

RENÉ VAN WOUDENBERG

Limits of Science and the Christian Faith¹

This paper is a discussion of the claim that, given the findings of science, the rational stance to take towards Christian belief is either to abandon it or to reform it drastically. It is argued that science has a number of limits, and that when these are taken into serious consideration, the claim loses much of its force.

Key words: philosophy of science, epistemology, rationality, Christian belief

Ever since the rise of modern science many people have claimed that, given the findings of science, the rational stance to take towards the traditional Christian faith is either to abandon it or to reform it drastically. This claim has been supported by considerations having to do with, among other things, chance, evolution and the laws of nature. I am not going to deal now with any of these more specific considerations (as I have done on other occasions) but will, instead, say something far more general about science. I am going to propose that the claim that I have just mentioned can only appeal to one when one neglects or somehow plays down the importance of certain limitations of science. Accordingly I will spend quite some time arguing that science as we currently know it is limited in various (and I think rather obvious) respects. Saying that science is limited is, of course, very different from criticising science. My guitar, I must say, has its limits: it cannot bring forth the golden sound of a horn. Saying as much, however, is not criticising my guitar.

My paper is organised as follows. In the first section I argue for various limits of science, but lay no claim to completeness. In the second section I spell out how these limits are relevant for the claim that, due to science, the rational stance to take towards Christian faith is either to abandon it or to reform it drastically. As to the two key notions in my title: by science I mean in the main the natural sciences; but occasionally I shall use the term in the more encompassing continental style, so as to include the humanities. By Christian faith I mean the faith a person has who wholeheartedly endorses the great traditional creeds such as the Apostles' Creed.

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1. Limits of science

It bears noting that the 'limits of science' can either be of a practical kind (having to do with limits in financial and technological resources, as well as to what is ethically permitted or required in the process of inquiry) or of a principled nature. The limits I have my eyes on are of the second, in principle, sort. The arguments I shall offer all have different points of departure, but, as will appear in due course, are nonetheless related in many respects.

(i) a limit from extra-scientific knowledge

One of the aims of science is to obtain knowledge. Scientists immerse themselves in all kinds of activities in order to acquire knowledge. But how shall we understand 'knowledge'? In contemporary analytic epistemology knowledge is analysed as true belief that has some further property, for instance that it is justified, or warranted. On this analysis one cannot know that, say, the cat is on the mat, unless one believes that the cat is on the mat and unless it is true that the cat is on the mat. But although true belief is necessary for knowledge, it is not deemed sufficient for it. For someone may, for no good reason, believe that the cat is on the mat, and the cat may be even be on the mat, without that person's knowing the cat is on the mat. That person's belief is true, but by luck – that person's belief lacks something important: it lacks justification or warrant, for that belief has nothing going for it, it is not formed or acquired in an appropriate way. Knowledge, we might therefore say, is true belief that is warranted.

There has been, and still is, considerable debate as to what this property of justification or warrant exactly is. Is it 'believed for good reasons', or 'based on sufficient evidence', or 'being certain', or 'coherence with a large body of other beliefs', or 'resulting from a reliable process', or 'being produced by a properly functioning faculty that is successfully aimed at truth and that worked in an appropriate environment'... or what?² For present purposes, however, I need not enter this debate, for the point I want to establish can be made irrespective of one's favourite analysis of the property under dispute. But I do need to note that I will be thinking of scientific knowledge as true belief whose warrant derives, somehow, from science or scientific research. How exactly scientific research can provide warrant is a topic of great interest, one that I presently need not go into either, because the point that I want to establish can be made irrespective of how exactly warrant-through-science works.

One of the aims of doing science is to obtain knowledge. It should be

² see Shope, R. *The Analysis of Knowing: A Decade of Research*, Princeton: Princeton University Press (1983) and Plantinga, A. *Warrant: The Current Debate*, New York: Oxford University Press (1993).

uncontroversial, however, that there are many things we know without science in any way being involved in the production of that knowledge or warrant for it. Examples abound. I open my eyes and see (and hence know) that the lights are on, that the sky is blue and that I have a white shirt on. I also know that the world is older than three minutes, that China is a very big country. I furthermore know that $5+7=12$, that if John is taller than Jack, Jack is not taller than John, and that 6 could not have been odd. I also know that I was in Toronto last week, that I am suffering from a mild pain in my left ankle and that I was born and raised in The Hague. I furthermore know many moral truths: that honesty is much better than dishonesty, that lying is wrong, that I ought to help my ageing mother, that there is more demerit in an unjust act than in an ungenerous one. Next there are many very general truths that I happen to know, such as: that there are very many people, that they live on the surface of the earth, that they need food and liquids to keep themselves alive, that they need love and respect, that there are very many countries in which these people live, and that these countries have governments, some of which are bad, but others of which are tolerably good.... And as it is with me, so it is with you. The point of rehearsing these obvious and perhaps boring truisms is, of course, that we have acquired vast amounts of knowledge without engaging in anything that could be called 'scientific research', and hence without the warrant condition for knowledge being satisfied by anything scientific. Let us call knowledge that is in fact obtained independent of science and furthermore isn't based on testimony about things that have been established through scientific investigation, extra-scientific knowledge.

Now one might have knowledge that is in fact extra-scientific but that could have been scientific. Many things that we in fact know without the help of science are such that they could be known with the help of science. For example, I know that my great-grandfather was a ship builder by profession; the warrant condition for my knowing is satisfied by testimony from my mother and other members of the family. But the warrant condition could also have been satisfied by something that involves scientific inquiry: for instance by my reading of a book by a professional historian on shipbuilding in early twentieth century Dutch harbours, or by having carried out such research myself. In that case my knowledge that my great-grandfather was a ship builder by profession would be an instance of the scientific variety. (And what if I have both scientific and non-scientific warrant for that knowledge? Then there is no simple answer to the question 'Is your knowledge scientific?')

But not all extra-scientific knowledge is such that although it is in fact acquired and warranted by something that doesn't involve science it could also be acquired and warranted by something that does involve science. Much of our knowledge can, as a matter of principle, not be acquired or warranted through scientific research. It seems impossible that I know, or

come to know, that lying is wrong in a way that somehow involves science; it seems impossible that science can satisfy the warrant condition for such knowledge. The same holds for other things that I know, such as that honesty is much better than dishonesty, or that I have an obligation to care for my children. Other examples, perhaps somewhat more controversial, would be the knowledge I have of some of my own mental states. It seems impossible that I know, or come to know, that I have a headache (when I have one) independently of my feeling a headache and exclusively in a way that involves, in one way or another, science. For, as Thomas Reid rightly said, ‘pain consists in being felt’. This is, of course, not to deny that I might learn all sorts of things about headaches, or about my own headache, through science. But what seems impossible is that I learn that I have a headache through scientific research. Let us call this sector of extra-scientific knowledge the sector of irreducibly extra-scientific knowledge.

My contention is that irreducibly extra-scientific knowledge marks a limit of science: there is knowledge that we have that cannot be obtained through or receive warrant from science. Contending this is, of course, criticising neither science nor this sector of our knowledge.

My contention will, of course, meet with scepticism. Emotivists and other moral anti-realists, for example, will deny that there are moral truths and hence dispute that there is such a thing as moral knowledge – which would be a problem for my argument because important instances of irreducibly extra-scientific knowledge that I gave were examples of moral knowledge. In response I can only say that I reject moral anti-realism for reasons that have nothing to do with the present argument.³ Another response to my contention might be to bite the bullet and deny that extra-scientific beliefs ever amount to knowledge. This, however, would be deeply problematic. For scientific knowledge *depends* in many ways on extra-scientific knowledge, for instance on what we know through perception, such as that the thermometer now reads 118 degrees Fahrenheit. Without such extra-scientific knowledge it is hard to see how science could even get started.

The point I have been trying to make is that science (as we now know it) is limited in that there is knowledge that as a matter of principle cannot be gained through, and isn’t warranted by, scientific research. I concur therefore with Nicholas Rescher when he says that ‘even in the strictly cognitive domain, scientific knowledge is only one sort of knowledge’, to which he adds:

The facts to which science addresses itself are... those that arise from intersubjectively available observation rather than personal sensibil-

³ My basic reason is that rejection of moral realism has all kinds of unlovely implications. See, e.g., Cuneo, T. *The Normative Web: An Argument for Moral Realism*, Oxford: Oxford University Press (2007).

ity.... This quantitative orientation of our natural science means that the qualitative, affective, evaluative dimension of human cognition is bypassed. Our knowledge of the value dimension of experience – our recognition as such of these features of things in virtue of which we deem them beautiful or delightful or tragic – remains outside the range of science.⁴

There is, then, a limit to science from irreducibly extra-scientific knowledge. In the next section I am going to explore this point when I will be suggesting that the Christian faith gives us knowledge of divine things – knowledge that science cannot give us and for which it cannot provide the warrant.

(ii) a limit from knowledge by acquaintance

In epistemology a distinction is sometimes made between ‘knowledge of truths’, or ‘propositional knowledge’, on the one hand and ‘knowledge by acquaintance’ on the other⁵ – between knowing about things, and knowing things. By my own experience I am acquainted with, for instance, the taste of wine, the smell of roses and the colours of Rembrandt’s ‘Nightwatch’. And there is a sense of ‘knowing’ whereby someone acquainted with the taste of wine can be said to ‘know’ that taste in a way that someone not thus acquainted cannot. It is one thing to be acquainted with the taste of wine, and another to know truths (or true propositions) about it – to know that Italian wines generally taste sweeter than French ones, due to various minerals and differential weather conditions, for example. It is logically possible to have the first kind of knowledge but lack the second. One can know something in the sense of being acquainted with it and at the same time know no, or almost no, truths about what one is acquainted with. One can be acquainted with colours, without knowing much about colours, and so on.

This distinction is also relevant when it comes to knowing people.⁶ One can know many truths about someone one is not acquainted with. Many people, for instance, know many truths about the second president of the United States, John Adams, for example, that he was happily married to his wife Abigail, that he stayed an extended period of his life in Europe, especially France, but also the Netherlands, that he obtained an impor-

4 Rescher, N. *The Limits of Science*, Berkeley: University of California Press (1984), pp. 209-210.

5 This terminology gained currency through Bertrand Russell; see, e.g., his *Problems of Philosophy*, Oxford: Oxford University Press (1948), pp. 46ff.

6 It should be added that I am using this distinction here in a way Russell would not approve of. He held that we can have knowledge by acquaintance of colours and sounds, etc., universals, logical forms, and (perhaps) oneself, but not other persons. However, there is nothing in the distinction itself that would prevent other persons being known by acquaintance. Russell’s denial of this possibility is premised by other of his philosophical commitments.

tant loan to finance the Revolution from a Frisian banker, that he was an ardent lover of poetry, that his son John Quincy Adams also became president, and so on. We can know these truths about him without ever having met him or being acquainted with him in the sense of having had personal interaction with him. But, although one may know many truths about Adams, there is a sense in which we don't know him. It is the sense of 'know' that forbids me to say 'yes' when I am asked 'Do you know George Bush?' I don't know that man, because I never have met him, have never have been acquainted with him – even though I know many truths about him.

The difference between knowledge by acquaintance and propositional knowledge has to do with truth in the following way: the objects of propositional knowledge (the things we usually talk about by using 'that'clauses: that John Adams was the second president of the U.S., that the thermometer reads '68 F', etc.) have truth value, they are either true or false. But the objects of knowledge by acquaintance (such as: the taste of wine and John Adams) are not the sorts of things that have, or even can have, truth value; neither the taste of wine nor John Adams can be true or false.

One aim of doing science is to obtain knowledge, or at the very least to formulate and deal with items such as conjectures, hypotheses, theories, predictions and so on, that are all propositional in nature and thus have truth value. What we want to find out by doing science is whether certain theories, hypotheses and so forth (which really are complex propositions) are true, or not. What this means is that science operates on the propositional level and that in so far as it gives us knowledge, it gives us propositional knowledge. But scientific knowledge never gives us knowledge by acquaintance, even though it is, to a certain extent⁷ based on such acquaintance. For how could a theory of light, like Newton's (or Goethe's for that matter), have been ever devised, if Newton (or Goethe) had not been acquainted with the phenomenon of light? Many scientific theories are based upon phenomena we can, in principle, be acquainted with.

If I am right about this, there appears to be a second limit for science, in that science, if it gives us knowledge at all, gives us propositional knowledge, but no knowledge by acquaintance. Nothing that qualifies as 'knowledge by acquaintance' merits the label 'scientific knowledge', even though, as I have suggested, science is to a certain extent based on such knowledge.

Later on I am going to explore this point when I will be arguing that the classical Christian faith partly (and only sometimes) involves knowledge by acquaintance of God.

⁷ Only 'to a certain extent' because theories are underdetermined by the acquaintance knowledge of their originators.

That science is limited in the way argued for in this section, has been used by Frank Jackson in his famous ‘knowledge argument’ against physicalism – where ‘physicalism’ is the thesis that the actual world is entirely physical.⁸ Since traditional Christianity too is committed to the denial of physicalism, it will be worthwhile taking a quick look into the argument.

Suppose that physics is completed, and that a human person – in Jackson’s argument she is called Mary – has been comprehensively instructed about the physical world (she has been instructed in physics, chemistry and neurophysiology and knows all there is to know about the causal and relational facts consequent upon all this) in a rather peculiar situation: she was instructed in the black and white room that she was born into and never left, through a black and white television screen. Having been comprehensively instructed, Mary knows everything that can be known about the physical nature of the world. And if physicalism is true, so the argument goes, she knows all there is to know. To suppose otherwise would be to suppose that there is more to know than all physical facts, which is exactly what physicalism is committed to denying. So Mary knows all truths, also, for example, all truths about human visual perception. As Mary has never been outside that black and white room, she never has seen the greenness of grass. Suppose now that Mary is to exit her room. Will she then come to know something she did not know before? Well, Mary knows everything there is to know about human visual perception. Yet she had never laid eyes on green grass. So, Jackson argues, upon leaving her room, Mary learns something new, the intrinsic characteristics of the experience of colour perception. Mary, the argument concludes, does not know everything. And this, Jackson says, indicates that certain facts about colour perception cannot be accounted for in a complete physical description of the brain processes of someone who has a colour experience. So, upon walking out, Mary obtains knowledge that she has not and could not have acquired through science.⁹

(iii) a limit from presuppositions

There can be no science without scientists making various very general presuppositions that, because of their special nature, could be called presuppositions. In this section I want to argue that there are no scientific proofs of the truth of these presuppositions. And this, I shall contend, constitutes another limit of science. I shall single out three presuppositions.

8 Jackson, F. ‘What Mary didn’t know’, *Journal of Philosophy* (1986) 83, 291-295.

9 For a careful analysis and defence of this (kind of) argument, see Robinson, H. ‘The anti-materialist strategy and the “knowledge argument”’, in Robinson, H. (ed.) *Objections to Physicalism*, Oxford: Clarendon (1993), pp.159-184. Jackson has distanced himself from the knowledge argument, and no longer thinks it shows physicalism to be false. See his ‘Mind and Illusion’ in O’Hear, A. (ed.) *Minds and Persons*, Cambridge: Cambridge University Press (2003), pp.251-271. At this juncture I can only declare that I find his distancing unconvincing.

1. In science the principles of logic, such as *modus ponens*, are used. The truth of these principles, however, cannot be proved on the basis of arguments that only have premises that are established by scientific research. This cannot be done for at least two reasons. In the first place the principles of logic are necessarily true, if true at all, but the findings of the natural sciences are, as a matter of principle, at best contingently true, if true at all. And this causes a problem, for necessary truths, if they are to be established, have to be established by reasoning that proceeds from necessarily true premises. But science can never provide necessary truths. Secondly, if the principles of logic are to be proved by argument, the proofs may not involve, or implicitly presuppose the truth of, those very principles. That would be begging the question. But any proof of the principles inevitably will have to beg the question. For one cannot prove anything (and a fortiori not the principles of logic) without using the principles of logic.¹⁰

2, Secondly, in science it must be presupposed that our basic cognitive faculties such as perception, reason and memory are by and large reliable. One cannot rely on observations without presupposing that sense perception is by and large reliable; one cannot conduct experiments without presupposing that reason is by and large reliable; likewise one cannot do science without presupposing that memory is by and large reliable. But the reliability of our faculties cannot be proved on the basis of arguments that crucially involve premises obtained by scientific research. For the scientific research that will have to provide the premises of such an argument itself presupposes the reliability of the faculties whose reliability it aims to establish.

To this it could be added, as William Alston has argued, that the reliability of our faculties cannot be proved by arguments at all. Every attempted proof of the reliability of, for instance, sense perception will crucially involve premises won by the workings of that very faculty. Similar things, he convincingly argues, hold for reason and memory. All such attempts suffer from what he has called 'epistemic circularity'.¹¹

3. Scientists not only presuppose the truth of the principles of logic and the reliability of our cognitive faculties, they also presuppose various things about their object of research. They presuppose, for instance, that nature behaves uniformly. The principle of the uniformity of nature says that the patterns nature displays on a small scale, nature will also display on a large scale. That this particular piece of iron expands when it is heat-

10 Husserl's case against nineteenth century psychologism, that tried to place logic on an empirical footing or make it an empirical science, crucially rested on arguments like the ones offered. See Husserl, E.G.A. *Logical Investigations*, part I (1900), Findley, J.N. (trans.), London: Routledge (1970).

11 Alston, W.P. *The Reliability of Sense Perception*, Ithaca: Cornell University Press (1992).

ed, tells us something not only about this particular piece, but about all iron. If we did not presuppose this principle, science would at once become impossible. We would not, in that case, have any reason to think that the causal connection between facts of type A and B that obtained yesterday in Amsterdam, will also, *ceteris paribus*, obtain tomorrow, there and/or in Brussels. Were the principle not presupposed, the testing of hypotheses would be pointless.

So, here are three presuppositions of science whose truth science is unable to prove. This does not mean there are no good grounds for adopting them. But it does mean that the person who refuses to accept or believe anything unless it is proved by science (a position we might label scientism) is in serious trouble. Such a person should refuse to accept the principles of logic, refuse to assume that our basic cognitive faculties are by and large reliable and refuse to accept the principle of the uniformity of nature. Such a person, then, refuses to accept the presuppositions of science and accordingly should be committed to not accepting anything science tells us. But that way lies madness. For we know and think many things on the basis of scientific research. Therefore, if one wants to save science as a source of knowledge (or warrant), one had better reject scientism.¹²

The existence of presuppositions of science, I submit, marks another limit of science. There are certain things absolutely fundamental to the scientific enterprise that science cannot prove to be true: its presuppositions. And this inability indicates a sort of limitation: it marks out something that science cannot do.

(iv) a limit from ultimate questions

There can be no science (taken in a broad sense now) without scientists asking questions. We can think of science as a set of tentative answers to questions. These questions take on various different forms; for example: ‘What is the cause of X (where X is some natural phenomenon, e.g. lightning and thunder)?’, ‘How can this pattern of phenomena be explained?’, ‘What are the ultimate constituents of matter?’, ‘What did Kant mean by the expression “the private use of reason”?’, ‘Why didn’t president Bush completely dismantle Saddam Hussein’s army in early 1991?’, ‘What is the best treatment for psychosis?’ Scientific questions differ greatly from one another. Some would be answered by citing facts, others by giving explanations, still others by citing reasons or motives, yet others by proposing a theory; some would be answered by offering an interpretation of a text, and some by suggesting a particular treatment, a particular course of action, and yet others in yet other ways.

¹² This point has also been argued by Ratzsch, D. *Philosophy of Science: The Natural Sciences in Christian Perspective*, Downers Grove, Ill.: IVP (1986), pp. 99f.

So, the questions scientists ask are not all of a kind. Some philosophers, however, have held that scientific questions are characterised by a feature that non-scientific questions lack. Some Wittgensteinians, for example, have held that scientific questions have the particular feature that their answers take the form of explanations.¹³ But this, as our sampling in the previous paragraph indicates, is not right. Furthermore, there are clearly extra-scientific questions whose answers have the form of explanations. Someone asking ‘Why are those windows wet?’ asks for an explanation, but asks no scientific question.

It may, therefore, be impossible to characterise a scientific question fully. What should be evident, however, is that there are extremely important ‘ultimate’ questions that cannot be answered by scientific research. I am thinking, of course, of such questions as, ‘Why are we all here?’, ‘Why is there something and not nothing?’, ‘Do we possess freedom?’, ‘What moral principles should we heed?’, ‘Which moral virtues should we try to attain?’, ‘What things are of value?’, ‘Does God exist?’, ‘What does God (if he exists) require from us?’ The sciences (still taken in the broader sense to include psychology and sociology) do not answer these questions and it would seem cannot do so. What part of physics, or biology, or psychology or sociology, is ever going to provide answers to these questions? We seem to face another limit of science, namely its inability to answer ‘ultimate’ questions.

Not everyone, however, will agree. At one time (not so very long ago) the neo-positivists declared that because science cannot answer them these questions are bad or meaningless. It isn’t that we can’t find answers to them, they held, but that those questions don’t even make sense to begin with.¹⁴ The famous Verification Principle, advanced to discriminate between meaningful and meaningless questions, however, itself ran into trouble. One point brought against it was that many questions that are clearly meaningful, on that principle were declared meaningless. In such a case one faces a dilemma: either maintain the principle and declare those questions meaningless, although they might still *seem* to be meaningful, or reject the principle and give those questions the attention they deserve. The latter seems the more reasonable way to proceed.¹⁵

Although the neo-positivist principle has receded into obscurity, many philosophers still hold that the thesis that science is limited in the way indicated in this section is false, for other reasons. Paul Churchland, for instance, thinks that as science progresses ‘ultimate’ questions will not be

13 Brümmer, V. ‘A Dialogue on Language Games’, in Brümmer, V. (ed.) *Interpreting the Universe as Creation*, Kampen: Kok Pharos (1991), pp.1-17. This idea is also endorsed throughout the works of D.Z. Phillips.

14 e.g. Carnap, R. ‘Überwindung der Metaphysik durch logische Analyse’, *Erkenntnis* 3 (1932), pp. 219-241.

15 see Plantinga, A. *God and Other Minds*, Ithaca: Cornell University Press (1967), pp.156-168.

answered but will simply wither away: no one will feel urged to pose them any longer for they no longer make sense; they will sound like the question ‘how does phlogiston work?’ in our ears. Such questions, he holds, belong to, and arise out of, an unscientific common-sense view of the world, that is radically false.¹⁶ Now this is no more than an expectation on Churchland’s part – one that very well might not come to pass. But what should we do with these ultimate questions so long as Churchland’s expectation is only an expectation? Should we abstain from asking them? But why? Given that ultimate questions continue to seem meaningful and important to us, and that science doesn’t seem to have a handle on them, it seems that all that follows is that it would be wrong and unreasonable to turn to science for ‘ultimate answers’. As Peter Medawar once quipped, ‘to expect from science to answer the ultimate questions is tantamount to expecting to deduce from the axioms and postulates of Euclid a theorem having to do with how to bake a cake’.¹⁷

This does not imply that ultimate questions cannot be answered at all. For, as I suggested in section (i), there is knowledge other than scientific knowledge and such knowledge might flow from sources that enable us even to address ultimate issues.

There are scientists and philosophers who, unlike the neo-positivists, reject verificationism, and unlike Churchland, don’t think the ‘ultimate’ questions will wither away as science marches on. According to these people, at least some of these questions are meaningful and they add to this that science can answer, and as a matter of fact has already answered, a fair number of them. Let me give just one example of this, having to do with the question of whether there is meaning to life. In evolutionary biology the notion of chance plays an important role – mutations in the genetic make-up of organisms are generally referred to as chance occurrences. A fair number of people assume that chance is incompatible with the notion of design and on the basis of that assumption conclude that the mutations are un-designed. From this they conclude that life is a meaningless affair, that there really are no such things as morally good and morally bad actions and that humans simply have to dance to the rhythm of their genes. This line of thought calls for a lengthy response that I won’t give now (and in any case biologists do not generally view the evolutionary process taken as a whole as a chance process due to the stringent constraints imposed by natural selection). Instead I offer one short remark, namely that this line

16 Churchland labels his position ‘eliminative materialism’, which he defines as ‘the thesis that our common sense conception of psychological phenomena constitutes a radically false ontology, a theory so fundamentally defective that both the principles and the ontology of that theory will eventually be displaced, rather than smoothly reduced, by completed neuroscience’ (see Churchland, P. ‘Eliminative materialism and the propositional attitudes’, *The Journal of Philosophy* (1981) 78, 67.

17 Medawar, P. *The Limits of Science*, Oxford: Oxford University Press (1986), p. 76.

of reasoning is confused because it does not properly distinguish among various notions of 'chance'. When biologists say that mutations are chance events they mean, among other things, that mutations don't result from some sort of prospective calculation on the part of the organism to the effect that, given the current local environment, the pay-offs of a certain kind of mutation would be great. The mutation doesn't occur because it is fitness-enhancing. But to go on from there and to make, on this basis, those further claims that I mentioned, surely is unwarranted. Those further claims simply don't follow – or they only follow when one helps oneself to a number of assumptions none of which itself is the result of scientific research. I have no very deep objection, however, to those who make claims of the following sort: 'From a biological perspective, life has no meaning.' For that claim signals the point I have been trying to make in this section: that science is not properly equipped to pronounce on ultimate matters. My not very deep objection to the claim is only that it is misleading in that it implicitly suggests that biology provides evidence for life's meaninglessness – which it does not. The more proper claim, therefore, would be 'From a biological perspective no pronouncement can be made on the meaning of life: neither that life is meaningful, nor that it is meaningless – biology is about other matters.'

So I submit that science is limited in the sense that it is unable and unequipped to answer ultimate questions.

(v) a limit from inexplicable brute facts

Besides ultimate questions, there are other questions that the natural sciences cannot answer. In a sense they are ultimate too, but not in the 'existential' way the questions in the previous section were supposed to be.

Among other things, scientists sometimes proffer explanations of phenomena. One type of explanation involves citing a universal law. That heated air moves upwards can be explained by reference to Boyle's law. That the tree in my garden gives that particular shape of shadow can be explained by invoking, among other things, the laws of light. Explanations like these consist at least in part in subsuming phenomena under universal laws. Such explanations are clearly valuable and add to our knowledge and understanding of the world. But such explanations leave unanswered the question why those particular universal laws hold and not others. Universal laws, then, figure in many explanations, but their very existence is left unexplained. Surely, some laws can be explained by reference to more general laws, and those laws might be explained by yet more general laws. But there is an end to this. There comes a point where there is no remaining higher level law. At a certain point we face brute facts – that is, facts that cannot be explained by reference to laws, or laws of a higher level of generality.

The set of brute facts comprises not only universal laws, but also the so-called universal constants that figure in such laws, such as the gravitational constant.¹⁸ These constants have specific values for which no further scientific explanation can be given.

Other brute facts are of a more homely kind. Consider an apple. We can try to explain why this apple tastes the way it does. Such explanation will no doubt make reference to taste-buds, to the way they are affected by the physical properties of the apple, to neurological impulses that are being transmitted to the brain, as well as to various laws. But such an explanation leaves unanswered the question why this particular stimulus (this apple) gives rise to this extremely hard to describe but very familiar sensation of taste. Scientists may be able to tell something informative about the neurological transmission of impulses. But they cannot explain why such-and-such impulses cause such-and-such taste sensations. As Thomas Reid once said:

No man can give a reason, why the vibration of a body might not have given the sensation of smelling, and the effluvia of bodies affected our hearing, if it has pleased our Maker. In like manner, no man can give a reason why sensations of smell, or taste, or sound, might not have indicated hardness, as well as that sensation which, by our constitution, does indicate it.¹⁹

Here again science encounters an inexplicable brute fact. The point I am navigating towards is that brute facts constitute a limit of (a particular kind of) science – natural science. The natural sciences as we now know them have a limit in that they cannot explain certain brute facts, even though these facts are invoked in explaining things other than themselves.

I should now like to point out that brute facts, in principle, can be explained, albeit by a type of explanation that is not employed in the natural sciences as we now know them. Whether that kind of explanation is allowable (either inside or outside the sciences), is a matter of great controversy. What I mean is this. One characteristic of explanations in the natural sciences is the negative fact that they don't refer to acts and intentions of personal agents. It seems quite obvious that many phenomena cannot be explained without such reference. To take an example from daily life: suppose I want an explanation of the puzzling fact that there is a book on my desk that I did not put there myself. One good explanation would be that my son put it there because he wanted me to read it. The puzzling fact is, in this case, explained by reference to an act (my son's putting the book on my desk) and an intention of a personal actor (my son's wish that I read

18 Note that the laws I am speaking of are whatever turn out to be the true laws. The laws that figure in current theories may not be among those.

19 Reid, T. *An Inquiry into the Human Mind* (1764), Hamilton, W. (ed.), Bristol: Thoemmes Press, (1994), pp. 120-121.

the book). This type of explanation makes no reference to universal laws, only to acts and intentions. Explanations of this type have been called ‘personal explanations’²⁰ to bring out that such explanations refer to persons, but they have also been called ‘teleological explanations’, to bring out that such explanations refer to goals and aims that agents have. In ordinary life personal explanations have, intuitively, a great appeal. We cannot live without them.

One issue that has been raised about personal explanations is whether they can be reduced to the sort of explanations that are ubiquitous in the natural sciences (that make no reference to goals). I cannot properly enter into that matter here, but only report that attempts to show that they can, seem to me to be unsuccessful.²¹

One might think that if personal explanations make sense in everyday life, they might also make sense when applied to the brute facts of the natural world I have been speaking of. This suggestion will, naturally enough, meet with suspicion. Many will object to it and say that personal explanations, if they work at all, must be confined to ordinary life and should not be employed in the natural sciences. But why should one grant so much? Surely, many difficult issues arise. But if there really are brute facts and if one furthermore thinks that personal explanations are, as a matter of principle, good explanations, then the field is open to explore the possibility of personal explanations of brute facts. And this, of course, is the substance of the current debate over the apparent fine-tuning of the cosmological constants. What is at issue here is the legitimacy, explanatory power and intellectual plausibility of a personal explanation of the order in the cosmos – an explanation that refers to the acts and intentions of a non-human actor.²²

This is not to say that the cosmic order must be explained in a personal explanation. One could take the line that that order is ultimately inexplicable (not only because there is no law to refer to, but also because there is no personal agent to refer to). This is not an impossible or an irrational position. But neither is the position of those who propose a personal explanation. It isn’t as if the one position is in accordance with the findings of science, whereas the other is in contradiction with it. The issue between these positions in large part turns on whether one thinks there is knowledge and warrant available from sources other than science – knowledge

20 Swinburne, R. *The Existence of God*, revised edn, Oxford: Clarendon (1991), pp. 32-35.

21 Donald Davidson is one among many who have argued that a personal explanation is a form of scientific explanation (see his ‘Actions, reasons and causes’, *Journal of Philosophy* (1963) 60, 685-700). Swinburne offers good arguments against Davidson’s position; see Swinburne *op. cit.*, (20), pp. 36-42. Other powerful criticisms of Davidson’s position are Schueler, G.F. *Reasons and Purposes: Human Rationality and the Teleological Explanation of Action*, Oxford: Clarendon (2003) and Sehon, S. *Teleological Realism: Mind, Agency, and Explanation*, Cambridge MA: MIT Press (2005).

22 See Foster, J. *The Divine Law Maker*, Oxford: Clarendon (2005).

that, when it is available, one might use in crafting personal explanations of brute facts.

So, I submit, if science is thought of as allowing only 'scientific explanations', then there will be many brute facts that defy scientific explanation. These facts are impenetrable for science and hence constitute a limit for it. This is not to deny that a serious discussion about the legitimacy and rationality of personal explanations is meaningful. But whatever position one reaches here will go beyond science (conceived of as allowing only scientific explanations). This too is a point I will be exploring in the final section.

(vi) a limit from norms for theory choice

Scientists devise hypotheses and theories, and they also evaluate them, comparing and contrasting them with alternative hypotheses and theories. Scientists make, and have to make, 'theory choices' or 'theory evaluations' and those choices and evaluations will have to be made in a reasoned way. But when is a reason to accept a particular hypothesis or theory a good reason, and when is it a bad one? This is the subject matter of what is sometimes called the Theory of Scientific Rationality.

It is generally agreed that certain reasons are of a bad kind. That a theory gives you a headache is no good reason to reject it, and that it boosts your popularity if you adopt it is no good reason to accept it. So there are norms of good and bad reasoning when it comes to theory choice and theory evaluation.

It could be argued, as Stephen Wykstra has done, that such norms occur at various levels.²³ There are, he argues, first of all norms at a theoretical level. One example of which is simplicity. Confronted with different theories with respect to the same subject matter, this norm says that if theory A is simpler than theory B, A's being simpler than B is a good reason for preferring A over B. Secondly, there are norms at a methodological level. One example is induction. Given two different theories concerning the same subject matter, this norm says that if theory A is based on inductive inference, whereas theory B only on casuistry, A is to be preferred over B. Finally there are norms at an axiological level, the level of values. One example is the 'height' of a theory. An instance of this is Robert Boyle's adherence to corpuscular or 'mechanical' philosophy for the reason that corpuscular explanations are exceptionally satisfying to the mind, much more so than Aristotelian explanations. Given two theories, only one of which involves corpuscular philosophy, this norm says that the one that

23 Wykstra, S. 'Reasons, Redemption, and Realism: The Axiological Roots of Rationality in Science and Religion', in: Beaty, M.D. (ed.) *Christian Theism and the Problems of Philosophy*, Notre Dame: UNDP (1990), pp. 118-161.

involves that philosophy is to be preferred over the one that does not.

In order to be able to see what this has to do with limits of science, it needs to be noted that all of the norms mentioned can be, and in fact have been, contested by scientists and philosophers alike. On the theoretical level it has been contested that simplicity should function as a norm. Reid, for instance, held that ‘if we conclude that [nature] operates in such a manner, only because to our understandings that appears... simplest, we shall always go wrong’.²⁴ A further problem with simplicity is that arguments for the conclusion that simpler theories are more likely to be true, such as Swinburne’s, have met with stern opposition. On the methodological level some have argued that the norm of induction itself is problematic, for, as Hume argued, induction cannot itself be justified. It cannot be shown that induction leads to truth, or high probability, or anything in that region. Finally, on the axiological level it has been contested whether the corpuscular theory is ‘higher’ or intellectually more satisfying than Aristotelianism.

The fact that theory choice and evaluation are informed by various contested and contestable norms indicates, I submit, another limit of science. In the following way: science itself cannot tell us what the proper norms for theory choice and evaluation are. It isn’t the case that scientific research brings to light which norms are the ones that should regulate our choices and evaluations of theories. All kinds of extra-scientific convictions and beliefs on the part of the scientist (and the community of scientists) come into play here. This is another point I will be exploring in the second part of my paper, when I will suggest that religious beliefs may inform one’s norms for theory choice. (It should be noted that the recognition that the norms for theory choice are rooted in something other than science doesn’t entail that those norms are subjective.)

This concludes my discussion of those limits of science that are most relevant for my purposes.²⁵ In the next section I am going to explore these limits in a discussion of the claim that, given modern science, traditional Christian belief must either be abandoned or drastically reformed.

2. Christian faith and the limits of science

I began by saying that it has been claimed that given the findings of mod-

24 Reid, T. *Essays on the Intellectual Powers* (1785), Hamilton, W. (ed.), p. 470.

25 There are, indeed, more limits to science than the ones I have discussed. There is a limit due to the fact that scientists have to use classificatory (‘formal’) concepts that figure in necessary truths that can only be known a priori and hence do not result from but are pre-supposed by science (see Bealer, G. ‘The philosophical limits of scientific essentialism’, in Tomberlin, J.E. (ed.) *Philosophical Perspectives, vol.1: Metaphysics*, Atascadero: Ridgeview (1987), pp.289-365). There also is a limit from the fact that human beings are fallible and sinful creatures (see Kuyper, A. *Principles of Sacred Theology*, New York: Scribner’s (1970).

ern science, the rational stance to take towards traditional Christian faith is either to abandon it or reform it drastically. I didn't say why that is supposed, but there are two broad types of reasons behind it: (a) science lends no warrant to Christian faith, (b) science provides defeaters for the Christian faith.

In this section I will be exploring what we (I hope) have learned about the limits of science by bringing it to bear on these two broad types of reasons for the claim that, given the findings of science, we should either abandon or drastically reform the Christian faith.

(a) science lends no warrant to Christian faith

'Christian faith' as I have presented it involves belief – belief in God, in his goodness and unlimited power, in the salvation he offers through Christ's redemptive suffering and glorious resurrection, and so on. Clearly, science does not compel us to believe any of this nor does it provide warrant for such beliefs. But that is nothing against those beliefs. For, as I argued in section (i), there are many things we truly believe and know without the warrant condition for knowledge being satisfied by science. We have, I argued, extra-scientific knowledge of moral truths, of values and of much else besides. To this list I now want to add the Christian beliefs just cited and suggest that these beliefs too can have warrant in a way that does not involve science.

How these beliefs can be warranted is the topic of the most exciting work in the philosophy of religion over the last four decades. It has been argued that there are various sources of belief in God and that there are various ways in which religious belief can be warranted. Alvin Plantinga has argued that there is such a thing as the *sensus divinitatis* that in a wide variety of circumstances elicits belief in God and gives it warrant.²⁶ William Alston has argued that there is such a thing as 'Christian mystical perception' and that such perception warrants certain beliefs about God.²⁷ Nicholas Wolterstorff has argued that there is such a thing as divine discourse: God speaking to someone in a way that provides warrant to the beliefs engendered in the person spoken to. Finally it has been argued that there is divine revelation and that beliefs formed in response to that can have warrant.²⁸

The point of my argument is that the fact that science lends no warrant

26 Plantinga, A. 'Reason and Belief in God', in Plantinga, A. & Wolterstorff, N. (eds.) *Faith and Rationality: Reason and Belief in God*, Notre Dame: UNDP (1983); Plantinga, A. *Warranted Christian Belief*, Oxford: Oxford University Press (2000).

27 Alston, W.P. *Perceiving God. The Epistemology of Religious Experience*, Ithaca: Cornell University Press (1992).

28 Mavrodes, G. *Revelation in Religious Belief*, Philadelphia: Temple University Press (1988); Swinburne, R. *Revelation: From Metaphor to Analogy*, Oxford: Clarendon (1992).

to religious belief is not much of an argument against such belief, because there are sources of warrant other than science.

In section (ii) I introduced the distinction between knowledge of truths (propositional knowledge) and knowledge by acquaintance and said that scientific knowledge (and scientific belief) is always propositional. This, too, is relevant for (a), the claim that science gives no warrant to Christian faith, in the following way: Christian faith, as I said earlier on, involves not only propositional belief, but also – and maybe even more central to it – awareness, or acquaintance, with God. Christian mystics have written extensively about experiential acquaintance with God. And to a lesser degree the average Christian too has non-propositional awareness of or acquaintance with God. As John Ballie thinks of faith, it is a ‘primary mode of awareness. Faith does not deduce from other realities that *are* present the existence of God who is *not* present but absent; rather it is an awareness of the divine Presence itself, however hidden behind the veils of sense.’²⁹ Since science, as I have been arguing, can never give us knowledge by acquaintance, it should come as no surprise that it cannot give us knowledge by acquaintance of God either. And a fortiori it is not much of an argument against Christian faith that science does not give us such knowledge by acquaintance.

Some of the most important questions human beings ask, ‘ultimate questions’, science is unable to answer – or so I have argued in section (iv). Still there might be knowable answers to them due to the extra-scientific sources of religious belief and warrant such as the ones mentioned earlier. These sources might provide materials for answers, or parts of answers, to ‘ultimate questions’. The meaning of life, these sources suggest, lies in living a life in communion with God. Why the world exists, these sources tell us, is because God willed it to exist. How we should live, they suggest, is such that we are devoted to serving and trusting God and to seeking to love and serve our fellows. These answers may be warranted – even if their warrant does not derive from science.

Often it is suggested that whereas science is firm, Christian faith is shaky. One way this very general point has been fleshed out is by indicating that Christian belief presupposes or involves all kinds of things that cannot be proved to a sufficiently sceptical mind, whereas science involves no such presuppositions – no presuppositions that cannot be proved to a sufficiently sceptical mind. But this way of putting things neglects the fact that science involves unproved and unprovable presuppositions. The point of my argument in section (v) was that there is nothing wrong with science because it cannot prove its presuppositions. But if it is not wrong when science involves unproved presuppositions, then neither should it be wrong when the Christian faith involves unproved presuppositions. In both cases

29 Ballie, J. *The Sense of the Presence of God*, New York: Scribner's (1962), pp. 88-89.

there may be (and I think in fact are) sources of warrant available other than science.

It appeared that what can be learned (I hope) about the limits of science, in a way is richer than what is needed to address a) and b). After all, I suggested that whereas science is unable to answer ultimate questions, the sources of Christian faith may provide warranted answers to such questions. This point clearly goes beyond addressing a) and b). And there is more along these lines, as I now should like to bring out. In section (v) I argued that there are brute facts that are scientifically inexplicable. I also contrasted scientific explanations with personal explanations, and suggested that there might be personal explanations for natural brute facts, such as the apparent fine-tuning of the cosmological constants and laws. The Christian faith clearly favours, or at the very least does not rule out, such teleological explanations. As a matter of fact, the possibility and advantage of such an explanation over simply taking for granted inexplicably brute facts might be a reason to take Christian belief with real seriousness.

One final thing along the same lines, that is, not directly addressing a) or b), is suggested by what we have learned about the limits of science. Theory choice, I said, is regulated by norms – norms that themselves are the objects of a discussion that cannot be terminated by an appeal to science. The warrant for holding on to certain norms and not to others (or for assigning them a place in a hierarchy of norms above others, and not below them) will thus have to derive from something other than science. But if, as I have suggested, Christian faith receives warrant from extra-scientific sources, then a case could be made for the thesis that it is appropriate for Christian theists to include in the body of norms that guide theory choices explicitly theistic beliefs.³⁰

(b) science provides defeaters for the Christian faith

Let me finally turn to the claim that science provides defeaters for the Christian faith. Many such arguments have been proposed, having to do with psycho-analysis, evolutionary theory, evolutionary psychology, biblical criticism and more. What light does what we have learned about the limits of science shed on the issue in general? This is a vast topic, but in line with the character of my discussion so far, I can only offer some very general and highly programmatic remarks. When it is claimed that science provides defeaters for the Christian faith, we must never forget the

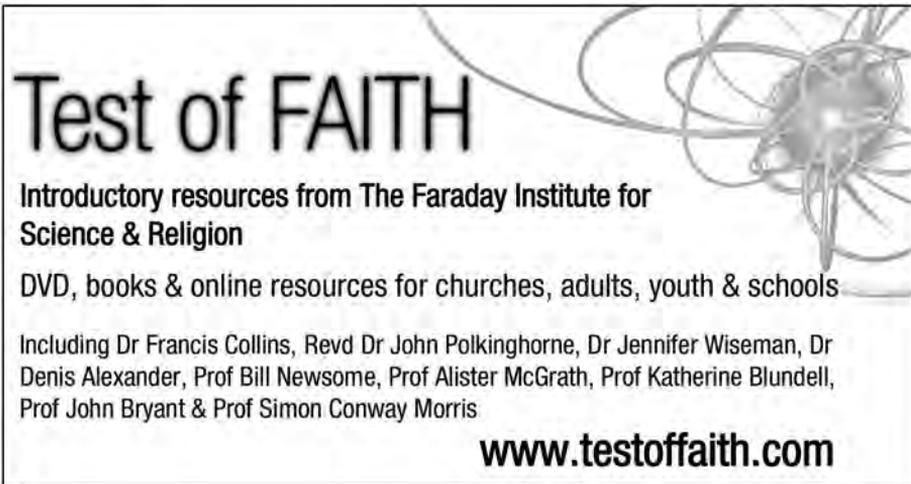
30 Wolterstorff, N. *Reason Within the Bounds of Religion*, Grand Rapids: Eerdmans (1977), pp. 63-64; Wolterstorff, N. 'Theology and Science: Listening to Each Other', in Richardson, W.M. & Wildman, W.J. (eds.) *Religion and Science: History, Method, Dialogue*, New York: Routledge (1996), pp. 95-104.

following points:

- 1 not everything that is claimed in the name of science is established scientific fact;
- 2 there is often quite some distance between what is scientifically established on the one hand, and speculative extrapolations from what is scientifically established on the other;
- 3 there is often also quite some distance between what is scientifically established on the one hand, and a world-view driven appropriation of what is scientifically established;
- 4 when it is claimed that science provides defeaters for Christian beliefs, it would seem that what in fact provides those defeaters is not the scientifically established facts, but either the speculative extrapolations meant in (2), or the world-view driven appropriations meant in (3);
- 5 neither the speculative extrapolations, nor the world-view driven appropriations receive warrant from science;
- 6 it is therefore not un- (or anti-)scientific when one rejects those speculative extrapolations and world-view driven appropriations.

These sketchy remarks cry out for further elaboration and illustration. But for now I must rest my case here – the case being that science is limited in various important ways and that these limits give us *prima facie* no reason to think that science calls on Christian faith to change.

René van Woudenberg is Professor of Metaphysics and Epistemology and Dean of the Department of Philosophy at the Free University of Amsterdam, the Netherlands.



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