

OTHER ARTICLES

THOMAS TORRANCE: SCIENCE, THEOLOGY, AND THE CONTINGENT UNIVERSE

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Abstract: *Thomas Torrance is a towering figure in twentieth century theology and one of few theologians of his stature to engage in dialogue with the natural sciences. In this paper I discuss and critique three aspects of this engagement: (1) the sense in which, for Torrance, theology is itself a science; (2) Torrance's redefinition of "natural theology" by way of an analogy from physics; and (3) some specific assumptions and findings of the natural sciences which Torrance discusses, which both accord well with the Christian doctrine of creation and also give scope for the more traditional kind of natural theology which Torrance rejects.*

Introduction

Thomas Torrance is undoubtedly one of the most significant British theologians of the twentieth century, a point brought out well in Alister McGrath's fine biography.¹ Of particular interest to someone like me, who had a scientific career and in later life turned to theology and ordination in the Church of England, is Torrance's engagement with the sciences. My own mentor and role model in following this path has been John Polkinghorne. Polkinghorne, who has been one of the most distinguished contributors to the science-religion dialogue, acknowledges that interdisciplinary work is difficult because one cannot hope to attain the same level of expertise in more than one discipline. Polkinghorne does, however, commend

1 Alister E. McGrath, *T. F. Torrance: An Intellectual Biography* (Edinburgh: T&T Clark, 1999).



Torrance as a systematic theologian who has seen the significance of engaging with what science has to say.² Torrance himself sees theology's interest in science as arising from the specific way God has revealed himself as Creator and Redeemer "within the creaturely objectivities of the world."³ He goes on:

Thus arising out of the very heart of theology there is an unquenchable interest in the scientific understanding of creaturely being, and for the whole fabric of worldly existence as the medium in which God has placed man and constituted him what he is in relation to Himself . . . That is the reason for the peculiar interest of theology in the rise and progress of natural science, and for the fact that its own scientific pursuits cannot be separated from the scientific pursuits that are pursued in the same world about other aspects of creaturely being.⁴

There are three main areas of Torrance's engagement with science that I would like to discuss in this paper, following on from my earlier work on Torrance in my book *The Heavens Declare*⁵ and my paper on Torrance in *Theology and Science*.⁶ The first, discussed also by Alister McGrath and Greg Cootsona in this volume,⁷ is the way in which Torrance sees theology itself as "scientific." Here Torrance raises deep issues as to what theology might, or might not, have in common with science, and what it means for theology to be a rational mode of discourse. The second is the subject briefly alluded to by Cootsona, namely the implications of Torrance's redefinition of natural theology as a kind of "theological geometry," again with implications for the rationality of theology. The third is to look at some of the specific things Torrance says about science which, to my mind, seem to allow for a kind of natural theology that is more traditional than Torrance's own redefined version. It will be apparent that, while I am a great admirer of Torrance, my respect for him does not depend on agreement in every

2 John Polkinghorne, *Faith, Science and Understanding* (London: SPCK, 2000).

3 Thomas F. Torrance, *Theological Science* (Edinburgh: T&T Clark Ltd, 1969; paperback edition, 1996), 56.

4 *Ibid.*, 57.

5 Rodney D. Holder, "Thomas Torrance: Natural Theology Redefined," in Rodney D. Holder, *The Heavens Declare: Natural Theology and the Legacy of Karl Barth* (West Conshohocken: Templeton Press, 2012), 138-168.

6 Rodney D. Holder, "Thomas Torrance: 'Retreat to Commitment' or a New Place for Natural Theology?" *Theology and Science* 7, no. 3 (2009): 275-296, <http://dx.doi.org/10.1080/14746700903036544>

7 Alister E. McGrath, "A Manifesto for Intellectual Engagement: Reflections on Thomas F. Torrance's *Theological Science* (1969)," *Participatio* 7 (2017): 1-16; Greg Cootsona, "Theology, Science, and the Power of the Ring: Response Article to Alister McGrath's 'A Manifesto for Intellectual Engagement,'" *Participatio* 7 (2017): 17-26.

point, and like McGrath "I make certain theological moves that Torrance does not."⁸ Indeed, I also differ somewhat from my great theological teacher, Alister McGrath himself!

Theology as a Science

As noted by McGrath and Cootsona,⁹ Torrance believes that theology is a science. The basic thesis of *Theological Science*, and repeated many times elsewhere, is precisely that theology is scientific because it relates to its object in the way appropriate to it. Our knowledge of the reality of our object of study, just as in the sciences, is determined by the way in which that object confronts us. As McGrath notes, this can be expressed simply by the phrase "ontology determines epistemology."¹⁰ For Torrance, this is what makes theology a "*rational event*."¹¹ Moreover, "This means that an antithesis between reason and faith must be ruled out, for faith is the behaviour of the reason in accordance with the nature of its divine Object."¹² A further important point that Torrance makes, also picked up by Cootsona¹³ and to which we shall return, is that there is no one scientific method, for each of the sciences has its own methodology.

Now it seems to me that this definition affirms something important, but is also open to criticism. The important point is that it distances us from a Kantian idealistic view in which external reality is somehow a construct of our human thought processes. Scientists would agree with Torrance here. Whereas Kant thought, *a priori*, that space had to be Euclidean because this was how the mind constructs its experience of space, Einstein demonstrated that space is curved. Quantum theory has developed out of the bizarre, counter-intuitive world presented to us by experiment, and it is certainly not something we could have thought of *a priori*. We are certainly up against something outside of us impinging on us here, which even challenges our normal modes of logical reasoning. This is the reverse of the mind imposing its own constructs on the world.

Although rational experience is only possible in the first place because our minds are structured in a particular way and, moreover, nature does indeed yield its secrets in response to the coercive questions we ask of it, Torrance believes that Kant goes too far in elevating this insight into a general principle whereby

8 McGrath, "Manifesto for Engagement," 2.

9 Ibid., 11, 15; Cootsona, "Theology, Science, and the Power of the Ring," 18.

10 McGrath, "Manifesto for Engagement," 15.

11 Torrance, *Theological Science*, 11.

12 Ibid., 33, n. 2.

13 Cootsona, "Theology, Science, and the Power of the Ring," 19-20.

“the conformity of the object to the mind of the knowing subject is attributed to our power of knowing or is predicated of our human nature.” Because of this, Kant presents us with the dangerous temptation “to discount the thing in itself as a mythological projection.”¹⁴

There is in fact a balance to be struck here. Philosophers of science now recognize the “theory-laden nature” of observation. Thus, no observation or experiment in science is uninterpreted. One always approaches an experiment with some preconceived notion or theory of what a measurement might mean, even if it stands to be corrected by what nature reveals. Torrance is somewhat ambivalent here. On the one hand, he affirms that, in the light of his definition of the character of theology, “a genuine theology is distrustful of all speculative thinking or of all *a priori* thought.”¹⁵ On the other hand, he seems to recognize the point when he refers elsewhere to “the all-important interdependence of theory and experiment.”¹⁶

Having made these positive comments, I now offer some criticism. Mainly, I wonder whether the similarity Torrance sees between theology and the natural sciences is not rather weak. In contrast, Wolfhart Pannenberg, whom McGrath criticizes,¹⁷ believes that theology is scientific if it proposes hypotheses and seeks to confirm them (a point noted by Ted Peters¹⁸). McGrath is right to criticize Pannenberg for getting the science wrong, notably with his view of field theory. However, as we shall see, Torrance is also vulnerable to the same criticism. More importantly for the present discussion, Pannenberg’s view of God as “the all-determining reality,” and his view of theological hypotheses as explanatory, looks to me a lot more like science. Indeed, Nancy Murphy¹⁹ and Philip Hefner,²⁰ who are major contributors to the science-religion dialogue, have seen Pannenberg’s view as expressible in terms of scientific research programmes after the manner of Imre Lakatos. Like McGrath, I have a preference for evaluating hypotheses by way of inference to the best explanation (IBE), but more particularly by way

14 Torrance, *Theological Science*, 89.

15 *Ibid.*, 33.

16 Thomas F. Torrance, *Divine and Contingent Order* (Edinburgh: T&T Clark, 1981; revised edition, 1998), 40.

17 McGrath, “Manifesto for Engagement,” 7, 13.

18 Ted Peters, *Science, Theology, and Ethics* (Aldershot, UK; Burlington, VT: Ashgate, 2003), 26.

19 Nancey Murphy, “A Lakatosian Reconstruction of Pannenberg’s Program: Responses to Sponheim, van Huyssteen, and Eaves,” in Carol Rausch Albright and Joel Haugen, *Beginning with the End: God, Science, and Wolfhart Pannenberg* (Chicago and La Salle, IL: Open Court, 1997), 409-426.

20 Philip Hefner, “The Role of Science in Pannenberg’s Theological Thinking,” in Albright and Haugen, *Beginning with the End*, 97-115, esp. 109-111.

of Bayesian confirmation theory after the manner of Richard Swinburne.²¹ One problem with the Lakatosian approach is the predictive quality of theological research programmes — predictions look a lot less specific than in the scientific realm. But my main point is that IBE, confirmation theory, and Lakatos' methodology all make theology look more like a science than does simply "relating to the object in the way appropriate to it."

Thomas Langford noted that Torrance's concept of "theological 'science' is so different from every other 'science' that only the most formal characteristics of similarity remain."²² However, he sees the term "science" as having apologetic value and contrasts Torrance with theologians who thought that being "scientific" meant being "anti-dogmatic." Cootsona makes a linguistic point in referring to the way one refers in French to the "sciences" rather than, as in English, to "science."²³ I would offer a somewhat similar point with reference to German. The word *wissenschaftlich* is usually translated "scientific" (and the noun *Wissenschaft* as "science"), but in reality it refers to any academic discipline. It conveys, as Torrance himself notes, "a rigorous, disciplined, methodical, and organized knowledge," and Torrance affirms that theology is just this.²⁴ However, what English speakers generally mean by "science" is what the Germans call *Naturwissenschaft*, meaning "natural science." If theology is *wissenschaftlich* rather than *naturwissenschaftlich*, Langford's point is somewhat mitigated.

A problem with taking the objectivity of God as the starting point for theology is that the very existence of God is disputed in the world outside theology. For Torrance, "Christian theology arises out of the actual knowledge of God given in and with concrete happening in space and time."²⁵ It is concerned with "the fact of God's self-revelation," and of course this means fundamentally God's self-revelation in Jesus Christ: "He [Christ] is the concrete embodiment of knowledge of God within our humanity."²⁶ It is here that Torrance most resembles his great mentor, Karl Barth, whom indeed he brought to the attention of the English-speaking world by sponsoring the translation of the *Church Dogmatics* and

21 Richard Swinburne, *An Introduction to Confirmation Theory* (London: Methuen, 1973); Richard Swinburne, *Epistemic Justification* (Oxford: Oxford University Press, 2001); and Richard Swinburne, *The Existence of God*, second edition (Oxford: Oxford University Press, 2004).

22 Thomas A. Langford, "T. F. Torrance's *Theological Science*: A Reaction," *Scottish Journal of Theology* 25, no. 2 (1972): 155-170.

23 Cootsona, "Theology, Science, and the Power of the Ring," 20.

24 Torrance, *Theological Science*, 116.

25 *Ibid.*, 26.

26 *Ibid.*, 45.

founding the *Scottish Journal of Theology*. It sounds just like what Dietrich Bonhoeffer referred to in Barth as a “positivism of revelation,” which Bonhoeffer saw as fine for the church but not for the outsider.²⁷ Peters’ criticism of starting with the assumption of God’s existence seems apt: “To presuppose its truth and then contend that this produces knowledge seems to beg the question” — and this is his accusation against Barth and his followers such as Torrance.²⁸

W. W. Bartley has criticized Protestant theology in the Barthian tradition as irrational for just this reason, dubbing it a “retreat to commitment.”²⁹ Heinrich Scholz, whom McGrath cites,³⁰ is similarly critical. In 1931 Scholz published an essay entitled “How is an evangelical theology possible as science?” in the journal *Zwischen den Zeiten*.³¹ In this essay Scholz put forward a number of criteria which were required to be fulfilled for any undertaking to count as science. These included freedom from contradiction, coherence, the capacity to be tested, congruity with what is physically and biologically possible, freedom from prejudice, and capacity of being expressed as a system of axioms and theorems. It seems to me that some of these are indeed essential, notably the first three. However, I would quibble with the fourth if it is meant to exclude the possibility of miracles by fiat, since that would introduce a “prejudice” of its own. The last is also contestable since it makes every science sound like pure mathematics. Nevertheless, it does seem to me that there are common grounds of rationality which can be used to evaluate theistic and atheistic hypotheses. Thus, Bayesian confirmation theory can be utilized to compare metaphysical hypotheses, just as it can be used to compare alternative scientific hypotheses, as acknowledged by atheist philosopher John Earman.³²

The problem, then, with Torrance’s position is that we are seemingly not allowed to bring evidence and the tools of a common rationality to bear on theology as we are in the sciences. For Torrance, our beliefs are justified because “we are given a profound inner experience through the Spirit of the objective

27 Dietrich Bonhoeffer, *Letters and Papers from Prison*, ed. Eberhard Bethge (London: SCM Press, 1971), 280, 286.

28 Peters, *Science, Theology, and Ethics*, 28.

29 W. W. Bartley III, *The Retreat to Commitment*, second edition (La Salle, Illinois, and London: Open Court, 1984).

30 McGrath, “Manifesto for Engagement,” 12-13.

31 Heinrich Scholz, ‘Wie ist eine evangelische Theologie als Wissenschaft möglich?’, *Zwischen den Zeiten* 9, Heft 1 (München: Chr. Kaiser Verlag, 1931), 8-35. Reprinted in *Theologie als Wissenschaft*, ed. Gerhard Sauter (München: Chr. Kaiser Verlag, 1971), 221-264.

32 John Earman, *Bayes or Bust? A Critical Examination of Bayesian Confirmation Theory* (Cambridge, MA: MIT Press, 1992), 153-154.

reality.”³³ The question is, how do we know that this is a genuine experience? It seems to me that an “internal” justification, testing against Scripture and discernment within the community, is not enough. We need rational argument, both for the existence of God — which is the task of natural theology — *and* for what Scripture says about him — what Swinburne has dubbed “ramified natural theology.”³⁴ While in my view certainly not undermining the central claims of Scripture, two hundred years and more of historical criticism of the Bible do make it difficult to read propositional truth straight out of its pages without some reasoned interpretation, including consideration of context, source criticism, and so on. In our present skeptical age we can no longer simply assert, “The Bible says . . . ,” and expect to be believed without argument.

Having raised the subject of natural theology — my second main area to consider with respect to Torrance’s engagement with the sciences — let us now move on to discuss what Torrance says about it.

Natural Theology

Natural theology as traditionally conceived concerns the knowledge of God open to us simply as rational creatures observing the world, apart from any special revelation. A typical definition is given by John Macquarrie: “Natural theology is the knowledge of God (and perhaps also of related topics, such as the immortality of the soul) accessible to all rational human beings without recourse to any special or supposedly supernatural revelation.”³⁵ Natural theology in this sense has a long, if chequered, history. St. Thomas Aquinas, for example, thought we could know *that* God exists from human reason alone, and his “five ways” can be seen as arguments forming a *praeparatio fidei*, or preparation for faith, in what comes to us by way of revelation:

The truths about God which St. Paul says we can know by our natural powers of reasoning — that God exists, for example — are not numbered among the articles of faith, but are presupposed to them. . . . God’s effects, therefore, can serve to demonstrate that God exists, even though they cannot help us to know him comprehensively for what he is.³⁶

33 Torrance, *Theological Science*, 28.

34 Richard Swinburne, “Natural Theology and its ‘Dwindling Probabilities’ and ‘Lack of Rapport,’” *Faith and Philosophy* 21, no. 4 (2004): 533-546. See also Rodney D. Holder, “Why We Need Ramified Natural Theology,” *Philosophia Christi* 15, no. 2 (2013): 271-282.

35 John Macquarrie in *The Blackwell Encyclopedia of Modern Christian Thought*, ed. Alister McGrath (Oxford: Blackwell, 1993), 402.

36 St. Thomas Aquinas, *Summa Theologiae*, 1a. 2, 2, Blackfriars edition (London: Eyre & Spottiswoode, and New York: McGraw-Hill, 1964), trans. Timothy McDermott OP, vol. 2, 11.

Now Torrance will have none of this (notwithstanding that Aquinas cites St. Paul here). As Cootsona notes,³⁷ for Torrance “natural theology may offer the greatest hindrance to natural science and to scientific theology alike.”³⁸ In the same place, Torrance goes on to say, “The purer theology is, the more strictly it behaves in terms of the nature of its Object, which is revealed as Grace — that is why justification by Grace alone not only sets aside natural goodness, but sets aside natural theology, for both belong to the natural life of the natural man.”³⁹ Reinforcing the point, he says:

Natural science starts from premises that do not include God, and moves in an opposite direction to theology in accordance with the nature of its subject-matter, but “natural theology” starts from the same premises and the same phenomena as natural science and seeks to move toward God, and in so doing brings itself into conflict with natural science and with pure theology, proving to be a source of confusion to both if not an actual obstacle in their progress.⁴⁰

Natural theology must be excised from scientific theology as a “sort of ‘foreign body,’” says Torrance, if scientific theology is to be consistent with its commitment to respond to God as he has actually revealed himself. Despite this, Torrance does make an important concession in seeing a role for natural theology in “helping to remove the grounds of rational doubt.”⁴¹

Torrance utilizes an analogy from science to make his point, the notion of complementarity in quantum theory. In quantum theory entities possess both particle and wave properties, which are “complementary” rather than “contradictory,” because the specific property that is seen depends on which of the mutually exclusive experimental set-ups is selected. Correspondingly, says Torrance, natural science and theology possess mutually exclusive ways of probing reality.⁴² However, as John Polkinghorne remarks, the notion of complementarity in quantum theory “provides no licence for the easy export of the notion to other disciplines.”⁴³ Torrance seems to be describing what Stephen J. Gould calls the NOMA (non-overlapping magisteria) position, whereas many of us do see areas of overlap such as commonly shared rational modes of enquiry

37 Cootsona, “Theology, Science, and the Power of the Ring,” 23.

38 Torrance, *Theological Science*, 102.

39 *Ibid.*, 102.

40 *Ibid.*, 103.

41 *Ibid.*, 103.

42 *Ibid.*, 102.

43 John Polkinghorne, *Quantum Theory: A Very Short Introduction* (Oxford: Oxford University Press, 2002), 37.

and broader questions such as science's need for metaphysical underpinning. The latter point is well brought out in the recent book *Beyond Matter* by Roger Trigg,⁴⁴ and indeed I shall point out later how Torrance, notwithstanding his apparent NOMA stance here, agrees with this.

For Torrance there is, despite the above, a natural knowledge of God which all possess "unless they obstruct or suffocate it."⁴⁵ However, this natural knowledge "cannot be worked up into a 'natural theology.'" But then, curiously, Torrance quotes Geddes McGregor with apparent approval: "It is being more and more widely admitted that a disposition towards theistic belief is a necessary antecedent to the presentation of a reasoned case for theism."⁴⁶ It does not seem a very big step to me to go from "removing the grounds for rational doubt" to "working up a natural theology" from "natural knowledge" as a *praeparatio fidei*, which would seem to be consistent with the Geddes quotation, even if Torrance himself intends otherwise.

The problem, as Torrance sees it, is that natural theology undermines Christology which, for Torrance, like his mentor and hero Barth, is the judge and starting point of his theology. McGrath quotes Torrance to this effect with particular clarity, citing a moving story from Torrance's life. Torrance had cause during World War II as an army chaplain to minister to a dying soldier who asked him, "Padre, is God really like Jesus?" Torrance unequivocally replied that yes, the only God there is had come to us in Jesus and "poured out his love to us as our Saviour." Reflecting on this episode later, Torrance wrote:

That incident left an indelible impression on me. I kept wondering what modern theology and the Churches had done to drive some kind of wedge between God and Jesus, and reflected on the damage done by natural theology to Christology and the proclamation of the Gospel! The evangelical teaching which I had from Karl Barth was considerably reinforced on the battlefield. There is no hidden God, no *Deus Absconditus*, no God behind the back of the Lord Jesus, but only the one Lord God who became incarnate in him.⁴⁷

The centrality of Christ for Torrance, as it was for Barth, is deeply impressive, and Christ is central to me too. However, in an age which is at once skeptical and pluralistic, we need to help people to see that what we claim to be revelation really is revelation. Some may just accept this without argument, but many

44 Roger Trigg, *Beyond Matter: Why Science Needs Metaphysics* (West Conshohocken, PA: Templeton Press, 2015).

45 Torrance, *Theological Science*, 103.

46 Torrance, *Theological Science*, 104, n. 1.

47 McGrath, *Torrance: Intellectual Biography*, 74.

will need first to be convinced that there is a God at all before that God can be identified with Jesus Christ. And this is where traditional natural theology, which I equate to the arguments that also come under the rubric of "philosophy of religion," come into play, followed by the arguments of "ramified natural theology."

I referred in my introduction to Torrance's redefinition of natural theology as "theological geometry," which is Torrance's way of re-appropriating the concept or term which he otherwise sees as anathema. This may be a "lovely idiom," as Cootsona puts it.⁴⁸ Indeed, Polkinghorne commends Torrance's approach to natural theology, and resembles Torrance in recognizing it as "an integral part of the whole theological quest for understanding and by no means an isolable or merely preliminary sub-department of it."⁴⁹ However, Polkinghorne's actual treatment of natural theology is much more like the traditional view, arguing, as he does, towards theism from such factors as the comprehensibility of the universe — its openness to our human understanding through science — and its fine-tuned character.

Let us unpack Torrance's "lovely idiom." He draws an ingenious analogy from physics, indeed from Einstein's general theory of relativity:

The fact that four-dimensional geometries are not just other ideal possibilities inventively thought up . . . but involve a profound correlation between abstract conceptual systems and physical processes, has considerable epistemological implications for theological as well as natural science. Since this gets rid of the old dualisms between material existence and absolute space and time, or between nature and supernature, it is no longer possible to operate scientifically with a separation between natural theology and revealed theology any more than between geometry and physics. In physics, this means that geometry cannot be pursued as an axiomatic deductive science detached from actual knowledge of physical processes or be developed as an independent science antecedent to physics, but must be pursued in indissoluble unity with physics.⁵⁰

This important passage continues thus:

In theology, this means that natural theology cannot be undertaken apart from actual knowledge of the living God as a prior conceptual system on its own . . . Rather must it be undertaken in an integrated unity with

48 Cootsona, "Theology, Science, and the Power of the Ring," 23.

49 John Polkinghorne, *Science and Christian Belief* (London: SPCK, 1994), 3.

50 Thomas F. Torrance, *Space, Time and Incarnation* (Edinburgh: T&T Clark, 1969; paperback edition, 1997), 69.

positive theology in which it plays an indispensable part in our inquiry and understanding of God. In this fusion "natural" theology will suffer a dimensional change and will be made *natural* to the proper subject-matter of theology. No longer extrinsic but intrinsic to actual knowledge of God, it will function as a sort of "theological geometry" within it, in which we are concerned to articulate the inner material logic of knowledge of God as it is mediated within the organized field of space-time.⁵¹

It seems to me that two things are going on here. The first is that natural theology is in no sense an autonomous discipline, providing arguments based on common tools of rationality for theistic belief. It is subsumed within what Torrance variously calls "positive" theology, "scientific" theology, or simply "dogmatics."⁵² Indeed, it is interesting that Torrance cites Barth's approval of his incorporation of natural theology into theology proper.⁵³ Just as in general relativity geometry becomes part of physics because of the way space and matter are bound up together, so natural theology becomes a part of systematic theology.

One is led to conclude that natural theology in Torrance's formulation approaches nature already presupposing the truth of God's revelation in Christ and presumably the full-blown Nicene and Chalcedonian formulations. Indeed, Torrance affirms, "the doctrine of the Trinity belongs to the very groundwork of knowledge of God from the very start."⁵⁴ In that light Torrance certainly has very interesting things to say (and I shall come to some of them in the next section), but I would argue that this is not really "natural theology," but more correctly described as a "theology of nature." However, as I shall argue, these insights can be put to good use in the traditional way too. Indeed, perhaps what Torrance neglects is the reverse of how I expressed general relativity above. It is also the case that the curvature of space affects how matter behaves. So perhaps nature can tell us something about God as well.

The second thing going on is that general relativity's relational view of space-time and matter is useful in its own right in doing real work for theology, that is, it is not merely a useful analogy. It breaks down the dualism between space and matter just as Torrance wants to break down various dualisms himself, such as between nature and supernature. Torrance draws important consequences for theology from this. Space-time as an infinite receptacle led Newton to identify it

51 Ibid., 69-70.

52 Thomas F. Torrance, *The Ground and Grammar of Theology* (Belfast: Christian Journals Ltd, 1980), 15, 49-52.

53 Ibid., 91.

54 Ibid., 89.

with the infinity and eternity of God so that we are in God as in a container, but this ultimately led to the separation of God from nature and thus to deism.⁵⁵ Moreover, this view posed a problem for the incarnation, since "If God Himself is the infinite Container of all things He can no more become incarnate than a box can become one of the objects it contains."⁵⁶ This problem seems to be compounded since, for Newton, space and time are absolutes. General relativity's view of space-time and matter as intimately related apparently changes the position since now "space must be defined in terms of bodies or agents conceived as active principles, making room or creating space for themselves in the universe" — and presumably this includes God creating space for himself in the incarnation.⁵⁷

It is not at all clear to me that general relativity helps here in the way that Torrance believes, neither is it clear that Torrance entirely understands the physics (as noted above, this is an accusation McGrath rightly makes against Pannenberg's understanding of "fields"⁵⁸). Einstein's universe for Torrance may be described as "finite and unbounded." He goes on:

That is, so to say, instead of being closed from above down, the universe is to be regarded as open from below upward. The finite universe certainly has frontiers, but they are not frontiers at which it is turned back to be imprisoned in itself so much as frontiers where it is open indefinitely to what is beyond.⁵⁹

The trouble is that these are technical terms. First, Einstein's equations of general relativity allow for both finite and infinite universe solutions. The infinite universe solutions differ from Newton in so far as space is expanding, but how that would make any theological difference is far from clear. It is actually very difficult, and may be impossible, to know whether the universe is finite or infinite, this being determined by the density parameter Ω .⁶⁰ Ω greater than one gives a finite universe and Ω less than one an infinite universe, but the measured value is very close to one, making it difficult to tell. The only case we could be sure about would be a finite universe less than about 50 billion light years in dimension, since then we might see the same object from different

55 Torrance, *Space, Time and Incarnation*, 38.

56 Ibid., 39.

57 Ibid., 69.

58 McGrath, "Manifesto for Engagement," 13.

59 Torrance, *Divine and Contingent Order*, 79.

60 See John D. Barrow, *The Infinite Book* (London: Jonathan Cape, 2005), 144.

directions in the sky.⁶¹ Certainly a finite universe would solve some philosophical problems having to do with the actual existence of infinities in nature. However, Torrance's take on it is still problematic. A three-dimensional finite universe does not have boundaries in the same sense that a two-dimensional surface like the earth's does not. It is technically called a "closed" as opposed to an "open" universe which would be infinite, and it could indeed be described as turning back on itself. Moreover, it is difficult to see what "open indefinitely to what is beyond" can mean when there is no beyond. Into the bargain absolute space and time arguably still have meaning in general relativity, time being measured from the Big Bang singularity and space in terms of the microwave background radiation.⁶²

Torrance also has a problem with determinism versus indeterminism. A deist could equally adopt Einstein's universe as Newton's since it is just as deterministic; indeed, as Ernan McMullin argues, it is more deterministic since the inter-connectivity of matter, energy, and space-time serves strongly to limit contingency.⁶³ McGrath rightly notes Torrance's relative neglect of quantum theory which would add richness to his treatment,⁶⁴ and Tapio Luoma sees his misunderstanding of Einstein as behind this neglect.⁶⁵ Polkinghorne too believes that Torrance errs in ascribing indeterminism to the "dynamic field of space-time"⁶⁶ in general relativity — much like Pannenberg's error which McGrath rightly criticizes.⁶⁷ It is in the quantum realm, as well at the macroscopic level of chaotic systems and systems far from equilibrium, that one might see the universe as "open" in the sense which Torrance means. Indeed, since Torrance discusses the

61 As in the model of J.-P. Luminet *et al.* See J.-P. Luminet, J. Weeks, A. Riazuelo, R. Lehoucq, and J.-P. Uzan, "Dodecahedral Space Topology as an Explanation for Weak Wide-Angle Temperature Correlations in the Cosmic Microwave background," *Nature* 425 (9 Oct 2003): 593-595. A more popular, and somewhat updated, account is to be found in J.-P. Luminet, "A Cosmic Hall of Mirrors," *Physics World* 18, no. 9 (2005): 23-28.

62 Peter E. Hodgson, *Theology and Modern Physics* (Aldershot and Burlington, VA: Ashgate, 2005), 104; see also Colin Weightman, *Theology in a Polanyian Universe: The Theology of Thomas Torrance* (New York: Peter Lang, 1994), 191.

63 Ernan McMullin, "How Should Cosmology Relate to Theology?" in *The Sciences and Theology in the Twentieth Century*, ed. A. R. Peacocke (Stockfield: Oriel, 1981), 17-57, 56, n. 50.

64 McGrath, "Manifesto for Engagement," 7.

65 Tapio Luoma, *Incarnation and Physics: Natural Science in the Theology of Thomas F. Torrance* (Oxford & New York: Oxford University Press, 2002), 111.

66 Torrance, *Divine and Contingent Order*, 14.

67 John Polkinghorne, *Reason and Reality: The Relationship between Science and Theology* (London: SPCK, 1991), 93.

latter type of system, this point brings us nicely to a consideration of what he says about both the comprehensibility and contingency of the universe, which is perhaps where his greatest contribution to the theology-science dialogue lies.

Comprehensibility and Contingency

Torrance rightly sees the universe as possessing a rational order that is both open to human understanding and contingent. It seems to me that Torrance's insights here, despite himself, lend themselves to a natural theology of the more traditional kind, one in accord with the approach of John Polkinghorne. Thus, Torrance says:

This rational unity of the cosmos, spanning celestial as well as terrestrial spheres, which is the correlate of Judaeo-Christian monotheism, has ever since constituted one of the fundamental assumptions of the natural sciences: it is the ground of our confidence that wherever we may direct our enquiries we will find the universe accessible to rational investigation and thought, even though, as correlated to the unlimited reality and rationality of God, the rationality of the universe has an indefinite range that reaches beyond the limits of our finite minds.⁶⁸

The rational unity of the cosmos is grounded in the rationality of God. Yes, but the rational unity of the cosmos is something which scientists not only assume but find confirmed as they discover more and more about it. Can we not start instead from this rational unity and ask where it comes from? In other words, can we not, with Polkinghorne, use it as a natural theological argument?⁶⁹ Is not the rational unity best explained theistically, and can we not argue, as Richard Swinburne does, that the simplest and best explanation for it is creation by one God rather than many?⁷⁰ As Polkinghorne and Swinburne say in their different ways, theism does not compete with scientific explanations; rather, it explains why science explains. Alvin Plantinga also argues that theistic belief provides support for the very possibility of science: the mediaeval concept of *adaequatio intellectus ad rem*, which is based on the doctrine of the *imago dei*, well explains a host of human capacities, not least our ability to do science, something that naturalism has a much harder time doing.⁷¹

68 Torrance, *Divine and Contingent Order*, 3.

69 E.g. John Polkinghorne, "Where is Natural Theology Today?" *Science and Christian Belief* 18, no. 2 (2006), 169-179.

70 Swinburne, *Existence of God*, 145-147.

71 Alvin Plantinga, *Where the Conflict Really Lies: Science, Religion, and Naturalism* (New York: Oxford University Press, 2011), 269-270.

Torrance is aware that the comprehensibility of the universe was a deep mystery to his hero, Einstein. Torrance refers to "the free ungrudging will of God's love to create" and goes on:

That is the ultimate ground for what Einstein called the "incomprehensible comprehensibility" of the universe, which evoked from him as a man of science a constant wonder and deep sense of religious awe. It was with reference to this that he sometimes appealed to the Leibnizian notion of "pre-established harmony" behind the "miracle" of *Verständlichkeit*.⁷²

Indeed Einstein, though his God was something like that of Spinoza, came close to a natural theological argument of the kind I have mentioned:

You find it surprising that I think of the comprehensibility of the world (in so far as we are entitled to speak of such a world) as a miracle or an eternal mystery. But surely, *a priori*, one should expect the world to be chaotic, not to be grasped by thought in any way. One might (indeed one *should*) expect that the world evidence itself as lawful only so far as we grasp it in an orderly fashion. This would be a sort of order like the alphabetical order of words in a language. On the other hand, the kind of order created, for example, by Newton's gravitational theory is of a very different character. Even if the axioms of the theory are posited by man, the success of such a procedure supposes in the objective world a high degree of order which we are in no way entitled to expect *a priori*. Therein lies the "miracle" which becomes more and more evident as our knowledge develops.⁷³

Stanley Jaki noted that "even more revealingly" Einstein added the following to this passage:

And here is the weak point of positivists and of professional atheists, who feel happy because they think that they have not only pre-empted the world of the divine, but also of the miraculous. Curiously, we have to be resigned to recognizing the "miracle" without having any legitimate way of getting any further. I have to add the last point explicitly, lest you think that, weakened by age, I have fallen into the hands of priests.⁷⁴

The notion of contingency also offers possibilities for traditional natural theology. As we have seen, there is some misunderstanding as to where this contingency

72 Torrance, *Divine and Contingent Order*, 35.

73 Albert Einstein, letter to Maurice Solovine, March 30, 1952, quoted in Stanley Jaki, "Theological Aspects of Creative Science," in *Creation, Christ and Culture: Studies in Honour of T. F. Torrance*, ed. Richard W. A. McKinney (Edinburgh: T&T Clark, 1976), 164.

74 *Ibid.*, 164.

lies for Torrance, paradoxically more in relativity than quantum theory. However, Torrance is on better ground when he refers to the multi-levelled nature of the physical world — important for him in any case, as we saw, in demarcating different sciences with their own methods.

The importance of the hierarchy of levels is that higher levels cannot be reduced to lower levels. There is genuine novelty as one rises up the chain of complexity. Torrance argues that “the open character and endless spontaneity and surprise of its natural order” is “ultimately explicable only from beyond itself in the infinite differentiability of divine rationality and its inexhaustible source of possibility.”⁷⁵ Moreover, he says that the universe “constitutes an essentially *open* system with an ontological and intelligible reference beyond its own limits.”⁷⁶ Again, he says that the universe is characterized “not by closed rigid structures but by open-ordered structures, not by necessary truths of reason but by contingent truths which defy complete mathematical formalization,” and here the point is not dependent on a misreading of Einstein but compatible with the hierarchy of sciences.⁷⁷ The point about mathematical incompleteness is reinforced elsewhere by Torrance where he rightly draws on Gödel’s theorem, which represents the final nail in the coffin for any programme of scientific reductionism.⁷⁸

Torrance notes with approval Michael Polanyi’s claim “that all meaning lies in the higher levels of reality that are not reducible to the laws by which the ultimate particulars of the universe are controlled.”⁷⁹ Levels of reality are open upwards but not reducible downwards, and do not contain their sufficient reason within themselves for their own contingent order. The universe as a whole is like this, as an open system and an intelligible whole requiring a sufficient reason beyond itself.

This is a controversial claim but one which I believe Torrance is correct to make. A number of atheist scientists are also arch-reductionists. Thus, Richard Dawkins claims that human beings are “survival machines — robot vehicles blindly programmed to preserve the selfish molecules known as genes.”⁸⁰ Peter Atkins believes that “At the deepest level, decisions are adjustments of

75 Torrance, *Divine and Contingent Order*, 23.

76 Ibid., 36.

77 Ibid., 38.

78 E.g. Torrance, *Theological Science*, 255.

79 Torrance, *Divine and Contingent Order*, 20; quoting Michael Polanyi, *Scientific Thought and Social Reality*, ed. F. Schwartz (New York: International Universities Press, 1974), 136-137.

80 Richard Dawkins, *The Selfish Gene* (Oxford: Oxford University Press, 1989), v.

the dispositions of atoms in the molecules inside large numbers of cells in the brain.”⁸¹ And Francis Crick boldly announces: “The Astonishing Hypothesis is that ‘You,’ your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules.”⁸²

If these claims are true, then all is up with the human race: there is no purpose, no meaning, and indeed no science. In particular, free will and the ability to make choices based on reason, rather than those choices being determined by antecedent physical causes going backwards in time *ad infinitum*, are vital. As J. B. S. Haldane observed, “It seems to me immensely unlikely that mind is a mere by-product of matter. For if my mental processes are determined wholly by the motions of atoms in my brain, I have no reason to suppose that my beliefs are true. They may be sound chemically, but that does not make them sound logically. And hence I have no reason for supposing my brain to be composed of atoms.”⁸³ However, Torrance’s point is now widely recognized, and the obverse of reductionism, namely emergence — the coming into being at higher levels of complexity of new phenomena with new laws to describe them — is seen as more descriptive of the way things really are. Particularly important is the phenomenon of “downward causation,” the idea that higher levels of organization, and scientific laws formulated at these higher levels, affect lower level entities; causation is not all one way, from lower to higher levels.⁸⁴

It seems to me, and Torrance would agree, that we should accord at least equal reality and causal efficacy to higher level phenomena such as consciousness as to those at the lowest levels, atoms and molecules. In fact, the study of whole systems, rather than simply individual parts, is increasingly seen as necessary in science, and is required for the study of subjects as diverse as quantum physics (especially the phenomenon of quantum entanglement) and systems biology.⁸⁵

There are two ways in which the insight of Gödel’s theorem strengthens the anti-reductionist, pro-emergentist case. The theorem states that any

81 P. W. Atkins, *The Creation* (Oxford: W. H. Freeman & Co., 1981), 35-37.

82 Francis Crick, *The Astonishing Hypothesis: The Scientific Search for the Soul* (London: Simon and Schuster, 1994), 3.

83 J. B. S. Haldane, *Possible Worlds and Other Essays* (London: Chatto and Windus, 1927), 209.

84 Donald T. Campbell, “‘Downward Causation’ in Hierarchically Organised Biological Systems” in *Studies in the Philosophy of Biology: Reduction and Related Problems*, ed. F. J. Ayala and T. Dobzhansky (London: MacMillan, 1974), 179-186.

85 Denis Noble, *The Music of Life: Biology Beyond the Genome* (Oxford: Oxford University Press, 2006).

mathematical system as complicated as (or more complicated than) arithmetic is incomplete, or else it is inconsistent. Indeed, true statements can be produced by human mathematicians that lie outside the scope of deduction within such a mathematical system. It follows from Gödel's theorem that physics is incomplete. There will be statements in physics that are true but unprovable. As Paul Davies puts it, "No rational system can be proved both consistent and complete. There will always remain some openness, some element of mystery, something unexplained."⁸⁶ And Stephen Hawking changed his mind about the possibility of a physical theory of everything precisely because this is ruled out by Gödel's theorem.⁸⁷ Torrance refers to the impossibility of complete logicalization of any science, because of Gödel's theorem, in a number of places.⁸⁸

The second way in which Gödel's theorem strengthens the anti-reductionist case is by countering the notion, propagated by proponents of "strong artificial intelligence," that the human mind is no more than a sophisticated digital computer. As Roger Penrose argues, computers operate algorithmically, that is, according to sets of rules that operate in the same way as the logical rules whereby mathematical theorems are derived by logical deduction from axioms.⁸⁹ There are, therefore, truths which a human being can know but which a computer can never derive.

Like Polkinghorne,⁹⁰ Torrance also rightly sees the thermodynamics of non-equilibrium or open systems — especially as in the work of Ilya Prigogine and his collaborators at the University of Brussels on dissipative systems far from equilibrium — as a locus for the emergence of extra factors in which temporal becoming has a place. Prigogine's work shows how a new kind of organization spontaneously emerges out of apparently random fluctuations far from a state of equilibrium.⁹¹

Torrance also, very significantly, sees contingency in the existence of the universe in the first place and in its initial conditions, and in the laws with which it is endowed. In cosmology, Torrance rightly notes, "relentless research carries

86 Paul Davies, *The Mind of God* (London: Simon and Schuster, London, 1992), 167.

87 Stephen W. Hawking, "Gödel and the End of Physics," public lecture, Dirac Centennial Celebration, Cambridge, 20 July 2002; <http://www.damtp.cam.ac.uk/dirac/dirac/hawking/>, accessed 13 February 2017.

88 E.g. Torrance, *Theological Science*, 255; *Divine and Contingent Order*, 52, 54, 157 n. 55.

89 Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford: Oxford University Press), 1989. Penrose has responded to critics of his position in Roger Penrose, *Shadows of the Mind* (Oxford: Oxford University Press, 1994).

90 Polkinghorne, *Reason and Reality*, 38.

91 Torrance, *Divine and Contingent Order*, 55; *Ground and Grammar*, 12, 141.

us to zero points before which physical laws, as we have formulated them, become critical and peculiar, and even predict their own downfall."⁹² In a similar vein, Torrance writes:

Our theories have come up against the limits set for us by the initial conditions of nature which, though they cannot be accounted for within the frame of our physical laws, are nevertheless essential to the rational enterprise of science.⁹³

The breakdown of physical laws at the beginning is the reason why atheist Fred Hoyle disliked the Big Bang theory — which he was responsible for naming — and came up with his alternative of the "steady-state."⁹⁴ Today, this question is still very much alive, with cosmologists coming up with speculative theories, such as string theory or the Hawking and Hartle "no boundary proposal,"⁹⁵ to try and describe the first tiniest fraction of a second after the Big Bang, or even to avoid a beginning at all. Yet Alexander Vilenkin and his colleagues have shown through the singularity theorems they have proved that "all the evidence says that the universe had a beginning."⁹⁶

Not only is the Big Bang singularity a contingent event, it is also the case, says Torrance, that "contingence must be integrated into the basic structure of our scientific theories and explanations which means that physical laws themselves must be recognized as contingent."⁹⁷ Why the particular physical laws which pertain to our universe do so is a great mystery which leads cosmologists into further areas of arguably metaphysical, rather than scientific, speculation involving multiverses: enormous, usually infinite collections of universes in which all the different possible laws apply. Torrance has it right, saying:

There is no intrinsic reason in the universe why it should exist at all, or why it should be what it actually is: hence we deceive ourselves if in our natural science we think that we can establish that the universe could only be what it is.⁹⁸

92 Torrance, *Divine and Contingent Order*, 27.

93 Ibid., 27-28.

94 Helge Kragh, *Cosmology and Controversy: The Historical Development of Two Theories of the Universe* (Princeton, NJ: Princeton University Press, 1996), 253.

95 Stephen Hawking, *A Brief History of Time: From the Big Bang to Black Holes* (London: Bantam, 1988), 136-141.

96 Said by Vilenkin at a Cambridge symposium held in early 2012 in honour of Stephen Hawking's 70th birthday. See Lisa Grossman, "Death of the Eternal Cosmos," *New Scientist* 213, no. 2847 (Jan 2012): 6-7.

97 Torrance, *Divine and Contingent Order*, 28.

98 Ibid., 36.

In a footnote to the above quotation we find this very interesting passage:

This is a question as to the absolute necessity of our actual universe including its initial conditions: why is there something and not nothing, and why this particular something? — to which only an *extrinsic* answer can be given, i.e. from divine revelation. It must be distinguished, therefore, from the extremely interesting question behind the so-called “anthropic principle”: given the initial conditions of the universe, why has it expanded in such a way as to give rise to man? — to which an answer may be given in the light of the realization that if the universe were not what it actually is, no intelligent life could have developed and it would not be comprehensible.⁹⁹

Torrance then refers, *inter alia*, to the classic paper on the anthropic principle by Martin Rees and Bernard Carr,¹⁰⁰ which was brought to his attention by his friend, the great radio astronomer Sir Bernard Lovell. The “anthropic principle” is indeed very interesting and a matter on which I have written at length elsewhere.¹⁰¹ It has to do not just with initial conditions — which go beyond there being a singularity to such factors as the initial expansion rate and mean energy-density — but also with the values of the fundamental constants of physics. Both the initial conditions and the constants have to be “just right,” as Paul Davies puts it, “like Goldilocks’ porridge,” for the universe to give rise to life.¹⁰² It is not enough to say that the universe must be as it is, otherwise we would not be here, since it could have been different from what it is in infinitely many ways. Why it is the way it is demands an explanation since the conditions required for a life-conducive universe are so special. And here, if one is an atheist, one is virtually driven to speculate that all possible values of the constants are instantiated in different universes, or even that all possible laws of physics are instantiated in different universes. One is then not supposed to be surprised that a universe that is “just right” for us to exist does exist and that we are in that particular universe. Torrance is clear:

in a finite and expanding universe in which *time* enters as an essential ingredient into its empirical reality, the questions why there are initial conditions rather than not, and why the initial conditions are what they are, cannot be avoided.

99 Ibid., 146.

100 B. J. Carr and M. J. Rees, “The Anthropic Principle and the Structure of the Physical World,” *Nature* (1979): 605-612.

101 Rodney D. Holder, *God, the Multiverse, and Everything: Modern Cosmology and the Argument from Design* (Aldershot, and Burlington, VT: Ashgate, 2004); Rodney D. Holder, *Big Bang, Big God: A Universe Designed for Life?* (Oxford: Lion Hudson, 2013).

102 Paul Davies, *The Goldilocks Enigma: Why is the Universe Just Right for Life?* (London: Allen Lane, 2006), 3.

That is to say, the initial conditions, singularities though they are, are also boundary conditions that bear upon an intelligible ground beyond themselves, and that require this meta-empirical reference to be consistently and intelligibly integrated within the universe, upon the nature of which they have such a decisive influence.¹⁰³

It is a pity that Torrance focuses entirely on the singularity where physics breaks down. We can also talk about the conditions one second after the beginning, when the mean density needed to be within one part in 10^{15} of what it actually was for life to arise, or even 10^{-43} seconds after the beginning (the earliest time we can sensibly speak about) when the mean density needed to be right to one part in 10^{60} .¹⁰⁴ It is also a pity that Torrance does not focus on the need for the fundamental constants of physics to be “just right.” I do not have time to develop all the arguments and counter-arguments here (for example, the role of inflation in solving some of the fine-tunings at the expense of being fine-tuned itself, but then the subsequent development of inflationary multiverses), and so refer the reader to the literature.

Coming back to Torrance, it certainly looks to me as if cosmological and design arguments can be drawn from what he says. Why does the universe exist, and why is it structured in such a way that it gives rise to life? Inference to the best explanation would arguably lead us to prefer a theistic answer to one that says that the universe is just a brute fact. Bayesian confirmation theory can formalize the argument by comparing theistic and atheistic hypotheses, such as a brute fact universe or a multiverse not created by God.¹⁰⁵ It just strikes me as a pity that Torrance has ruled out such arguments by what he has said about natural theology and has thereby missed an important tool in the apologetic armory.

Conclusion

Thomas Torrance is one of few theologians of his stature to engage with the natural sciences. Indeed, he sees theology itself as a science. This is because theology engages with its object in the manner appropriate to it. I have noted the positive implication of this, that the object is given to us externally, just as curved space-time forces itself upon us. *Pace* Kant, in neither instance are we simply constructing what “must” be the case out of our own brain structures.

103 Torrance, *Divine and Contingent Order*, 46.

104 Holder, *Big Bang, Big God*, 88.

105 Holder, *God, the Multiverse, and Everything*, 88-112; Holder, *Big Bang, Big God*, 155-178.

On the other hand, this does seem to represent a minimal kind of commonality with science. In the modern world the reality of the object of theology is disputed, and it seems not enough to say that it is accorded to us by an inner experience of God's grace. We need to bring arguments to bear using tools of rationality that are shared across disciplines. We cannot, moreover, in the light of two hundred years of historical criticism, simply accept God's revelation to us in Scripture as given, but again need to bring rational tools of enquiry to bear. It is my belief that there are good arguments, both to support theistic belief and to render basic Christian tenets rationally supportable, but Torrance seems to deny us these.

Thus, Torrance denies the validity of natural theology as traditionally conceived. Rather, he reinterprets natural theology in an ingenious way, as a kind of "theological geometry" analogous to Einstein's incorporation of geometry into physics through general relativity. However, it appears to me that this leads, in Torrance's thought, more to what we should call a theology of nature than natural theology.

When discussing the natural sciences in detail, Torrance displays impressive erudition even if he entertains some misunderstandings. Of vital importance to him are the universe's comprehensibility and, in many different ways, its contingency. The openness of the universe to human scientific enquiry was a mystery for Torrance's scientific hero, Einstein, and I have pointed out that it can be used, as it is by John Polkinghorne, as an element in natural theological argument of the traditional kind. It accords with Christian doctrine, but can also point to the truth of that doctrine.

Similarly, the contingency of the universe accords with the Christian doctrine of creation, that God freely created the universe (and this particular universe at that) out of all the possible universes held in the mind of God. That contingency is most evident in the very existence of the universe in the first place, in its initial conditions (including its beginning at a singularity), in the particular laws instantiated in it (with the particular constants of physics with which these laws are endowed), in its incompleteness, and in its openness to genuine novelty in the increasing levels of complexity which arise in its unfolding evolution.

Despite my criticisms, I remain deeply impressed by Torrance's contribution to the science-religion dialogue and count him a worthy winner of the 1978 Templeton Prize.