, in the sense of having latent potential to make significant numbers of true predictions? What appears to be an empirical falsification could actually be consonant with theory but is an anomaly due to having less than complete relevant information available to us. Perhaps the most famous example of this is the orbital path of Uranus around the Sun, which before the discovery of its closest neighbour planet Neptune circa 1846, was consistently found to depart from predictions made on the basis of Newton's gravitational theory. Once the existence of Neptune was established and factored into the calculations, the anomalous orbit of Uranus was explained and was anomalous no longer.

But how can we tell whether contradictory observations should count as falsification of a theory or should instead encourage attempts to refine and repair it? The strong temptation is for anyone with an emotional attachment to a particular theory to repair it beyond breaking-point. Intuitively, however, we feel that salvage attempts should in some sense 'improve' the theory, or make it 'better', rather than merely keeping it alive for its own sake. Recognising that theories of any complexity will inevitably be strictly-speaking false in some respects, and that the scientific knowledge derived from them will necessarily be tentative and conjectural, Popper (1963) sought to arrive at a normative standard for ordering theories. In this way, progress towards scientific truth can be achieved if we are able to replace one good (but ultimately false) theory by another better (but still ultimately false) theory. He proposed that rival theories should be distinguished by their *verisimilitude*, or closeness to the truth. Verisimilitude was conceived as dependent on two desiderata: truth and content. Truth alone is an insufficient criterion as we seek theories that are not simply trivial or uninteresting, but ones that are bold and assertive with wide scope and surprising implications; hence content is to be valued. So a theory with good verisimilitude displays high 'truth content' (i.e., the true propositions entailed by the theory) and low 'falsity content' (i.e., its false consequences). Although apparently promising at the time, problems were soon uncovered with Popper's formulation (e.g., Tichý, 1974; Miller, 1974; Popper, 1976) since the true consequences and the false consequences of a theory increase and decrease together: see Veronesi (2014, pp. 182–3) for a particularly clear exposition.

In his seminal 1962 publication *The Structure of Scientific Revolutions*, Thomas Kuhn argued that scientific discovery is misrepresented as a uniform progression towards greater objective truth about the nature of reality using a well-defined, universally accepted and well-understood methodology. Rather scientists use a variety of procedures and ideas that implicitly inform their beliefs and their work. At any point in time, there will be a good deal of shared agreement between scientists about what is and isn't current scientific knowledge and how to go about furthering it. Kuhn calls this the prevailing "paradigm". Few scientists ever query the paradigm, but formulate research questions and interpret experimental results within its strictures; Kuhn calls this the practice of "normal science". From time to time, anomalies may arise within the normal paradigm, or attention may focus on phenomena that defy explanation within it. Should these anomalies and failures build to reach a sufficient level, they may initiate a reappraisal of the paradigm and a possible revolution (paradigm shift) in which it is replaced by a new one—as occurred when deterministic Newtonian mechanics was superseded at sub-atomic scales by non-deterministic quantum mechanics and at very high velocities by special relativity.

Kuhn's work had a transformative effect on the philosophy of science, not least by its characterisation of scientific discovery as a social enterprise (by which I mean carried out by a community of scientists) as much as a product of a strict logically-based methodology. Whereas Popper had championed a critical rationality in which the dominant theories of the day should be actively attacked with a view to demonstrating their falsity, Kuhn believed that adherence to "normal science" was justifiable and necessary for progress, until such time as the prevailing paradigm proved no longer tenable (Rowbottom, 2011). Subsequently, Imre Lakatos (1970) elucidated a position intermediate between Popper and Kuhn. He attempted to retain Popper's insistence on sound logical and empirical principles underlying scientific methodology but allied with Kuhn's recognition that falsificationism applied too strictly was inimical to the pursuit of knowledge by social groupings of scientists working within the prevailing paradigm of normal science. Lakatos called this the *scientific research programme*—essentially an evolving sequence of theories. For Lakatos, the programme consisted of a *hard core* of central theses treated as resistant to refutation together with a set of more easily-refutable *auxiliary hypotheses*. The programme as a whole is thus falsifiable, with progress made by adopting a strong preference for modifying the auxiliary hypotheses (the "negative heuristic") over modifying the hard core (the "positive heuristic").

The move away from viewing scientific progress as the product of a strictly-defined methodology was driven further by famously maverick philosopher Paul Feyerabend. In his much-quoted *Against Method*, Feyerabend (1975) argued—like Kuhn and Lakatos—against the notion of a specific, identifiable and universal "scientific method" but went much further in suggesting that scientists frequently make progress by *ad hoc* means owing nothing to any accepted methodology. He used the informal description "anything goes" for what is now more formally known as *epistemological anarchism*. Controversially, he went on to suggest that the absence of a universal method leading to well-attested knowledge undermines claims that science has a privileged position over other belief systems like religion. And in later work, he complained that the ideas of reason and rationality so prominently employed to describe the putative virtues of scientific thinking are "ambiguous and never clearly explained" (Feyerabend, 1987, p. 10). Little wonder

then that he has been described as "the worst enemy of science" (Theocharis and Psimopoulos, 1987; Brown and Kidd, 2015).

3.2 Scientific Discovery

Thus far, we have mainly considered how theories/hypotheses are assessed once they are in place. So how does an hypothesis come to be generated? In *The Logic of Scientific Discovery*, Popper writes: "The initial stage. the act of conceiving or inventing a theory, seems to me neither to call for logical analysis nor to be susceptible of it". For him, this is a matter for psychology, "irrelevant to the logical analysis of scientific knowledge". By contrast, Charles Sanders Pierce (1839–1914) strove over a long period to establish a form of logic, so-called abduction, by which hypotheses could be generated from data, subsequently to be tested by deduction and/or induction (Fann, 1970). These days, abduction is more usually called *inference to the best explanation*, or IBE, a term coined by Gilbert Harman (1965). To quote Harman:

> "The inference to the best explanation" corresponds to what others have called "abduction" ... one infers, from the premise that a given hypothesis would provide a "better" explanation for the evidence than would any other hypothesis, to the conclusion that the given hypothesis is true. (pp. 88–89)

But there is an obvious difficulty with IBE: how exactly do we decide what is "best"? It cannot be just a value judgement, left entirely to individual subjectivity according to who is doing the judgement and how. As Peter Lipton (2000) writes: "The difficulty of articulating Inference to the Best Explanation is compounded when we turn to the question of what makes one explanation better than another" (p. 188). We can, of course, lay out criteria for deciding which is the best among competing hypothesis, and Lewis Vaughn (2018, Chap. 8) attempts to do exactly this. He first mentions that *consistency* is an absolute, minimum requirement for any hypothesis to be taken seriously. If an hypothesis is inconsistent/incoherent, then it warrants no further consideration. Judging the worth of a theory is then a four-step process: (1) Stating the theory and checking for consistency, (2) assessing the evidence for the theory, (3) scrutinising alternative theories, and (4) testing the theories against the criteria of *adequacy*: namely *testability* (is there some way to determine if a theory is true?), *fruitfulness* (does it make novel predictions?), *scope* (the diversity of phenomena explained), *simplicity* (the number of assumptions made, cf. Occam's razor), and *conservatism* (how well a theory fits with existing knowledge).

The consequent problem is how to understand and apply the criteria, and how to weigh them up when they are in conflict. The depth of the problem can be gauged by reflecting on the fact that IBE is routinely used both by those of a religious bent to argue for beliefs like the resurrection of Jesus (e.g., Lennox, 2019, p. 74 *et seq.*), and by atheists to argue their opposing case (e.g., Baggini, 2021, pp. 17–18). Thus, the religious believer of philosophical persuasion might well argue that the God hypothesis H_G has the required consistency, has huge scope (after all God created everything) and great simplicity (all we need is an omnipotent God). Hence God probably exists. The atheist on the other hand points to the lack of fruitfulness (religion has, he/she says, never reliably predicted

anything of note) and argues that, far from being simpler than the naturalistic alternative H_N, H_G violates Occam's razor in including an additional and entirely unnecessary condition, i.e., the existence of a God. This kind of appeal to Occam's razor is extensively employed by, for example, Graham Oppy (2013) in weighing up arguments for and against the existence of God.

In summary, my feeling is that it is as well to be wary when a protagonist for an argument makes a supporting appeal to inference to the best explanation. It should not be taken at face value, but the protagonist's approach to concluding that hypothesis H is "best" or "better" than alternatives should be carefully examined, and in particular the way that the criteria of adequacy are assessed.

3.3 Scientific Knowledge

What exactly then is the status of the knowledge about the world that scientific inquiry produces? In the philosophy of science, two distinctively different answers to this question have traditionally been given. The debate between proponents of the two alternative views, *realism* and *anti-realism*, is long-standing and technical (see Brock and Mares, 2007), so what follows is necessarily a considerable simplification.

Realism holds that science discovers truths about the world as it really is, independent of the existence of human observers. That is, the facts of nature exist and are there to be discovered. For example, realists believe that electrons exist as entities in nature. Although they are not directly observable, their effects can be directly detected—as when J. J. Thomson in 1897 famously visualised the fluorescent shadow of an electron beam cast by a metal cross inside a Crookes tube. For the realist, if a scientific theory is successful in terms of having high explanatory and predictive power, this is reason to believe that the entities embodied in the theory (such as quarks, electrons or genes) are 'real', even if they cannot be observed. Opposing this, anti-realism (also known as instrumentalism or idealism) holds that such unobservable entities are entirely abstract constructs, existing only in the human mind. Their sole purpose is to underpin comprehensible theories able to make sense of the world—to explain experimental data and make testable predictions (e.g., van Fraassen, 1989). In other words, rather than *discovering* electrons, quarks and genes, anti-realists believe that scientists *invent* them as part of the process of theory formation; if there were no scientists, there would be no electrons. Regarding any science of directly observable objects (zoology perhaps), there is no disagreement between realists and anti-realists, since all can agree that the principal objects of study (lions, tigers, ...) are real enough. It is, of course, possible to have deep philosophical arguments about what is and isn't observable, especially as scientific and technological advances open up ever more powerful ways of visualising natural phenomena beyond the range of human perception. For example, modern atomic force microscopy and photo-ionisation microscopy allow imaging of subatomic phenomena to the extent that many scientists now report being able to 'see' molecular bonds (e.g., Giessibl, 2021) and the electron orbitals of an excited hydrogen atom (e.g., Stodolna *et al.*, 2013) respectively.

What is the relevance of this to the science-religion debate? The answer is that the realism versus anti-realism dichotomy is not particular to science, but pervades philosophy in general (Brock and Mares, 2007). Theology and religion

are frequently posed (at least in academic or philosophical discourse) as being centrally concerned with unobservable entities (pre-eminently God) and the reality or otherwise of these entities. According to philosopher John Worrall (2004), conflict between science and religion can only occur under a realist view, for: "If, instead, theories are regarded simply as tools for organizing empirical data, then there can be no conflict" (p. 87). Worrall notes that, accordingly, a number of religious believers appear keen to minimise conflict by adopting an anti-realist stance But, he argues, religious belief is intrinsically realist, since it holds to the reality of a God and related "substantive claims about the universe" (p. 88) that go well beyond any evidence.

To many, myself included, a strict dichotomy between realism and anti-realism is too black-and-white: there is room for aspects of both to inform a more nuanced view of the world. In particular, Barbour (1997, pp. 117–120) defends a so-called *critical realism* intermediate between the two extremes. In Barbour (2000), he writes:

> Critical realists ... view theories as partial representations of limited aspects of the world as it interacts with us. Theories, they say, allow us to correlate diverse aspects of the world manifest in differing experimental situations. (pp. 91–92)

This to some extent answers Worrall charge of inconsistency in that "critical realism ... recognizes the limitations of concepts and models in both science and religion but insists that they refer to the real world, though always selectively and inadequately" (Barbour, 2000, p. 95).

Somewhat related to realism is the concept of *materialism*, or *physicalism* as it sometimes called (e.g., Beckermann, 1992, p. 1). Whereas realism holds that entities exist in nature independent of human observation and thought, materialism claims that all such entities are material or are the result of material interactions. Consequently, all observations are contingent on lawful physical processes; there are no supernatural causes. According to this view, mind and consciousness supervene on neural and brain processes, (see Kim, 1998, for an accessible account). The notion is frequently extended to *scientific materialism*, and the closely-related concept of *scientific naturalism*, which posits that science is the only reliable and valid way to discover truth about the world[4]. Barbour (2000) puts it thus: "if the only real entities are those with which science deals, then science is the only valid path to knowledge" (p. 20). Materialism/naturalism is often coupled with *reductionism*, according to which all scientific knowledge is hierarchical and can in principle ultimately be reduced to more basic statements using the language of physics. Nobel Laureate biophysicist Francis Crick (1994) describes reductionism as "the main theoretical method that has driven the development of physics, chemistry and molecular biology" (pp. 8–9). This is not to say that there is no place for *emergentism*, broadly the tenet that genuinely new descriptive terms are required to make sense of phenomena that emerge as we move up the hierarchy of complexity (Broad, 1919; Pepper, 1926; Beckermann *et al.*, 1992). For example, it is neither sensible nor useful to describe a gene in terms of quarks, leptons, etc. or even protons, neutrons and electrons.

[4] Some authors maintain a distinction between materialism and naturalism, and even between various subtle flavours of the two. To avoid undue complication, I will treat them as loosely synonymous for the purposes of this paper.

Materialism is most obviously contrasted with some form of dualism: matter/mind in the case of science; body/soul in the case of religion. Modern thought is generally antithetical to dualism, so that present-day theologians tend to reject it while at the same time usually being hostile to reductive materialism. Process theology (see Part 2) offers one framework for steering a path between dualism and reductive materialism. Another popular framework is emergence, as briefly introduced above. Quoting Ward (2008): "if you are an emergent materialist, you have already taken the first step towards forming some idea of God. You have said that not everything is a physical object in space" (p. 18). But see Rue (2007), who cautions against employing the concept of emergence in theology until it is much better understood.

3.4 Limits of Science

It is not surprising that those with strong religious convictions find scientific materialism unattractive, leaving as it does no room for divine or supernatural influences to be felt in the world. As Barbour (2000) writes: "The philosophy of reductive materialism ... clearly conflicts with Western religious beliefs about human nature" (p. 148). Consequentially, heavily disparaging terms are frequently aimed at it. Two particular such descriptors are *scientism* and *scientific imperialism*. The general idea behind these terms is that, loosely, materialism is guilty of failing to recognise the limits of science and, as a consequence, mistakenly believing that science is "all there is".

As eminent physicist/priest John Polkinghorne (1986, p. 73) puts it: "Scientism is the mistaken attempt to exalt science into a complete philosophy". A properly sceptical and open-minded reader can barely fail to observe the rather self-justifying tone, with the "mistaken" qualifier converting what ought to be a neutral statement into a faintly-disguised insult. Yet as far as I can discern, nowhere in his extensive writings does Polkinghorne make a serious attempt to argue that science could never be a complete philosophy, merely contenting himself with vague generalities, such as: "The intrinsic unpredictabilities discovered by twentieth-century science can be interpreted to show that physics has not established the causal closure of the universe and that belief in human and divine providential agency is not forbidden" (Polkinghorne, 2011, p. 136). Barbour (2008) characterises scientism as encompassing two assertions: "(1) the epistemological claim that the scientific method is the only path to knowledge, and (2) the ontological claim that matter is the fundamental reality in the universe (materialism)" (p. 260). Used pejoratively, as it frequently is, scientism is excessive and unwarranted reverence towards science as the uniquely privileged route to knowledge of all kinds.

However, it would be a mistake to think that charges of "scientism" always come from Christian believers. For example, Popper (1978) wrote: "I am against those exaggerated claims for science that have sometimes been, rightly, denounced as 'scientism' ... and especially against the misconceived claim that we have the truth in our pockets, or that we can approach certainty" (p. 341). And even those of a decidedly non-Christian view are not above levelling charges of scientism as, for example, when distinguished sceptic philosopher Massimo Pigliucci (2010) writes that scientism "... encapsulates the intellectual arrogance of some scientists who think that, given enough time and especially financial resources, science will

be able to answer whatever questions we may wish to pose" (p. 235) or atheist philosopher Julian Baggini (2016) describes it as "an iniquitous intellectual land grab, in which all meaningful discourse is claimed for science and anything else is razed to the ground as useless" (p. 168). But the severest criticism surely comes from committed believers, such as nuclear physicist and avowed Christian Ian Hutchinson. In his 2011 book *Monopolizing Knowledge*, Hutchinson characterises scientism as "the belief that science, modelled on the natural sciences, is the only source of real knowledge". Since in his view, many important beliefs are justified and rational but not scientific, "scientism is a ghastly intellectual mistake ... The whole point of my analysis is to assert that non-scientific knowledge is real and essential". Although I find much to admire in Hutchinson's book, particularly the first half where he presents a very clear and readable account of the development of the philosophy of science in the last century, it has the undisguised purpose of defending his religion against attack from New Atheism[5].

A very similar critique of scientism from the same perspective of committed Christian belief is made by mathematician John Lennox (2019) who writes in typically robust fashion in *Can Science Explain Everything?*: "Think about it: if science were the only way to truth, you would have to get rid of half the faculties in any school or university—history, literature, languages, art and music ..." (p. 20). In my view, Lennox is making a rather obvious error here: namely in viewing "science" as a single, undivided discipline. (Hutchinson makes the same error when he writes of science "... no *single* [my italics] approach to knowledge can rightfully monopolize our assent.") In effect, he is adopting the failed positivist view of a single, distinctive "scientific method" that he has been at pains to disavow earlier. If in a distant future, language and music came to be subsumed within some over-arching new 'science', there would continue to be every reason to maintain separate schools of language and music, just as today we have separate schools of physics, chemistry and biology.

I think it entirely fair to say that even the most cursory reading of Hutchinson and Lennox will reveal their strong prior commitment to Christian belief (see my comments in Section 2 earlier). It is hard to escape the conclusion that this has severely compromised their impartiality. Within the scope of this article, it is not possible to develop this charge fully, so one representative example will have to suffice. Concerning historical ideas about the reliability of the Bible as a mainstay of Christian belief, Hutchinson writes: "Eventually, it began to be analyzed by some scholars as if it were simply another book, to be interpreted by whatever were the prevailing academic standards of the day." But surely, this is *precisely* the way that an open-minded academic should approach analysis of any text, be it the Bible, Homer's *Odyssey* or Vladimir Nabokov's *Lolita*. By his implicit *a priori* assumption that the Bible is not just "simply another book", he is in some danger of disqualifying himself from consideration as a serious and independent commentator on matters of science and religion.

The negative portrayal of scientism by Popper, Hutchinson, Baggini, Lennox and others is certainly not universally accepted by practising scientists and philosophers of science. For example, highly-respected physicist-philosopher Mario Bunge (2015), holder of no fewer than 49 honorary doctorates, wrote: "Adherence

[5] ... as is plain to see from the book's combative subtitle: *A Scientist Refutes Religion-Denying, Reason-Destroying Scientism.*

to scientism has been repaying handsomely, economically as well as culturally, whereas betting on anti-scientistic dogmas threatens the growth of knowledge." And Bunge was by no means an uncritical follower of New Atheism, as can be judged from his description of Richard Dawkins as "but a popularizer" (Bunge, 2016, p. 297). Philosophers Maarten Boudry and Massimo Pigliucci have co-edited an important book titled *Science Unlimited? The Challenges of Scientism*, presenting a serious study of scientism in all its guises by a number of authoritative philosophers and scientists (Boudry and Pigliucci, 2017). The general consensus among the contributors is that charges of scientism are frequently over-stated, often as a way of protecting particular non-scientific disciplines (particularly theology) from criticism and shutting down debate on their value, and can usually be safely disregarded. And evolutionary biologist Jerry A. Coyne (2015) writes: "... scientism is a virtue—the virtue of holding convictions with a tenacity proportional to the evidence supporting them" (p. 198).

Regarding scientific imperialism, theologian Ted Peters (2018) describes this as: "... scientism attacking religion with an added strategy. Rather than merely attempting to eliminate the enemy, scientific imperialists seek to conquer the territory formally possessed by religion and claim it as their own" (p. 15). More generally, Fumagalli (2018) writes: "Most ... characterizations relate SI to the systematic application of a discipline's theories and methods to model and explain phenomena investigated by other disciplines" (p. 2147). In addition, he cites the oft-repeated definition of Dupré (2001) as: "the tendency to push a good scientific idea far beyond the domain in which it was originally introduced" (p. 74). Like scientism, scientific imperialism is not an especially-well defined term. Fumagalli (2018) explores concepts underlying the term and some objections to scientific imperialism. He concludes that whereas "these objections provide a valuable basis for opposing some instances of SI ...", they do not "... yield cogent reasons to think that SI in general is objectionable or unjustified" (p. 4142).

Both terms—scientism and scientific imperialism, and whether viewed pejoratively or not—take it for granted that there are inherent limits on scientific knowledge, but what are they? And how might we know what they are? Ralph Gomory (1995) divided knowledge into the known, the unknown and the unknowable. Obviously, there will always be limits on our knowledge of contingent events in the history of the universe, simply because they are forever lost in the vastness of space-time, but it seems incontrovertible that our knowledge of the necessary (i.e., the non-contingent aspects of nature) will also be severely constrained. And whereas the boundary between the unknown and the unknowable is in principle fixed (albeit hidden to us), the boundary between the unknown and the known shifts inexorably as human culture develops. In *The Limits of Science*, Nobel Laureate biologist Peter Medawar (1985) contends: "... it is logically outside the competence of science to answer questions about first and last things" yet "... there is no limit upon the ability of science to answer the kind of questions that science *can* answer" (p. 86). But what exactly are the kind of questions that science can answer? We simply do not know what hidden truths of nature science will uncover in the future; we know virtually nothing about the boundary between the unknown and the unknowable. Given this, surely the most defensible position to adopt is to assume provisionally that there are no limits; we are then at liberty to see where the pursuit of scientific discovery takes us. Note the extreme importance (following Popper) of treating all theories as provisional, always and forever, as it is

precisely this which invalidates charges of scientific chauvinism, fundamentalism, imperialism, "scientism" etc. as levelled from an entrenched position of religious commitment by Hutchinson (2011) and others.

3.5 A Working Manifesto

According to philosopher Marc de Mey (1982), "Popper (1970) stands out as the strongest defender of a view which sees science as the product of an inexorable methodology. Whatever the origin of ideas, whatever their appeal or apparent soundness, there is an ultimate criterion to decide whether what is proposed is scientifically tenable or not" (p. 149). But as we now know, the efforts of the adherents of logical positivism, of logical empiricism and of Popper to identify such a definitive methodology have met with, at best, limited success, and further strong reasons for pessimism in this regard are provided by the highly-influential philosophical works of Kuhn and Feyerabend. Indeed, given the plurality of science, there is every reason to suppose that there simply does not exist a single unifying methodological thread; some high degree of disunity is surely inescapable (Dupré, 1983, 1993; Cartwright, 1999). The methods of physics are very different from those of, say, evolutionary biology, computational neuroscience or cognitive psychology. As Bschir *et al.* (2019) write: "Many scholars working in the philosophy of science are inclined to declare the question about the nature of science as futile" (p. 761).

But herein lies a paradox. How can we explain the extraordinary fertility of the brand of scholarship that is widely recognised to constitute modern science—together with its ability to spawn technologies with demonstrable power to change the course of nature—if we are unable to say exactly what it is? And in the face of this inability, how can an individual scientist, or group of scientists, know how to pursue 'science'? The answer must lie, at least in part, in conceiving science in accord with Ludwig Wittgenstein's (1953) famous philosophical idea of "family resemblances". That is, there are no necessary or sufficient defining characteristics for an endeavour to be considered 'science', only broad similarities between endeavours generally agreed to be 'scientific'. Viewed in this way, there is no great imperative for practising scientists to pay much attention, if any, to philosophical issues, only provided that their science leads to exploitable results. As Hutchinson (2011) writes: "No intellectual argument has anything like the impact of useful technology".

For the purposes of pursuing the science-religion debate, however, it is necessary to have at least some agreed idea of what is and isn't science—some sort of working hypothesis or manifesto. So I set out here my own views, which I believe will not be too far removed from what most scientists recognise science to be. First and foremost, I think there is virtue in retaining at least some aspects of positivism and, in particular, Popper's notion of critical rationality. Theories are forever tentative and provisional, and whereas strong falsification may be unachievable, still efforts aimed at falsification can pay dividends. Similar comments apply to verification. Rather than seeing falsification and verification as absolute or binary, it is surely more reasonable to see them as graded, such that provisional theories can be falsified or verified to a degree. Over time, a theory is then strengthened according to how well it resists attempts at falsification while confirmatory evidence builds. This is more or less the *strong inference* methodology

codified by biophysicist John R. Platt (1964) and regarded by many informed commentators as worthy of some degree of assent, albeit with qualifications (see, e.g., Pigliucci 2010, pp. 6–12).

As we have seen, following Kuhn's incisive contributions, Popper's students Lakatos and Feyerabend took matters in somewhat different directions. Whereas Lakatos sought middle-ground between Popper and Kuhn in the form of the research programme with its core and auxiliary hypotheses, Feyerabend took Kuhn much further in the direction of epistemological anarchy and relativism. Like most commentators, I think Feyerabend goes too far but I am very sympathetic to Lakatos's attempts at rapprochement. As for the methodology employed, in place of Feyerabend's "anything goes", I believe that scientists generally approach science in a more principled and better motivated way, by employing tried and tested heuristics, both in the creative process of generating theories and in subjecting them to a softer form of verification/falsification than that implied by a strict demarcation criterion. Such heuristics are well recognised as highly valuable in mathematics and science (e.g., Pólya, 1945; Polanyi, 1957; Sagan, 1996). And whereas formal, symbolic logic has only limited applicability, as the failed logical positivist agenda shows, the methods of informal logic, sound argumentation and principles for the avoidance of faulty reasoning (e.g., Moore and Parker, 1986; Gilovich, 1991; Walton, 2008; Damer, 2013; Vaughn, 2018; Pinker, 2021) all form an indispensible part of the scientist's armoury.

Many philosophers treat the practice of science as an essentially solitary activity, focussed at the level of the individual practitioner. But as we are surely well aware, the progress of any scientific discipline is strongly dependent upon the acceptance (or otherwise) of individual contributions by the community of experts in that discipline, principally but not solely by mechanisms of peer review. Accordingly, there is a strong case to be made for viewing science as a group rather than individual activity. Indeed, Rowbottom (2011) employs this insight to argue for a very productive resolution of some key differences between Popper and Kuhn. What emerges over time is a sort of 'truth by consensus' among the scientific community, but because the community shares a commitment to the progress of human knowledge, a shared (albeit usually implicit) understanding of the nature of science in which all theories, propositions and even practices are viewed as inherently provisional, and because scientists are typically well-educated professionals, this is not 'mob rule' but a very robust, resilient process. To cite Kuhn (1962): "there is no standard higher than the consent of the relevant community" (p. 94).

More recently, philosopher Paul Hoyningen-Huene (2013) has presented a view of science very consonant with my own and, I suspect, that of many other scientists—perhaps the majority. He argues that: "Scientific knowledge differs from other kinds of knowledge, in particular everyday knowledge, by being more systematic" (p. 25). Hoyningen-Huene's systematicity theory is based on the nine dimensions of descriptions, explanations, predictions, defence of knowledge claims, critical discourse, epistemic connectedness, completeness, knowledge generation and representation of knowledge. According to Bschir *et al.* (2019, p. 769), Hoyningen-Huene departs from earlier attempts to characterise science in three distinctive and important ways: (1) he treats "science" as widely and generally as possible; (2) he avoids any attempt to define science, relying instead on Wittgenstein's family resemblance concept; and (3) he is concerned with

contrasting science with everyday knowledge rather than with a demarcation between science and non-science.

To summarise our discussion of the nature of science, it is fair to say that the strenuous efforts of philosophers over the past century have failed to identify and define a unique methodology guaranteed to deliver 'truth'. But by no means does it follow that things are as pessimistic as Feyerabend asserts, as is readily appreciated by reflecting on the enormous and demonstrable successes that science and its close relative technology have enjoyed in providing tools that enable us to mould our environment (often for the better, but alas not always). The key principles underlying this success are, I believe, the tentative nature of scientific theories coupled with systematic (and, crucially, public) attempts to confirm and/or disconfirm these theories by the community of peers, and to explore their implications, which leads to a coherent connectedness among the ever-growing body of scientific knowledge. If this is scientism, so be it!

4 What is Religion?

If we are to make sense of the relation between science and religion, having arrived (with a degree of difficulty) at some sort of working definition of science, we must now try to do the same for religion. Arguably, the task of identifying the essential nature of religion is even harder than the corresponding task for science. It seems incontrovertible that there exists far greater agreement amongst scientists world-wide about what constitutes good science than there is among believers across the globe about 'good' religion. It is a truism that most people have the religion they do because they were born into it. But if we are to make headway in the science-religion debate, we need a shared understanding of what we mean by religion no less than of science.

As stated in the Introduction, religion is taken to be well exemplified by what we might call "traditional" Christianity but even this comes in many guises. My focus here will be on the brand of Christian apologetics[6] espoused by, for example, C. S. Lewis in his classic *Mere Christianity*. For the sake of clarity, I will leave out of account the more radical, unorthodox, controversial, mystical or "non-realist" brands of Christian thought exemplified by, for example, Pierre Teilhard de Chardin (1957), D. Z. Phillips (1976) or Don Cupitt (2006). I will take the core beliefs of this traditional Christianity to be those embodied in the Nicene Creed of 325, revised at the Second Ecumenical Council at Constantinople in 381. A simplified version, the Apostles' Creed, is widely used within the Christian church (McGrath, 2018); it probably originated in mid-fifth century Gaul and reached its present form during the eighth century. It consists of 12 statements, covering the core beliefs of God ("The Father") as creator, the virgin birth of Jesus ("The Son") conceived by "The Holy Spirit" (so forming a trinity), the crucifixion and resurrection, redemption and forgiveness of sins and the afterlife. All these are to be believed on the basis of faith, so it is no misrepresentation to say that the Christian concept of faith is the bedrock of apologetics.

An interesting observation is that the Apostles' Creed is completely silent on belief in the Bible itself, whereas the Nicene Creed only says that Jesus Christ

[6] An *apologist* is one who defends Christian belief against criticism.

"rose again on the third day in accordance with the Scriptures". According to McGrath (2018): "Many theologians would argue that Christian theology is the exploration of the basic ideas of these creeds, investigating their basis in the Bible, and their impact on Christian thinking and living." If McGrath is right, the lack of reference to the Christian Bible in the creeds is curious indeed. At least, it is curious until one reflects on the fact that the creeds were in reality an attempt to define Christian dogma or orthodoxy centuries after the formative events were supposed to have occurred, and in the face of biblical inconsistency and self-contradiction. To take one key example, Zuersher (2014, p. 73) writes: "The Nicene doctrine of the trinity, for example, finds no support in scripture". That is to say, it has all the appearance of a *post hoc* doctrinal construction of the early Christian church fathers. So we need to be cautious of McGrath's formulation, and look a little deeper at what theology might or might not be.

4.1 Religion or Theology?

In the science-religion debate, I think it is fair to say that the terms *religion* and *theology* are used more or less synonymously. Certainly, it is hard to discern much difference in usage, if any. To cite Smedes (2008): "Barbour speaks of *religion* but often seems to conflate theology and religion" (Note 1, p. 255). So what is the difference?

My view, put simply, is that theology is (or ought to be) the academic study of religious belief, whereas religion itself is the way that this belief is put into everyday practice, both by individual believers and by organised religious groupings. Properly then, the science-religion debate (being academic in character) is better posed as a debate between science and theology. But such refocussing will not make the problem of definition go away; if theology is the academic study of religion, it will obviously inherit the problem of defining religion. And in the words of McGrath (2018): "The failure of past attempts to offer a reliable and warranted definition of religion is widely conceded in the vast scholarly literature devoted to this subject."

Paul Badham (1996) writes: "Theology literally means 'thinking about God' ... it usually means studying the sources of Christian belief like the Bible and the Creeds, and exploring the meaning of Christianity for today" (p. 101). Since viewed in this way, theology is academic study, it should be perfectly possible for a theologian to be a non-believer. However, my observation is that it is exceedingly rare—not completely unheard of, but almost so—for a theologian to be an atheist; it is more usual for atheists with a background of extensive theological study and knowledge to self-identify as philosophers of religion. The unfortunate consequence is that the study of theology is almost universally predicated on prior commitment to belief in God, consonant with the classic definition of theology by Anselm of Canterbury (1033–1109) as "faith seeking understanding", i.e., it is faith that comes first. Wittgensteinian philosopher Rush Rhees (1997, p.44) puts it starkly thus: "All that theology can try to do is indicate, perhaps even with some sort of formal proof, what it is correct to say, what is the correct way of speaking about God". In similar vein, eminent biochemist-priest Arthur Peacocke (1999) asserts "theology is in principle the relating of everything to God" (p. 697) and Biola University theologian Erik Thoennes declares "Good theology is based *in the belief*

that God exists, is personal, can be known, and has revealed himself" (my italics)[7]. Finally, I give this quote from theologian John Haught (2008):

> By using the term "theological" here I mean to indicate, first of all, that my reflections arise out of belonging to a theistic religious tradition, that is, one that professes belief in a personal God, a God of infinite power and love ... (p. xii)

The pre-commitment to the existence of God is completely obvious in these quotes. To many scholars (myself included), any such pre-commitment to faith in God's existence would disqualify theology from serious consideration as an academic discipline, being the very antithesis of open-minded enquiry. It is entirely reasonable for the theologian to make a provisional, *ab initio* assumption of the existence of a god of some kind and then to explore the logical implications of this tentative theory, but my strong impression is that virtually no theology proceeds in this way. This impression seems to be shared by others. For instance, Flew (2000) says of the arguments typically presented by philosophical theologians:

> These traditional and still almost universally accepted forms of presentation are fundamentally prejudicial. For they assume that there is a Divine Being with an actual nature the features of which we can investigate. They assume there is an Infinite Creator, whose existence ... we may take for granted. (p. 37)

It is evident from even the most cursory reading of the literature on Christian theology that it is thoroughly pervaded by deeply-held prior commitment to the tenets of Christianity on the part of authors. In *The Dawkins Delusion?*, McGrath (2007) gives a sketchy argument for the theologians' belief being properly provisional, in the manner required of legitimate scholarship. He states, correctly and reasonably, that "our beliefs may be shown to be *justifiable*, without thereby demonstrating that they are *proven*". Again correctly and reasonably, he argues that "Darwin's theory of evolution is presently the best explanation of the available evidence; but that doesn't mean it is correct". At this point, he leaves things hanging, with the clear invitation to the reader to draw the implication that the theologian's 'belief' in Christian apologetics is of the very same kind as the scientist's 'belief' in evolutionary theory, i.e., held tentatively allowing of the possibility that a better theory might displace it in future. But this is surely quite disingenuous: McGrath's entire book is an undisguised attempt to defend and promote his strong *a priori* commitment to Christian apologetics (as indeed is all of the considerable output from this prolific author, who is a spirited and dogged defender of Christianity). In tone, *The Dawkins Delusion?* is quite as proselytising as *The God Delusion*. Put simply, mainstream Christian theology is based firmly on uncritical *a priori* belief in the essential 'truth' of its foundational creeds, and faith in their veracity. As such, we can already begin to see that in practice it is clearly and obviously at irreconcilable odds with the scientific worldview.

[7] `https://www.biola.edu/blogs/good-book-blog/2016/what-is-theology`, last accessed 6 December 2021. "Biola" stands for Bible Institute of Los Angeles.

4.2 Theism and Deism

Before proceeding, it is worth making explicit the important distinction between theism and deism, since as eminent medical geneticist and Christian apologist Francis Collins (2006) writes: "Most nontheologians are not quite sure what a theist is" (p. 202). *Theism* is belief in a personal God who created the universe *ex nihilo* and remains intimately involved in its everyday workings and in people's lives, like the God of Christian apologetics. By contrast, *deism* is belief in an impersonal God who (like the God of theism) created the material universe and possibly sustains and monitors it but from a detached position, without intervening directly in people's lives—a sort of absentee landlord, deaf to prayers. Deism rejects the trappings of organised religion—a church, priests or clerics, holy scriptures and sacraments—as well as the doctrine of Jesus as God incarnate and saviour. Some deists believe in an afterlife, others not. Deism holds that reason and sense-data are the source of all knowledge (including that of God) and rejects special revelation as a route to religious knowledge. The extent to which deism is a "religion"at all is open to conjecture. Accordingly, in discussion of the science-religion debate, I believe it is implicit that the 'religion' under consideration is necessarily theistic.

One especially influential deist was Thomas Paine who famously wrote: "My own mind is my own church" (1794, p. 6). In recent years, deism has enjoyed something of a revival among some scientists who see in it a satisfying way of answering deep questions about the origin and apparent "fine-tuning" of the universe, and the source of human ethics (as the handiwork of God) while avoiding the intellectual difficulty of reconciling scientific standards of knowledge elucidation with the credulous acceptance of religious dogma. Paul Davies (1983, 1992) is a particularly prominent modern exponent of this kind of deism. And although there is considerable ambiguity and debate surrounding his precise religious views, Albert Einstein is usually counted among the ranks of deists (e.g., Isaacson, 2007, p. 385). Unfortunately, Einstein was prone to use words like 'religious' and 'religion' to describe his beliefs when closer scrutiny reveals that he is really talking about a sort of spirituality or non-theistic naturalism rather than anything like the God of traditional Christianity (Stanley, 2009). This has led to a great deal of confusion, with apologists only too ready to claim Einstein (quite erroneously) as a fellow believer. In my assessment, Albert Einstein was at most a deist but more likely a pantheist[8] (Dawkins, 2006, p. 40).

A somewhat related distinction is that between *immanence* and *transcendence*. An immanent God is active in the world and his spirit pervades people's everyday lives; a transcendent God is outside the world and independent of it, beyond physical laws and complete human understanding. Obviously, the god of deism—having created the universe and then left it "free-running"—is entirely transcendent. By contrast, the God of Christian apologetics is traditionally viewed as both transcendent and immanent. He is transcendent by virtue of having created nature and its laws in the first place; he is immanent as a central tenet of Christian belief, which holds that God wishes profoundly to enter into an ongoing, personal and all-loving relationship with his human creations. To my mind, this poses a

[8] Pantheism holds that "God" is a metaphor for the whole of creation, i.e., God is identical with the universe and everything within it, and has no separate existence as a personal or anthropomorphic entity.

huge conceptual problem for theology: how can the actions of a transcendental God be felt in a physical world? This is the issue of *divine action*, which has been the subject of considerable contention and debate in theology, especially as scientific understanding of the physical universe has progressed. I do not propose to say more on this topic here: the interested reader is referred to Ward (1990) and Tracy (2006) for accessible accounts.

4.3 Religious Knowledge

Given the problems that we have confronted in trying to characterise science in a clear and supportable way, it is not surprising that characterising theology is similarly problematic. In fact, my contention is that it is even more problematic. As theologian Leslie Houlden (1989) writes, there is a "lack of agreed framework and of consensus on what constitutes legitimate theological argument ..." (p. 4). It must surely be a concern for the discipline (as it would be for *any* discipline) that one of its senior figures has this view of it.

In similar vein, another eminent theologian, Schubert Ogden (1978) writes:

> On the conventional account, theology differs from other forms of reflection ... for one or both of two reasons: (1) because it has to appeal to special criteria of truth for some or all of its assertions; and (2) because the theologian has to be a believer who already holds these assertions to be true. (p. 3)

If this conventional account is a correct portrayal, and I believe it is, then we already see the inescapable seeds of irrevocable conflict with science, which relies on general, well-accepted and attested (as opposed to "special") criteria of truth, and does not require the practitioner to be an *ab initio* faithful 'believer' of the provisional postulates of science. But Ogden, as a devout believer, naturally found his own characterisation rather uncomfortable and so sought to circumvent it. I have to say that I find his attempts hard to follow and not at all persuasive. He looks for refuge in the argument that "being a Christian clearly is not among the necessary conditions for being a theologian" (p. 16). But as we have seen, the reality is that theologians are almost without exception believers.

So what are the "special criteria of truth" employed by theology that are not shared by other forms of reflection, like science? The so-called Wesleyan Quadrilateral (Figure 1) gives four sources of authority for theological knowledge, namely: scripture, tradition, reason, and Christian experience (Outler, 1985). Although the Quadrilateral is not entirely uncontroversial (very little in theology is) and Wesleyan—or Methodist—theology is but one brand of apologetics, I believe it to be a reasonably representative one. In fact, the Quadrilateral is based on the traditional Anglican triad of scripture, tradition and reason, but is if anything rendered more comprehensive by the addition of experience. So let us take it at face value and look at each of its four 'sides' in turn.

John Wesley (1703–91) took scripture, i.e., the Bible, to be the primary source of religious knowledge, with tradition, reason, and experience subsidiary to it. In the words of Outler: "... we can see in Wesley a distinctive theological method, with Scripture as its preeminent norm but interfaced with tradition, reason and Christian experience as dynamic and interactive aids in the interpretation of the

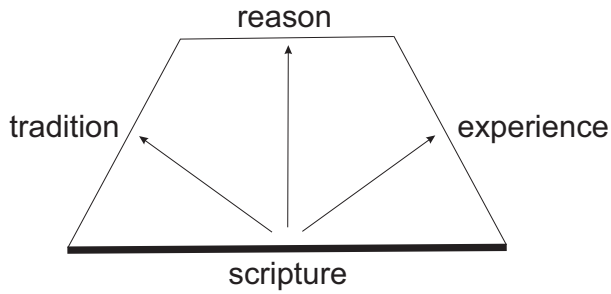

Fig. 1 The Wesleyan Quadrilateral depicts the four putative sources of authority for religious knowledge, namely: scripture, tradition, reason, and Christian experience. Here, scripture is portrayed by a longer, thicker line to illustrate its status as the primary source of knowledge. The arrowed lines indicate that in this scheme scripture can inform tradition, reason and experience, but not *vice versa*.

Word of God in Scripture" (p. 4). Regrettably, space here does not allow an anywhere-near adequate treatment of the status of scripture as a source of religious knowledge. This topic has absorbed the sustained attentions of a vast number of far better philosophers and theologians than I am, with a correspondingly huge literature that defies neat summarisation. Nonetheless, I believe it is possible to make some useful and supportable assertions about the Bible as a valid and reliable source of knowledge. Let me start by stating that I take it as incontrovertible that the Bible is not literally true, nor can it reasonably be seen as the inerrant "Word of God", by virtue of its evident multiple authorship, widespread and obvious contradictions between these authors, extensive borrowings from earlier cultural myths, and its many historical inaccuracies (see, e.g., Ehrman, 2012; Firestone, 2014; Zuersher, 2014; Conner, 2017). Confronted with these glaring departures from any semblance of a reasonable standard of authoritative and coherent writing in what is supposed to be the keystone treatise of Christian apologetics, theologians typically respond with one of several somewhat-related rationalisations, of which I will discuss three in particular.

The first, and by far the most common, is to assert that much of the content of the Bible is plainly and obviously meant to be taken as metaphor or allegory. This appears to me to be a desperately weak attempt to salvage and defend an intellectually untenable position. How are we to know which parts are allegorical and which are to be taken literally? It cannot be that all of the Bible is allegorical as it would then have no more claim to be a valid source of knowledge than Mervyn Peake's *Gormenghast* trilogy. As far as I am aware, no strict criteria for this kind of demarcation have ever been advanced. The cynical observer would surely be excused for imagining that something in the Bible is supposed to be interpreted literally (like the Genesis myth of human origins) only until such time as science conclusively shows it to be false. Some scientist/believers appear disarmingly prepared to concede this without a hint of embarrassment. For example, Consolmagno and Mueller (2014) write: "If there's a passage of Scripture that seems to contradict what we know from science, then that passage should not be interpreted literally—it should be interpreted figuratively" (p. 26). (How convenient.) The Nicene and Apostles' Creeds both mandate that the central claims of Jesus Christ as God incarnate and of the resurrection are taken as

completely literal, so for Christian apologists there can be no question of the story of Jesus being interpreted as allegorical. Yet no less an authority than Keith Ward writes: "The judgement as to whether or not the resurrection happened as recorded in the Bible is likely to depend on whether or not you already believe in God" (2008, p. 30), emphasising yet again the problem of prior commitment (see Section 2). Given the central importance of the resurrection for Christian belief[9], I will deal with this in more detail before considering the second and third rationalisations.

As the balance of informed opinion among historians is on the side of a charismatic religious leader known as Jesus (or the contemporary Hebrew equivalent) being active in first-century Palestine, and that he was possibly crucified at around AD 30, I propose to leave out of account here the work of those portraying Jesus as entirely mythical (e.g., Wells, 1975; Doherty, 2009; Fitzgerald, 2010; Carrier, 2014). This is not because I don't take this work seriously, but because denying the existence of Jesus at this point would leave us little to argue about. Unless we entertain the possibility of his existence, there is no sense in discussing the credibility of his resurrection, so let us continue under this assumption.

According to the aphorism popularised by Carl Sagan, extraordinary claims require extraordinary evidence[10]—and resurrection anywhere and at any time is certainly extraordinary by definition. So how strong is the historical evidence for this supposed happening in the case of the crucified Jesus? As one would expect given the prior-commitment phenomenon, strenuous attempts at persuasive argument for or against the resurrection are made on both sides. From the perspective of apologetics, Dickson (2019) defends academic study of the historicity of Jesus, argues that we probably know more about Jesus now than at any point in history, and attempts to show that the resurrection was plausible on the (mainly documentary) evidence. But to my mind he falls well short of presenting even a minimally plausible account, never mind approaching the standard of extraordinary evidence. The crippling weakness of his case can be readily ascertained from his bland conclusion: "I would say that the evidence for the resurrection is good enough to warrant skeptical readers picking up one of the Gospels and studying it with an open mind" (p. 144).

Possibly the most respected and authoritative scholar on the historical Jesus was Géza Vermes, the first ever Professor of Jewish Studies at Oxford University, a former Catholic priest, and famous for his work on the Dead Sea Scrolls. His writings extend from the pioneering *Jesus the Jew* (1973) through to the three-volume collection *Jesus: Nativity – Passion – Resurrection* (2010). Describing Jesus as a "rural holy man", in Vermes (2010) he takes the reader through the evidence for the resurrection and its possible interpretations. He notes: "All we have is bits of circumstantial evidence, if they can be called evidence" (p. 433). This is hardly an auspicious start for anyone seeking extraordinary support for an extraordinary claim. As Vermes says: "To put it bluntly, not even a credulous non-believer is likely to be persuaded by the various reports of the resurrection;

[9] The Bible (or more precisely, the letters of Paul of Tarsus) says: "And if Christ has not been raised, then our preaching is in vain and your faith is in vain" (1 Corinthians 15:14).

[10] In *The Demon-Haunted World*, he cites Thomas Huxley (1825–95) to the effect that assertions should "require corroborative evidence in exact proportion to the contravention of probability by the thing testified" (Sagan, 1996, p. 80).

they convince only the already converted" (p. 434). He goes on to consider eight possible interpretations of the evidence, but is at pains to rule out two of them *ab initio*, namely the extreme ones of "the blind faith of the fundamentalist believer and the out of hand rejection of the inveterate sceptic" as they are "not susceptible to rational judgement" (p. 435). The remaining six possibilities are then dissected in turn, with the conclusion that "none of the six suggested theories stands up to stringent scrutiny" (p. 441). Vermes describes this as a "conundrum" for the physical resurrection concept, but does not discount a metaphorical "spiritual resurrection" of the life and teachings of Jesus ("... in the hearts of men", as he puts it) as some sort of explanation for the origin and subsequent spectacular growth and survival of the Christian belief system. But regarding the physical resurrection, which is central to apologetics, we are left with the two extreme positions of believing it actually happened more or less as detailed in the Bible and a mythical resurrection fabricated by Jesus' followers, either at around the time of his crucifixion or in the early years thereafter. And if (to put it mildly) the evidence for the former falls so markedly short of being extraordinarily strong, what else can an open-minded scholar do but escape Vermes's conundrum by opting for the explanation that sees the resurrection as a straightforward fabrication?

The second rationalisation—so-called biblical accommodation—has a similarly long "pedigree", stretching back to Thomas Aquinas (1225–74) via John Calvin (1509–64). Biblical accommodation (or divine accommodation, or condescension) is the notion that God communicates with us in highly simplified terms that we are able to understand. This, so the story goes, is necessary because of the extreme epistemological gap that exists between an all-knowing God and the human capacity to understand his message. According to this doctrine, the language of the Bible is accommodated to the ability of first-century people to comprehend its "truth", and this is held to explain its apparent contradictions, gross factual inaccuracies, and outmoded (if not downright immoral) ethical strictures as perceived by present-day readers. I do not believe any properly unbiased scholar could give this shoddy idea the slightest credibility. It relies on the entirely erroneous premise that childish just-so stories can somehow stand in place of mature factual discourse. To give just one illustration, if God wished his human creations to understand their relationship to him (as Christian theology insists he does), why would he say that he "formed man of the dust of the earth" (Genesis 2:7) rather than reveal that *homo sapiens* evolved from precursor life forms? Why is the former better accommodated to first-century ignorance than the latter? And why perpetuate first-century ignorance rather than enlighten it in any case? One is forced to conclude that an explanation of the shortcomings of biblical text in terms of accommodation and/or condescension offers little or nothing of any value.

The third and final rationalisation falls back on the idea that the Bible is an account of how understanding of God unfolded in biblical times, viewed through the eyes of more or less contemporary commentators. To cite Ward (2008): "What the Bible offers is a history of the development of the idea of God in ancient Hebrew religion. As such, it is a precious document of religious history, and one reason why it is important to read it now is precisely to see how religious ideas developed over thousands of years in one Middle Eastern tribal tradition." (pp. 64–65). But Ward hereby abandons all pretence at the contents of the Bible having been shaped by divine intervention. He is, in effect, conceding what atheists have said over many

centuries, and seems to align himself squarely with those who hold the Bible to be a compendium of fables, dubious "history" and moral precepts recorded by man. Further, the identity of most of the many and various authors is either unknown or contested (e.g., Ehrman, 2012; Conner, 2017), and there is every reason to believe that at least some (if not all) were more concerned with proselytising on behalf of Christianity than recording historical events with any accuracy and objectivity. There is surely no reason on this basis to accord the Bible any particular special status as a source of factual knowledge of the natural world. On the contrary, the kind of knowledge that one would gain from reading and studying it is akin to what one would learn about the Olympian gods from reading Homer's *Odyssey*. Perhaps less so, as the authorship of the *Odyssey* is probably in far less dispute, and the text has been less subjected to revision and redaction via multiple translations. Nor should we forget that the Bible is composed of a patchwork of disparate writings stitched together after widespread debate long after the event about which should be included as canonical and which excluded. In short, by virtue of its dubious origins, obscurantist language and extensive contradictions, it would be unwise in the extreme to treat the Bible as an authoritative source of what one might call 'spiritual' knowledge about how to live one's life in modern society.

It is a truism that each of the world's major religions fêtes a particular 'holy' book as a source of "special" (usually infallible) knowledge, and rejects the corresponding claims to special status of the so-called sacred writings of rival religions. This is routinely done on no discernible logical or rational basis. So how is the properly-sceptical observer supposed to arbitrate among these competing but unsupported claims? The most defensible position must be to reject them all. This seems to leave the Wesleyan Quadrilateral in rather a sorry state, as the Bible is touted as its primary source of religious knowledge, but let us put that to one side and try to assess the other three allegedly "special" but subsidiary sources of tradition, reason, and experience on their own merits.

Traditional knowledge is that developed, sustained and passed informally from generation to generation within a community. In primitive communities especially, those lacking widespread literacy and/or formal structures for education and skills acquisition, it can be a highly valuable means to conserve and enhance vital knowledge about such things as agriculture, midwifery, animal husbandry, basic sanitation, etc. The obvious problem with it is that social history is replete with examples of traditional 'knowledge' being anything but reliable, such as the many contraception myths and superstitions that have proliferated throughout history[11]. Barbour (2000) writes that "... religious traditions are ways of life that are primarily practical and normative. Stories, rituals, and religious practices bind individuals in communities of shared memories, assumptions, and strategies for living" (p. 31). This is well and good, and may be a valid and useful route to the acquisition of certain life skills—learning to get along with others in the community—but it hardly constitutes a means of gaining robust knowledge about the fundamental, hidden truths of existence. Earlier in his book (p. 21), Barbour obliquely criticises scientists who portray religious traditions as "subjective, closed-minded, parochial, uncritical, and resistant to change" but

[11] One of these, the use of sponges soaked in lemon juice, is even to be found in the Talmud. So much for tradition as a source of religious knowledge in Judaism.

Fig. 2 The central "God as person" metaphor of the Abrahamic tradition is well illustrated by William Blake's watercolour etching "Ancient of Days" (1794), showing the deity creating the earth from his abode in the heavens. Although a religious man, Blake was himself scathing of the traditional Christian God figure; Nobodaddy and Urizen being among the names that he invented for this personal deity. So idiosyncratic were his views that he has been described as "a cult of one". Source: `https://www.britishmuseum.org/collection/object/P_1859-0625-72, PublicDomain,https://commons.wikimedia.org/w/index.php?curid=27197029`.

tellingly offers no argumentation whatsoever to counter this portrayal. Perhaps it is fair and accurate?

In his highly thought-provoking and readable 2005 *Religion is not About God*, philosopher Loyal Rue posits that religious tradition is not so much about knowledge, but instead provides a "central metaphor" for a religion, the role of religion in society being to integrate facts and values in such a way as to promote individual and societal well-being. The central metaphor in the Abrahamic tradition is, he argues, "God as person" (Figure 2), whereby God is both the giver of facts via his creation and the giver of values via divine command. Problems then arise when human knowledge progresses to the point that the metaphor is no longer sustainable. On p. 317, he writes: "One need not espouse scientism to see how familiarity with science might interfere with realism about root metaphors. It is enough simply to recognize how the onset of science displaced the explanatory power of 'God as person'".

Turning next to reason as a source of religious knowledge, we immediately encounter a problem of deciding exactly what reason—or rationality—means. This

difficulty requires to be cleared up before we can hope to make much progress. Although there is a strong tendency among many (particularly atheists, I am sorry to say) to treat "reason" as a simple, circumscribed, almost self-evident concept, I do not think this is a defensible position. In a very real sense, the difficulty is akin to that of settling on a definition of "science", or identifying a strict "scientific methodology", to which all could assent—as discussed in Section 3. The inability to offer a definition of reason to which all right-thinking people could agree has been called "philosophy's dirty secret" by Baggini (2016, p. 56). The inconvenient fact is that reason is multifaceted and so argument is rarely settled by reason alone; a degree of judgement is almost always necessary and this inevitably varies from person to person. As this is the case for philosophy in general, it must necessarily be the case for both philosophy of science and philosophy of religion. Baggini puts it like this:

> Reason as a concept comes in a variety of thinner and thicker forms. At its thinnest it is merely an appeal to the use of the intellect to think through issues. At its thickest it specifies the precise methods by which such thinking should be conducted. Such thick conceptions of reason may demand variously that it is deductive, scientific, dialectical. Reason, thinly conceived, has the virtue that most people find themselves able to endorse its value, but this agreement comes at the cost of defining reason so vaguely that it does not provide us with any real information on what it practically means to use it. Thicker conceptions get over this problem but at the price of consensus. People simply do not agree on which thick conception of reason we should employ. (pp. 4–5)

I take it as a given that in the academic context in which the science-religion debate plays out, we should be employing a relatively thick form of reason in Baggini's terms. But the price of consensus to be paid is opening up a niche in which apologists can claim ownership of a 'special kind' of reason different from that employed in science but legitimate in religious or theological discourse. So for the moment, let us allow that there might be such a special kind of reason and see what follows.

If it is to be 'special', then it cannot be the "extraordinary claims require extraordinary evidence" form of reason towards the thick end of Baggini's spectrum that is familiar to scientific discourse. (I would offer the recent book *Rationality: What It Is, Why It Seems Scarce, Why It Matters* by Harvard cognitive scientist Steven Pinker as an excellent primer on this relatively 'thick' version of reason/rationality.) As we have just seen, this points strongly to the foundational apologetic dogma of the resurrection being a myth. So if it's a source of religious knowledge, it undermines rather than supports the religious worldview in this crucial instance. I have scoured the theological literature on "reason" without managing to identify a coherent consensus on exactly what the word is supposed to mean when employed by theologians. For example, Thomas Aquinas wrote in *Summa contra Gentiles*: "religious truths are divided into those of reason and those of faith" (cited by Martin, 1990, p. 249). In direct contradiction of Aquinas, Albl (2009) asks us to accept that: "Reason itself is a matter of Faith. It is an act of faith to assert that our thoughts have any relation to reality at all" (p. 31). Muddying the waters further, Outler (1985, p. 3) says: "There is no contradiction between reason's discoveries of natural law and faith's discoveries of revelation", apparently

siding with Aquinas on reason and faith being disjoint (rather than conjoined as Albl would have it) but utterly failing to mark out a 'special' theological reason that is in any way distinct from a more prosaic form of reason, such as scientists might employ to discover well-attested natural laws. Perhaps Christian apologetic philosopher Richard Swinburne can help here? After all, his 2005 book has the title *Faith and Reason*. Surprisingly for a book with this title, it says very little about reason *per se* (but much about faith and belief) and nothing about a special brand of reason particular to the quest for religious knowledge.

The notion of a special brand of reason, particular and specific to religious and theological discourse, is often tied to the idea of a similarly special form of language. On this point, atheist philosopher Kai Nielsen (1982) denies that there is any such thing:

> There is no "religious language" and "scientific language". There is rather the international notation of mathematics and logic; and English, French, Spanish and the like. In short, "religious discourse" and "scientific discourse" are part of the same conceptual structure. (p. 83)

This is not to say that theology does not have its own very particular, distinctive and extensive jargon[12], only that if Nielsen is correct, these jargon words are essentially empty in wide discourse since they share nothing with any conceptual structure outside of theology.

Nielsen's argument that there is no special religious language receives support from an unexpected quarter, namely Jesuit priest Paul Mueller:

> This is a built-in problem for Christianity in relation to science. Christianity is a big social structure that has no choice but to depend on and make use of the language and concepts of science and other sources to give expression to what's important to it. It has no alternative; there is no other language to use. (Consolmagno and Mueller, 2014, p 148)

Binkley (1962) makes essentially the same point when he writes: "... basically in religious language, what we have is an odd or extraordinary use of ordinary language. The same words are frequently used as are used in ordinary conversation. But we must not let that mislead us, for they are put to a different purpose" (p. 21). This is well and good, after all any field of endeavour will do this. For example, computer science uses ordinary, everyday words like *bug* and *cloud* with an 'extraordinary' meaning but crucially, care is taken to define the extraordinary usage so that no one thinks we are talking about insect life and atmospheric water vapour. It is my contention that religion/theology signally fails to do this, seemingly trading on the ambiguity that inevitably arises, as it does here with the word *reason*.

The impression that there simply does not exist a special and particular kind of reason that allows reflective access to religious knowledge was for me greatly strengthened by reading *The Language of God* by Francis Collins (2006). Collins is a world-famous geneticist who led the Human Genome Project, undoubtedly one of the great triumphs of modern science. It is a rash person who would not approach Collins' writing on the topic of science and religion with an open-mind,

[12] Such as grace, theodicy, hamartiology, Christology, soteriology, lapsarian, kenosis, noetics, pneumatology, gospel, exigesis, hypostatic unity, eschatology, heurmeneutics, perichoresis, ...

prepared to take him and what he has to say seriously. As his self-imposed task is, as a scientist, to present "Evidence for [Christian] Belief", we are surely entitled to expect some cogent argumentation for this belief. Disappointingly, he doesn't really add anything to what we get from reading *Mere Christianity* except perhaps a degree of authority as a highly successful scientist that C. S. Lewis arguably lacks. On the subject of reason, about the best he can manage is:

> There are good reasons to believe in God, including the existence of mathematical principles and order in creation. They are positive reasons, based on knowledge, rather than default assumptions based on (a temporary) lack of knowledge. (p. 93)

But for all we know the existence of mathematical principles governing the universe could be a prerequisite for its very existence, and thereby for our existence. By no means does this point irrevocably to the necessity of a theistic God, even less the personal God of Abraham, Isaac and Jacob, demanding worship and seeking a loving relationship with humanity: the Duhem-Quine thesis should caution Collins against jumping to just the very conclusion that suits his case when there are so many other possible interpretations of the observations. Turning to the matter of order in creation, as a top-rank geneticist Collins is of course not arguing for anything as crude as creationism, based on literal acceptance of the Genesis story, which he roundly and rightly condemns, or the almost universally-abandoned argument from design. Like many present-day Christian apologists, he views evolution as the process through which the God of theism worked the miracle of creation, so-called "theistic evolution" (Collins, 2006, p. 199). But this is very clearly an inelegant *post hoc* rationalisation, forced historically on apologists only after the theory of evolutionary biology could no longer be rationally denied. Surely an omnipotent God keen for a knowing and loving relationship with his human creation could have made a tidier and more efficient job of bringing them into existence? As argued convincingly and at length by Coyne (2015, pp. 132–150): "... theistic evolution is not a useful compromise between science and religion. Insofar as it makes testable predictions, it has been falsified, and insofar as it makes claims that can't be tested, it can be ignored" (p. 147). Weighed up dispassionately, I see little or no virtue in Collins's "reasons" for belief in the Christian God, nor are there any compelling grounds to think that there exists a 'special kind of reason' that, when used in a religious context, can yield reliable knowledge about religious truth.

Thus far, neither scripture, tradition nor reason have held up as credible sources of religious knowledge. What about the fourth 'side' of the Wesleyan quadrilateral: namely, experience? At the outset, let me remark that in my opinion the experience we are discussing here is necessarily personal, not public. For shared, public experiences, such as when we all see the sun rise or the tide recede, are in no sense 'special' to religion. John Polkinghorne (2000) seems to agree with me when he states: "One of the roles of theology in any era is the intellectual study of the religious dimension of personal experience" (p. 19).

For my part, I prefer the term 'revelation' for this form of private experience since it more directly captures and encapsulates the notion of a uniquely religious source of knowledge: of "knowing God", as it were. I will use the term here in the way that Aquinas used "special revelation" in distinction to "general revelation", the latter describing the notion that truths about creation can be learned from

empirical study of the natural world. My own feeling is that the term "general revelation" is these days redundant: to the atheist it is simply science; to the theist or deist it is natural theology (see Part 2 for discussion of natural theology). Many writers reserve the term revelation for a particularly dramatic version of religious experience. For example, Ward (2008) writes:

> In most religions, some visions or inspired words are considered to be 'revelations'. This is a rare and definitive communication of important spiritual and moral truth from God. ... (p. 127)

However, it seems to me that there can be no definitive difference of kind between this sort of dramatic revelation and a less dramatic occurrence. A revelation is a revelation. And in any event, what is at issue here is how someone—anyone, not especially a 'prophet' or religious visionary—can not only come by revealed knowledge but recognise it as such. Hence, I will not respect any such distinction.

Just like the other putative sources of knowledge discussed so far—scripture, tradition and reason—there is a huge literature on revelation and religious experience. I cannot hope to do it any kind of justice, so I will simply point the reader to a couple of the more important references, before setting out my own perspectives. The case from the theistic side is made (albeit rather idiosyncratically) by Swinburne (2007); the case against is well made in Chapter 6 of Martin (1990). Perhaps the most puzzling thing about (special) revelation—to me as an atheist, at least—is why anyone should take it seriously in the first place. After all, if it is not public but is instead entirely private to the individual, there can be no checking procedure to ensure that the 'knowledge' claimed is anything other than illusory. Of course, it may not be, but the point is that we have no way of telling. As philosopher C. B. Martin (1952) writes in "A religious way of knowing":

> The only thing that I can establish beyond correction on the basis of having certain feelings and sensations is that I have these feelings and sensations. No matter how unique an experience may be, it cannot do the impossible. (p. 497)

Against this, Ward sketches out his view of a possible checking procedure of the kind typically advanced by theists. Does the claimed divine revelation have any credibility and does it have observable effects? Ward writes: "... we have to judge as well as we can whether a person has such a close relationship to God. We will examine their lives for moral heroism, inspired wisdom, spiritual peace and joy, a sense of union with the supreme Spirit, and liberation from self" (p. 128). But Martin's view of anyone professing religious knowledge through experience is "... no matter how much or how little his subsequent behaviour such as giving up bad habits etc. is affected, it could never prove or disprove his statements".

Perhaps the strongest thing that can be said in favour of revelation/experience is that, as spelled out by theologian H. P. Owen (1969), it is a form of intuition not unlike the one that we employ in making sense of the everyday world. For example, we all have individual beliefs, intentions, emotions, hopes, desires, etc., but from our individual perspective, how do we know that others share similar thoughts, feelings and dispositions? This is the classic "other minds" problem (e.g., Hyslop, 1995). Somehow intuition leads us to the unerring knowledge that we humans are all alike in this respect. For unless we act towards others in the certain knowledge

that they share emotions, desires, etc. similar in kind (if not in exact detail) to our own, we can hardly function in society. Irrespective of how we solve the problem, solve it we must do. And if we can have intuitions universally accepted as valid about other human minds, why not about the mind of God (e.g., Plantinga, 1967)?

There is, of course, a wide chasm between the two cases; they are in no way comparable in the manner that Plantinga disingenuously pretends. As human beings, we are constantly surrounded by other humans in society. We can collect copious sense data about the activities of our fellow humans. We have constant opportunities to check predictions based on our intuitions about how others will act in given circumstances. We can converse with others about their thoughts and feelings and thereby hone and refine our intuitions. None of this applies to God: there is no sense data, no observing his actions, no way of predicting these actions (or inactions), and so on. As Peter Donovan (1979) writes: "... while our awareness of others may at times be largely intuitive it is capable of being backed up with a strong argument from analogy, from our knowledge of ourselves as conscious beings". But we have no possibility whatsoever to draw any kind of useful analogy between ourselves and God. If traditional Christian theism is to be believed, we are but an infinitely pale "image" of God, fit only to worship him as an incomparably superior being. What looked at the outset distinctly unpromising, namely the notion that revelation/experience could lead to knowledge about God, turns out on examination to be even worse than first thought. It is in fact hopelessly and irredeemably flawed.

To conclude this discussion of the nature of religious knowledge (and its contrast to the nature of scientific knowledge), I can do no better than to quote Richard Dawkins (1997), so often the subject of attack by apologists:

> There's all the difference in the world between a belief that one is prepared to defend by quoting evidence and logic and a belief that is supported by nothing more than tradition, authority, or revelation. (p. 29)

4.4 Faith

The foregoing discussion has uncovered several linguistic stumbling blocks in talking about religion. Thus far we have not discussed, except obliquely, another huge semantic stumbling block that generates widespread problems in understanding theology as a discipline and religion as a way of life, as well as complicating the science-religion debate. This concerns the word *faith*. It is worth expending a little effort to try to clear up at least some of the major controversy about faith before proceeding. Admittedly, this is easy to say; it is much less easy to do.

Faith is a cornerstone of traditional Christianity, indeed all monotheistic religions. But what exactly is it? Apologists are at pains to condemn the "faith is belief without evidence" characterisation of New Atheism as crude, simplistic, and prejudicial. A typical such characterisation comes from Sam Harris who writes of religious people: "... they start with the premise that belief without evidence is especially noble. This is the doctrine of faith." (Dawkins *et al.*, 2019, p. 58). And famously Richard Dawkins has said: "Faith is the great cop-out, the great excuse to evade the need to think and evaluate evidence. Faith is belief in spite of, even

perhaps because of, the lack of evidence"[13]. Alister McGrath (2007) responds: "It is not a Christian definition of faith, but one that Dawkins has invented to suit his own polemical purposes". However, I do not think the atheist portrayal is so easy to dismiss. For example, Harris (2005) takes the Bible itself (Hebrews 11:1) as his source of a definition: faith is "the assurance of things hoped for, the conviction of things not seen" (p. 64). He comments: "this passage seems to render faith entirely self-justifying". The "conviction of things not seen" appears to be no more than a validation of belief in the absence of sense-data. Not only that, this belief is in the very strong form of "conviction". Regarding "the assurance of things hoped for", many would see this as a veritable definition of wishful thinking. C. S. Lewis (1952) attempts to give this sort of thinking some intellectual veneer when he writes: "Creatures are not born with desires unless satisfaction for those desires exists" (p. 136). This is known as the argument (for God's transcendence) from desire. The usual counter to the argument from desire (and one that I personally find decisive) is that we can easily have wishes—in the form of fantasies—that have no possible satisfaction; and the religious desire for "another world" may be more akin to a fantasy than to the innate, biologically-based desires that Lewis is assuming.

So how do present-day believers prominent in the science/religion field define faith, and what is its relation to the putative sources of religious knowledge discussed in Section 4.3 above? Like the word *reason* when used by believers, faith seems to mean an array of different things. Indeed, we have seen that there is even disagreement among apologists on what the difference is between faith and reason. In my view, atheist Sam Harris (2005) helps us out here. On pp. 64–5, he draws a distinction between the "ordinary, scriptural sense" of faith, viz. "belief in and life orientation towards certain historical and metaphysical propositions", and what he sees as redefinition of the term by philosophically-inclined academic theologians. He writes: "Of course, anyone is free to redefine the term 'faith' however he sees fit and thereby bring it into conformity with some rational or mystical ideal. But this is not the 'faith' that has animated the faithful for millennia". So let us see what prominent Christians active in the science-religion debate have to say about faith, and try to determine if their writings are consonant with scripture and tradition, or are rather in the nature of a redefinition to a form that an everyday believer might not recognise as their 'faith'.

Starting with Alister McGrath (2018), he writes: "Christian theologians have traditionally made a distinction between faith as *a set of beliefs*, and faith as *an act of believing* (p. 1). I imagine what he means by this rather cryptic statement is that the former is to do with acceptance of certain propositions (such as "Jesus died for our sins") and the latter with the way that the Christian believer lives his or her life in light of these beliefs. He goes on to write that faith "... is a matter of the heart, not simply the mind". This seems to be a reasonable portrayal of "ordinary, scriptural" faith, but remarkably by use of the phrase "matter of the heart" McGrath concedes that faith is not entirely rational, and gets close to accepting implicitly Harris's "belief without evidence" characterisation. As Coyne (2015, p. 250) pointedly writes: "It's hardly necessary to add that the heart is not an organ for thinking, and that we can never understand 'how the universe works'

[13] From Dawkins' speech at the Edinburgh International Science Festival, 15 April 1992.

by using our emotions, via faith". McGrath goes on to denigrate "rationality" in the following terms:

> ... its credibility has been severely shaken on account of the growing realization that different cultures have different understandings of rationality. Reason, it turned out, was not the universal quality that many rationalists believed it to be.

But having apparently disposed of rationality as a simplistic notion discarded by serious philosophers and theologians, he then writes approvingly of Aquinas: "his *Summa contra Gentiles* ... represents a classic statement of the rationality of the Christian faith, and especially the existence of God" (p. 4). McGrath certainly appears to try to have it both ways with reason/rationality meaning something or nothing, according to what suits his apologetic purposes. A more charitable reading is to assume he is well aware of the multifaceted nature of reason, as we have discussed it with respect to Baggini's conception of a thin-to-thick spectrum of reason in Section 4.3, and is referring to subtly different versions of reason in these apparently conflicting usages. But this is surely too charitable, as he signally fails to draw any such explicit distinction himself.

We should not be too surprised that Christian theologians like McGrath seek to obfuscate the nature and status of evidence-based rationality as a faculty to be practised, valued and nurtured, since it is essentially fatal to dogma-based apologetic belief. Instead, as remarked earlier, they seek to pin their beliefs on 'other' kinds of rationality, more friendly to religious thinking. For example, Barbour (2008) writes of "different types of rationality in different contexts" and goes on to assert "... for the Christian the conviction that God is rational is not based primarily on an understanding of scientific rationality" (p. 260). Theologian/philosopher Wentzel van Huyssteen (1998, 1999, 2006) has been a particularly prominent exponent of this notion of "the many faces of human rationality" as a thinly-disguised screen for prior commitment to Christian belief. The "many faces" that he posits supposedly derive from "pre-theoretical reasonableness, a 'common sense' rationality" (van Huyssteen, 2006, p. 131). He goes on:

> For this reason, we cannot talk abstractly and theoretically about the phenomenon of rationality anymore; it is only as individual human beings, living with other human beings in concrete situations, contexts and traditions, that we can claim some form of rationality. In this sense, human rationality is revealed as always person- and domain-specific, as we discover it as present and operative in and through the dynamics of our words and deeds.

This seems to be some way removed from Baggini's considerably better argued case for seeing reason as lying on a thin-to-thick spectrum. In particular, rather than being person-*specific* and domain-*specific*, it is surely more measured to see reason as being *influenced* by these factors. For after all, if reason/rationality, as the concept is understood by scholars seeking robust understanding of the world and our place in it, was strongly person-specific, there could be no solid foundation for agreement among a community of scholars, or indeed other people in general. Similarly, if it was strongly domain-specific, there could be no cross-reference between different disciplines. But, of course, this is precisely what van

Huyssteen seeks, namely to block cross-reference to the norms of science as a way of rescuing theology from the charge of irrationality. But at other times, van Huyssteen seems to argue against himself, as in the following passage where he apparently criticises his own assertion that rationality has "many faces", at least radically different ones:

> ... even if we were to acknowledge the possibility of radically separate or different forms of rationality (which is, as will become clear later, highly problematical and therefore unlikely), the crucial question will still remain whether the rationality of science is in any significant way superior to, or normative for, other forms of rationality. (van Huyssteen, 1999, pp. 20–21)

The best sense I can make of this is to reject it as incoherent, and instead hold fast to the principle that evidence-based rationality is the most defensible form of rationality, albeit a complex matter involving a degree of judgement just as Baggini has said. Unfortunately for van Huyssteen, this most defensible form of reason is not friendly to religious belief.

Moving on to the words of McGrath's colleague John Lennox, on p. 99 of *Can Science Explain Everything?*, he writes that faith is "... receiving from Christ in a deliberate act of commitment and trust the gift of salvation that we could not earn or provide for ourselves". Again, this seems a reasonable portrayal of the everyday Christian conception of faith but it is abundantly plain that Lennox sees no requirement for evidential corroboration of this "commitment and trust", which is very obviously predicated on *a priori* belief in Christ as God incarnate. On the contrary, any call for such corroboration would be a denial of faith.

Turning to Keith Ward (2008), he writes: "... the test of genuine belief in God is whether or not your life is directed towards sharing in and learning to increase in the world around you beauty, bliss and goodness. This is why belief in God is often called 'faith', and not just intellectual assent. Faith is the practical commitment to a relationship with God ..." (p. 132). Thus far, none of these offerings of McGrath, Lennox or Ward are "redefinitions" in Harris's terms: they are all, I think, descriptions of faith that practising Christians would find agreeable. Yet they are all highly susceptible to the charge of "belief without evidence", since they hinge entirely on uncritical prior acceptance of the tenets of Christianity.

The usual rejoinders to this charge from apologetic scientist-believers are two-fold. The first is to attempt to widen the concept of "evidence" to admit the putative sources of religious knowledge considered in Section 4.3: scripture, tradition, a special form of "reason" and revelation. But as we have seen, none of these putative sources is remotely credible as a secure route to robust, resilient knowledge. The second manoeuvre is to attempt to portray religious faith as no different (or at least similar) to what scientists do in pursuing science, or everyday people do in living their lives. This is an example, to use Harris's words, of an attempt to "bring it into conformity with some rational ... ideal". For example, Ward (2008) says of physicists' search for a Grand Unified Theory:

> The thesis that such a search will succeed is an article of faith in the power of science. It is not an unreasonable faith; there are good reasons, in the past success of science and the elegance of the laws so far discovered, to hold it. But to do so is as much a step of faith as is a commitment to the God hypothesis, which also has many good reasons to support it, but cannot at present be conclusively established. (pp. 57–58).

In the same vein, Collins (2006, p. 3) writes: "The principles of faith are, in fact, complementary with the principles of science"; and Lennox (2019) writes: "... for, just as faith in science is evidence-based, similarly Christianity is an evidence-based faith" (p. 50). Yet the notion that religious faith is no different to scientific "faith"—or is at least "complementary" to it—surely does not stand up to serious scrutiny (e.g., Bloom, 2015). Certainly, any working scientist takes many things on trust: it is plainly impractical (not to say unnecessary) for anyone to verify at first-hand all the base knowledge of a particular field of science by repeating in their entirety all key experiments, proving all key theorems from first principles, etc. Instead, by virtue of a thorough scientific education in which the student scientist repeats a representative sample of important experiments, is likewise familiarised with the proofs of several classic results, and is tutored in the application of basic principles to solve novel problems, confidence is built that first-hand verification of most if not all of the field's knowledge base could be carried out if desired. Thus, scientific "faith" is really a form of trust built out of studied experience. There is simply no counterpart in religion to this kind of trust-building exposure to repeatable experiments, provable results, generation of testable predictions from basic principles etc. Religious faith is just not like that, but is to do with acceptance of intangible propositions about the nature of existence and claims about non-repeatable events (divine creation, virgin birth, resurrection, eschatological destiny, ...) unsupported by robust sense-data. It is frankly idle to pretend that there is any comparability between the practice of science and religious faith. To cite Yale cognitive psychologist Paul Bloom (2015) in "Scientific faith is different from religious faith":

> Science establishes conditions where rational argument is able to flourish, where ideas can be tested against the world, and where individuals can work together to surpass their individual limitations. Science is not just one "faith community" among many. It has earned its epistemological stripes.

In short, science has a proven track record of attested predictive successes; religion has none. Given this, any parallels that one tries to draw between their respective *modi operandi* must necessarily fail to reveal anything of great value or utility.

A related manoeuvre is to attempt to depict religious faith as no different to the principles employed in leading a fulfilling secular life. As Hutchinson (2011) writes of those "who act boldly with determination and commitment, even in the face of risk and in the absence of complete information, who are successful in this world":

> Such people, men and women of *action*, illustrate one of the primary qualities of faith. They act in accordance with a view of the world that is plausible but unproven. That is faith. And religious faith is quite simply the same principle applied to matters of God and the spirit.

This has no more virtue or validity than the similar argument applied to scientific "faith". Hutchinson and like-minded apologists are merely (I suspect wilfully) failing to appreciate that the "plausible but unproven" tenets of scientific discovery or of material success in life are in no way comparable to the tenets of religious belief. The sense in which quantum theory, for example, is "unproven" given its success in underpinning vast swathes of modern, everyday technology is a world away from the unproven tenets of Jesus' resurrection and an afterlife, for which

observational support is entirely absent. Obscurantists can choose to use the same word ("faith") to describe both kinds of belief, but they are simply confounding the linguistic difference between types and tokens (Ogden and Richards, 1923; Wetzel, 2002). Scientific "faith" and religious faith are two different tokens—with distinct meanings—of the same linguistic type. You do not feed hay to a clothes horse.

5 Conclusions

In Part 1 of this two-part paper, I have set the scene for the focussed discussion of the relationship between science and religion that follows in Part 2. This has covered relevant aspects of the philosophy of science, the philosophy of religion, and the academic discipline of theology as it is usually practised. The treatment has been deliberately set at a tutorial level in recognition of the fact that few readers (including the author) will have formal and/or recent exposure to all the disciplines contributing to the science-religion debate. It is my contention that the seeds of conflict between science and religion are already apparent in this tutorial review, and will become even more obvious in Part 2, in which I structure the discussion around Ian Barbour's influential four-fold typology of science-religion relations.

Acknowledgements I am grateful to Keith Ward and John H. Brooke for taking the time to reply with commendable good grace to several questions that I posed to them during the writing of this two-part paper.

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