GROSVENOR ESSAY NO. 11

Towards an Integration of Science and Theology?

ISBN 978 0 905573 99 1

Comments or questions on this Essay should be directed to

The General Synod Office
21 Grosvenor Crescent
Edinburgh EH12 5EE
Tel: 0131 225 6357
Email: office@scotland.anglican.org

Scottish Charity No SC015962

Also available in this series:

Grosvenor Essay No. 1 – Sketches towards a theology of science. £2.50
Published 2004. ISBN 0 905573 64 1
Grosvenor Essay No. 2 – Theology and the power of the image. £3.00
Published 2005. ISBN 0 905573 66 8
Grosvenor Essay No. 3 – The inter-faith encounter. £2.50
Published 2006. ISBN 0 905573 71 4
Grosvenor Essay No. 4 – The shape of our church. £2.50
Published 2007. ISBN 0 905573 78 1
Grosvenor Essay No. 5 – On salvation. £2.50
Published 2008. ISBN 0 905573 83 8
Grosvenor Essay No. 6 – Thinking the Nicene Creed: New Life in Christ. £3.00
Published 2010. ISBN 0 905573 87 0
Grosvenor Essay No. 7 – Thinking the Nicene Creed: Incarnation. £3.00
Published 2011. ISBN 0 905573 89 7
Grosvenor Essay No. 8 – Marriage and Human Intimacy. £3.00
Published 2012. ISBN 0 905573 92 7
Grosvenor Essay No. 9 – The Art of Dying Well. £5.00
Published 2013. ISBN 0 905573 93 5
Grosvenor Essay No. 10 – The Church and Scottish Identity. £5.00
Published 2014. ISBN 0 905573 95 1

Contents

1. INTRODUCTION – HAS SCIENCE MADE CHRISTIANITY REDUNDANT?

by Eric Priest

Let me begin by making some comments about the rise of atheism and the possible relationships between science and religion, including the claim by New Atheism that they are at war. I will then give a personal account of what it is like to be a scientist, before summarizing the wide-ranging themes of this booklet, from philosophy, through astronomy to evolution, biology, psychology and theology.

1.1. The Rise of Atheism

Modern atheism is a complex mixture with several strands (e.g., Plantinga et al, 2010). As science has developed and explained more natural phenomena, so a role for a 'God of the gaps' has declined. So-called 'scientific atheism' has grown, in which God is not needed for scientific explanation. Although the rise of science has been natural, the accompanying rejection of God has, however, been complex and involved extra features.

In contrast, so-called 'humanistic atheism' was stimulated by the Enlightenment with its primacy of human reason and independence. Such atheism is articulated by Feuerbach (1804–72), with his view that our ideas of God are projections of our own minds, and reached a climax with Nietzsche's (1844–1900) proclamation of the 'death of God'. Modernism has, moreover, spawned at least two more types of atheism. One is 'apathetic atheism', with an indifference to the great questions of life, and a second is 'protest atheism', which is a cry against a God who seems indifferent to human suffering, as articulated by for example Camus (1913–60) and Dostoevsky.

Atheisms are critical reactions to classical theism, which is not so much a religion as a worldview that emphasises one God as supreme being, a distant creator with a deterministic relation to the world. Such a reaction is not so effective against the trinitarian theism of Christianity, where God is a unity who is ultimately personal and continually interacting with His Universe.

1.2. The Relationship Between Science and Religion

In most of science, we cannot prove that a theory or model is correct, but we can ask – '*Is it consistent with our observations?*' In a similar way, I can't prove that God exists, but I can ask – '*Is God's existence or non-existence more consistent with my experiences?*' For me, as a Christian, the existence of God is more consistent, and so I have chosen to live my life for the time being with the assumption that God does exist: trying to follow the example of Jesus in my life; studying the Bible; being part of a Christian community; and listening to the promptings of the Holy Spirit.

Ian Barbour (1997) put forward four possible relationships between science and religion, namely, that they are:

(i) in conflict
(ii) independent
(iii) in dialogue
(iv) or integrated.

The first possibility, that science and faith are at war or in conflict, is the one that has been stoked by the new atheists. However, I have never personally felt a conflict between science and religion and suggest that such a conflict arises only if you misunderstand the nature of either science or religion. Thus, at one extreme you may have a fundamentalist view of religion with a wooden literalist interpretation of scripture, but this ignores the history of Christianity, in which St Augustine in 400 AD famously wrote '*You should not interpret scripture in a way that conflicts with reason and experience*'. At the other extreme, Scientism suggests that science answers every question, but that is clearly false, since the questions that are of most importance to us as human beings are usually outside science, such as – '*Am I in love?*' '*Is that work of art beautiful?*' '*What is my purpose in life?*'

In ancient Greece, the Stoics thought that God is everywhere, whereas the Epicureans believed that, if the gods existed, they took no interest in the world. The latter led on to Stephen Jay Gould's (1999) idea of non-overlapping magisteria, which is similar to Barbour's relationship (ii), in which there is no connection between science (the material world) and matters of religion (including ethics and morals). This line of thinking naturally leads to a deist god who is

remote and uncaring and who is completely different from the Christian God. The next step, as science increases is naturally to do away with religion altogether.

Hyung Choi (private correspondence) suggested a clever parable concerning two islands labelled science and religion with their own languages and terminology and poking up above a thick mist. Some people tried to build a rickety bridge between the two islands, but a deeper truth was revealed when the Sun came from behind the clouds and the mists cleared to show that the two islands were not separate at all but were joined by dry land.

Thus, my own preference is for an exploration of Barbour's (iv), namely, that science and religion intersect along a fuzzy boundary where different questions are asked by science and religion about the same reality. Also, science and faith are immersed in an underlying unity that shares the same features of creativity, community, beauty and wonder.

Perhaps there is one island but different maps, one underlying reality, one building but different drawings, one truth illuminated from different directions. But each map or drawing or direction is incomplete and needs the others for a fuller understanding.

1.3. The Nature of Science

For any question, it is important to identify whether it is a scientific or non-scientific question. Thus, '*Is the Earth warming?*' and '*How did homo sapiens arise?*' are scientific, but '*What should we do about climate change?*' and '*Does God exist?*' are non-scientific questions.

Different questions can be asked about the same event. Thus, '*How or why is the kettle boiling?*' may have one answer in terms of physics and another in terms of my wife's thirst. Again, '*How or why are two people kissing?*' could have as one answer '*The application of suction during the anatomical juxtaposition of two orbicular oris muscles in a state of contraction*', but another answer is likely to be of more interest to those who are romantically inclined.

For a scientific question it is also important to determine whether it is part of mainstream science, in which case the answer is widely accepted and is unlikely to change, or is part of newer, more speculative science, which is on the fringes of knowledge and cannot yet be trusted. If a question is part of mainstream science, then we should accept and trust the answer given by the experts. Examples here include '*Did the Universe arise from a big bang 13.8 billion years ago?*' or '*Did humans arise by evolution with natural selection?*' or '*Has the Earth's global temperature risen by one degree centigrade in the past 100 years?*'

So, what is it like to be a scientist? Is it cold, rational, logical, mechanical, undertaken by computers and emotionless people in white coats, and having nothing to do with the arts or Christianity? Is the world deterministic, with the weather determined by individual clouds, life governed by individual molecules in cells, people determined by their genes, and our thoughts determined by individual electrical signals in neurons?

Modern science is far from being clockwork and deterministic. It has a combination of regularity and chance, of law-like and random behaviour. Statistical fluctuations are common, and so laws can only predict in general terms, but are unable to determine well in advance the formation of, say, individual cyclones or sunspots or stars. The nature of time and space and matter at the most fundamental level so far explored is full of uncertainty. In addition, science often has multiple levels of description, with the lower levels affecting the higher and the higher feeding back down on the lower, so that one cannot predict the higher level of behaviour by studying the lower level alone. Examples include the weather, flocks of birds and a human body.

Being a scientist in practice from my experience involves:

(i) creativity, leaps of faith, intuition and imagination, in which inspiration is followed by perspiration as the skills developed over many years are used to work out an idea;

(ii) it often fills me with a sense of beauty and wonder and therefore humility, and so, if a scientist is behaving in an arrogant manner, he is not being true to his science;

(iii) openness and questioning, which lead to a voyage of discovery;
(iv) and trust and integrity, which are crucial for the scientific community.

This affects in a profound way my life of faith, and so being a Christian for me involves:

(i) leaps of faith and trust;
(ii) it often fills me with a sense of beauty, wonder and humility;
(iii) openness and questioning, which lead to a pilgrimage;
(iv) and trust in the community, the body of Christ.

The close parallel between the nature of being a scientist and a person of faith suggest to me an underlying unity. Thus, a scientist can indeed be a Christian, provided he or she is open to the insights of science and is responsive to the hand of the maker in the Universe.

1.4. Summary of the Themes of this Booklet

1.4.1 New Atheism

Keith Ward begins by pointing out that the statement '*God created the world*' is an *axiological explanation* rather than a scientific one, since it is an explanation in terms of value rather than physical data. He then discusses different aspects of God, such as His consciousness and creative acts and stresses that God could function as an axiological explanation for why the cosmos exists. Asserting the existence of God is a factual claim but not a scientific one. Furthermore, belief in God can indeed be rational and based on evidence.

New Atheism is a philosophical theory about the nature of reality, which has been largely discounted in philosophy as a serious contender for truth. Its core is materialism, which rejects personal experience, value, consciousness and purpose, and instead counts only scientific observations of physical phenomena and believes that everything that is real has to be made of matter. But the value and meaning of human life cannot be settled by scientific methods, since science is not concerned with value and meaning.

Scientific observations often suggest values that go beyond science, such as elegance, order, beauty and wonder. Although death and suffering represent a deep problem for a believer, science has helped by showing that destruction goes together with creative emergence as essential parts of the cosmic process.

New atheists argue that science is incompatible with belief in God, but they often fail the canons of rationality in several respects, namely: not appreciating religious language and beliefs; not admitting the limits of science; not admitting the weaknesses of materialism as a philosophy; failing to distinguish between scientific and non-scientific questions; and caricaturing religious belief rather than appreciating moral and religious purpose. Instead, the existence of a rational God naturally makes the Universe intelligible and ordered, and so science possible.

1.4.2 Reductionism

Eleonore Stump describes the secularist scientific picture (SSP) of reality, in which all can be reduced to the laws of physics. This view makes two assumptions, namely, that there is nothing to a whole other than the sum of its parts, and there is causal closure at the micro-level of physics, so that any causality at the macro-level is just a function of micro-level closure.

By contrast, according to Thomas Aquinas, human persons and human agency are instead at the centre of a discussion of natural law. For him natural law is human participation in the eternal law from the mind of God. Thus, natural law is a gift of the Creator to humans, given either by the innate light of reason or through revelation of God's mind.

For Aquinas, natural law is the law of the law-giver, whereas for SSP it is just a description of the world at the microphysical level. For Aquinas, the ultimate foundation of reality is personal, whereas for SSP it is impersonal elementary particles.

The philosophy of SSP is reductionist, but that of Aquinas is anti-reductionist and neo-Aristotelian, in the sense that a thing is not just the sum of its parts but also depends on its configuration or organization or form. One example would be the function of proteins, which depends on the way the individual molecules are folded. Another would be autism, in which some psychologists suggest that

the interaction between an infant and a primary care-giver plays a crucial role.

1.4.3 Astronomy

David Wilkinson stresses that an interaction between the science of the beginning and end of the Universe and Christian faith is much more subtle and fruitful than would be implied by Hawking's statement that '*God is not needed at the first moment of the Universe*'. It is an opportunity for theology to take science seriously.

The Big Bang model describes the expansion of the Universe from a time 13.8 billion years ago when it was only 10^{-43} seconds old. It is supported by observations of galaxy redshift, of the microwave background and of the abundance of helium. What happened before that time is not currently understood, but we should resist the temptation to use God to fill the gap. The Christian God is not a God who fills gaps of current ignorance nor interacts with the first moment of the Universe and then retires to a safe distance: rather He or She is the one who creates and sustains the laws of physics and is as much at work in the first 10^{-43} seconds as at any other time.

When the Universe is 10^{12} years old, there will be no hydrogen left, stars will cease to form, and all massive stars will have become neutron stars and black holes. After 10^{14} years, small stars will become white dwarfs and the Universe will be a cold uninteresting place composed of dead stars and black holes. Nevertheless, a Christian believes in a Creator God, which gives hope in the idea of a new creation, a new heaven and a new Earth.

1.4.4 Evolution

Ken Miller describes how anti-evolution movements (such as intelligent design) have fed off a perceived enmity between evolutionary science and religion, seen in statements such as '*The God of the Galapagos is careless, wasteful, indifferent'* (Hull, 1991) or '*The Universe we observe has precisely the properties we should expect if there is no design, no purpose, nothing but blind pitiless indifference*' (Dawkins, 1995).

However, these are not scientific statements but faith-based assertions, and the assumption behind them is that science alone can lead us to truth regarding the purpose of existence. They have lost the

sense of wonder seen in Darwin's 1889 words '*from so simple a beginning, endless forms most beautiful and most wonderful have been, and are being, evolved*'.

Most biologists agree that the capacity for life itself is built into the fabric of the natural world. The solution for people of faith is therefore to respect the findings of scientific reason and to develop an understanding of science that is in harmony with religious faith. Religion can in turn enlighten the scientific vision of our existence.

1.4.5 Genes

Pauline Rudd stresses that the body is a complex entity without a simple hierarchy, made up of many macro- and micro-structures with feedback loops that enable us to survive in a changing world. We are made up of thousands of dynamic systems, many outside our conscious control. Our 30,000 genes are not a blueprint for our bodies, but they do contain information that represents potential and imposes constraints.

Genes are DNA-based units that exert effects on an organism through RNA or protein products. They possess four bases assembled on very long molecules of deoxyribonucleic acid (DNA). One strand of DNA with the bases attached and its complementary partner combine to form a double helix chromosome structure. Humans possess 23 tightly folded pairs of chromosomes.

Genes can replicate themselves. Many genes code for proteins with multiple functions. Genes respond to signals from their environment telling them that the protein is needed. Genes can be altered or mutated perhaps by miscopying, which may produce a protein with a useful or destructive function. Genetic diversity makes each of us unique and helps ensure the survival of our species.

At a biochemical level we are certainly more than our genes, for it is the external and internal environments that trigger gene expression. Our decisions are guided by the possibilities and limitations imposed by our genes and also by the environment. But living a fulfilled life means being integrated in a complex world where we find a niche to flourish physically and emotionally.

1.4.6 Psychology

For David Myers an open-minded attitude has caused him to change many of his earlier beliefs, so that he now believes that: parents have modest effects on their children's personalities and intelligence; electroconvulsive therapy can often relieve depression; the unconscious mind dwarfs the conscious mind; traumatic experiences are rarely repressed; and sexual orientation is a natural enduring disposition rather than a moral choice.

Psychology and faith intersect in the following topics:

(i) the effect of values and assumptions on psychology;
(ii) application of psychological insights to religious communities;
(iii) the psychology of religion;
(iv) psychological and religious understanding of human nature;
(v) the observed effects of religion;
(vi) and tensions between psychology and religion.

There are parallels between psychology and Christianity when discussing the unity of mind and body, pride, rationality and fallibility, as well as behaviour and belief. Furthermore, people with a religious faith show greater generosity with time and money, live longer, and are happier. Myers also discusses the effect of prayer in living as God's people.

Finally, he puts forward a strong case for same-sex marriage, on the grounds that: all humans have a deep need to belong; marriage contributes to flourishing lives; individualism is corroding marriage; sexual orientation is a natural disposition rather than a choice; it is an enduring disposition that is seldom reversed by willpower or therapy; and the Bible has nothing explicitly to say about enduring sexual orientation or loving long-term same-sex partners.

1.4.7 Nature of the Person

John Wyatt considers what it means to be a person from his perspective as a neonatologist working with premature babies. Some secular philosophers suggest that newborn babies and people with severe dementia or learning disabilities should not be regarded as persons and so should have fewer rights and privileges. Personhood in their view is determined by high-level cognitive functioning including

having preferences about continued life and interacting in a sophisticated way with others. Wyatt also discusses the nature of consciousness and the philosophical perspective of non-reductive physicalism, whereby the brain is entirely physical and material in nature, but mental states can emerge from physical neuronal processes and react back down on neuronal activity.

He contrasts this with a Christian understanding of the nature of person, in which reality consists of the personal as well as matter and energy, so that persons are not reducible to or limited by matter and energy. A person is a different kind of reality, namely, one that knows and is rational, communicative, creative, moral and loving. A person is a profound unity, with both a physical, material aspect and a personal, immaterial aspect.

Indeed, God's ultimate being is described in terms of three persons giving themselves to one another in love. The Christian claim is that we are made in God's image, created to reflect the divine character and being. Each human person is unique, made for relationships with others. An alternative version to '*cogito ergo sum, I think therefore I am*' could be '*You love me, therefore I am*'. Thus, in his career, John Wyatt has been called to recognize newborn babies as mysterious others to which he owes a duty of care and protection.

1.4.8 Miracles

Mark Harris considers the miracles of Jesus and suggests that the modern world view that miracles are scientifically impossible and a bygone relic of a primitive age is unsustainable in the light of the complexity of the relationship between miracle and science.

David Hume defined miracle as '*a transgression of a law of nature by a particular volition of the Deity*'. However, this regards nature as a rigid closed system, which is unreasonable in the light of modern developments of quantum mechanics, complexity and emergence. Furthermore, the miracles of the Exodus may be regarded as normal events that do not violate nature, but are still miracles of timing.

Jesus was known as a miracle worker, but his miracles are very diverse, some of them involving healings and others involving nature, such as the stilling of the storm. Do the miracles of Jesus contradict science? Perhaps sometimes no (e.g., the miraculous catch of fish),

and perhaps sometimes yes (e.g., the raising of Lazarus). In the gospels, the miracles, however, often have a deeper significance, suggesting that Jesus has power over nature and the kingdom of God is at hand.

1.4.9 Trusting the New Testament

Tom Wright asks whether a scientist can trust the New Testament. He suggests that the great lie of today's Scientism is that science has proved Epicureanism (that the world works by itself since the gods are far away), and stresses that science cannot adjudicate between different philosophical positions.

He compares different forms of knowing, in particular in science, in history and in the worlds of religion, culture and art. Then, he asks whether we can take the story of Jesus seriously as history, and in particular discusses whether we can believe in the resurrection, believe in miracles and trust the record of Jesus.

His conclusion is that we can indeed trust the New Testament to tell us about new creation, and about a power that generates new modes of knowing. This trusting is not a cool detached cerebral activity but involves opening ourselves as participants rather than spectators to the source of life.

References

Barbour, IG (1997) *Religion and Science: Historical and Contemporary Issues*. HarperOne, New York.

Dawkins, R (1995) *River out of Eden: a Darwinian View of Life*, Weidenfield & Nicholson, London.

Gould, SJ (1999) *Rocks of Ages: Science and Religion in the Fullness of Life,* Ballantine Books, New York.

Hull, D. L. (1991) 'The God of the Galápagos,' *Nature* **352**, 485–486.

Plantinga, RJ, Thompson, TR and Lundberg, MD (2010) *An Introduction to Christian Theology*, Cambridge University Press, Cambridge UK.

Eric Priest is Emeritus Professor of Mathematics at St Andrews University. A Fellow of the Royal Society, his research concerns the plasma physics of the dynamical behaviour of the Sun's atmosphere.

This includes mechanisms for heating the Sun's corona to a million degrees centigrade and the nature of solar flares and huge eruptions that may interact with the Earth's environment. He has helped organise a series of James Gregory Public Lectures on Science and Religion in St Andrews since 2007. He is on the Advisory Board of the Faraday Institute and the Board of Trustees of the John Templeton Foundation.

2. GOD, SCIENCE, AND THE NEW ATHEISM

by Keith Ward

2.1. Scientific Explanation

Some assertions about God can superficially sound like scientific attempts at explanation. If we say, '*God created the world'*, that sounds like a scientific explanation. It explains why the world is the way it is, and why it exists, by positing a hidden cause, God. But the surface grammar is misleading. Scientific and religious explanations are different in kind.

Scientific explanations generally refer to physical data that are in principle observable and publicly testable. The explanations can ideally be formulated in mathematical terms, or at least the data they deal with can be measured and quantified with precision. Experiments can be devised which test scientific proposals, and enable us to predict and sometimes use physical processes for improving the quality of human lives. Scientific explanations are tremendously useful, and scientific methods of formulating 'laws of nature' and of repeated experimental observation are essential to a modern understanding of the world.

But not all explanations are scientific explanations. '*God created the world'* does explain why the world is the way it is, at least in part. But '*God created the world'* does not give an ordinary causal explanation of some hidden physical reality that preceded this Universe in time, that we could experimentally test, describe in a neat mathematical equation, and perhaps use to create improved universes in future. So what sort of explanation is it?

2.1.1 Axiological Explanation

It is a sort of explanation which is perfectly familiar to us in everyday life, and one name for it is 'axiological explanation'. It is what we use when we try to explain, for example, why rational people act as they do – rational people act in order to obtain something they value. So axiological explanation is the explanation of a process in terms of value. It explains why people act as they do in terms of valued states

that people want. It has four major elements. First is the identification of some state or process as of intrinsic value, as being worth choosing for its own sake alone. This entails the second element, which is awareness of a range of alternative states on the basis of which such an evaluation could be made. Third is the assumption that a choice can be made. And fourth is the conscious appreciation and enjoyment of the value, without which all values would remain merely hypothetical rather than actual. Such explanation presupposes that intrinsic values do exist, that there is consciousness both of their possibility and actuality, that purposive choices can be made (choices made for the sake of realising a specific value), and that there are feelings or desires that can in principle be satisfied.

Axiological explanations are not usually used in the natural sciences. Strictly physical sciences do not ask whether anything is of intrinsic value, they set aside questions of consciousness and of subjective feelings, and they are extremely wary of speaking of purposes or goals in natural processes. The human sciences, like some forms of psychology and economics, may introduce such topics, but they usually retain a primary interest in recording publicly observable behaviour, in collecting data that can be measured in some way, and in attempting to frame significant generalisations that can be tested in varying contexts. They are usually content to record trends and correlations rather than to frame precise 'unbreakable' laws, and they are usually keenly aware of the many exceptions and unique cases that will qualify their general conclusions.

To give an axiological explanation of the whole Universe would be to identify the intrinsic values that it realises, to suppose that the cosmos is selected from a number of alternatives precisely because it realises those values, and therefore to postulate that there is a consciousness – 'God' – that envisages, selects, and appreciates those values. This could not, as in the human case, be a matter of recording the publicly observable behaviour of such a trans-cosmic consciousness, or of measuring its behaviour, or of framing testable generalisations about it that would apply to all gods of the same sort, at least not if there is in principle only one God.

2.2. Aspects of God

God is by most definitions a unique case, and is not a physically observable object, so it is hard to see how any physical descriptions or scientific generalisations could be offered in the case of God. This means there could be no scientific explanation of God's actions. Nevertheless, God could function as an axiological explanation of why the cosmos exists as it does – namely, for the sake of the values that it realises and that God, and perhaps other agents, can enjoy.

God's consciousness is utterly inaccessible to humans, since God has no locatable physical body to express divine thoughts and feelings. Moreover, it is a consciousness that is not dependent on some complex physical structure like a brain, so it has a sort of causal priority over matter that is quite unfamiliar to us. God does not know things, as we do, through sense-organs. God's knowledge is direct and unmediated, and it will cover not only the whole Universe, but also all the alternative universes that could possibly exist.

Moreover, God's desires and acts will not be whimsical or arbitrary. God will discern the true nature of all intrinsic values, and God's creative acts will be governed by that discernment. Thus, for most theologians, as for Plato and Aristotle, the being of God will itself be of supreme intrinsic value, since it contemplates all possible values without change, frustration or decay. God is the supremely Good and Beautiful, and that is, from an axiological viewpoint, the best of all reasons for the existence of anything.

God's agency would be the source and origin of the whole cosmos. As such, it would be beyond space and time, as their origin. Its knowledge and agency would thus be vastly different from ours. The Supreme Good that cannot fail to be, that is self-existent and perfect in actuality, is as far superior to human consciousness and personality as our consciousness is to that of a beetle. There is no hope that the methods of physical science could ever be used successfully to provide a scientific explanation of God or of God's actions.

2.3. Belief in God

Yet to assert the existence of such a God is certainly to make a factual claim, a claim about how things are. God is the spiritual creator of the physical Universe. But this is not a scientific claim. It does not offer any particular physical explanation of how the Universe came into being, and it does not offer publicly verifiable and experimentally testable evidence for the existence of God.

However, it would be quite wrong to say that it is irrational, or that it is based on no evidence. Belief in God is rational, because it is based on our knowledge that consciousness and intentional agency are fundamental features of reality, and the realization that many, indeed most, classical philosophers have argued that consciousness, and not unthinking matter, is likely to form the basic causal structure of reality. Belief in God is based on evidence, the evidence of personal conscious experience, of experience of value, especially in morality and art, and experience, common in many religious traditions, of liberation from egoism and conscious unity with a supreme Good.

Not all good evidence is public or experimentally testable. We all know our private thoughts and feelings in ways no-one else can. As for experimental tests, it would actually be immoral to devise experimental tests for whether people we know really love us. The deepest personal relationships depend upon commitment and trust, upon the cultivation of a rich inner complex of thoughts and feelings that we can never fully express, and upon loyalties that go beyond what we could strictly demonstrate to be the case.

Ironically, Logical Positivism, the philosophy that made verification by the senses a condition of making meaningful factual assertions, was unable to establish even the existence of a public world of physical objects, since it was unable to prove that any public even existed, as that would assume a set of other minds that were not directly verifiable by the senses.

Verification of some sort is important. But why should it be limited to sense-experience, and why should anyone insist that verification has to be conclusive and beyond dispute, in a world as transient and ambiguous as this? Intimations of transcendence and of value are sorts of verification. Science does not deal with them, but there is no

reason for science to deny them.

2.4. The New Atheism

Why, then, should there have arisen in the last few years a group of writers, usually with no great interest in and little respect for philosophy, who are resurrecting the rather old and historically exploded legend about a war between science and religion? I think it is mainly because of a rejection of personal experience as a reliable source of knowledge, and the consequent down-grading of value, consciousness, and purpose to being subjective and causally inoperative by-products of a wholly material reality, of which science gives the only reliable form of knowledge.

This is not in fact a scientific theory. It is a philosophical theory about the true nature of reality, a theory which is presently very fashionable, but has historically been largely discounted as a serious contender for truth. It is extremely odd to despise philosophy and yet to rely on such a very complicated and highly disputed philosophy as materialism. To say that the whole of conscious experience, with its rich and value-laden content, is either reducible to physical processes in the brain or is wholly causally dependent on such processes, is a hypothesis that is far from being established scientifically, so no view which purports to rest only on the well-established findings of science should assume it to be true. It rests on a commitment to philosophical materialism, which seems to many philosophers to undermine the very basis of human knowledge, which in the end lies in conscious experience.

Materialism is indeed self-contradictory if it asserts as true the proposition that '*only public observations of physical phenomena in space and time can count as evidence for true beliefs'*, since the evidence for the truth of this proposition cannot be any set of public observations. It will not do to say that the proposition is not a truth, but simply a declaration that one will not count anything but public observation as evidence. If such a declaration is to be reasonable rather than quite arbitrary, it must be based on something like the consideration that only public observations provide useful or fruitful knowledge. But that begs the main question at issue: are our experiences of value and transcendence, our struggles to understand our own lives and learn how to live well, all useless and fruitless? Are

our often agonised attempts to find meaning in our lives, to face up to the anguish of despair and death, to find something worth-while in our inner struggles, to be consigned to being pointless by-products of unconscious material processes?

Perhaps here we touch the real heart of the New Atheism – a rather old atheism in fact, that reached its zenith with Nietzsche and Marx. For this is not just an abstract philosophical debate between idealism (the philosophical view that something mind-like is the basis of reality) and materialism (the philosophical view that everything that is real has to be made of matter). It is not a debate between religion and science at all. It is a passionate debate about the value and meaning of human life and experience. Such debates cannot be settled by scientific methods, which are not as such concerned with questions of value and meaning.

2.5. Going Beyond Science

Yet the facts are not irrelevant to this issue. For instance, does science not show that nature is cruel, purposeless and pointless? No, that is a value judgment and not a conclusion of scientific study. Of course if we believe that the cosmos has a purpose – to produce distinctive sorts of value – then examination of the cosmos is relevant to whether there are such values, whether it is reasonable to see the cosmos as directed to producing them, and whether it is such that an intelligent consciousness could have created it. But we have to go beyond science to answer such questions. We have to engage in philosophy, asking what sorts of values there might be, how and in what way they might exist, and how they might connect with various sorts of purpose.

Scientific observation of the cosmos suggests some values very strongly – the elegance and ordered complexity of the laws of nature, the beauty of the galaxies, the creative emergence apparent in the majestic processes of cosmic evolution, the incredible integration of simple parts into complex organized wholes, the development of understanding and appreciation in three pounds of grey matter in the human skull. Science is not an emotionless discipline, and most scientists are inspired with amazement and awe by the sheer grandeur of the Universe.

Yet such evaluations and emotions are not parts or conclusions of any strictly scientific theory. They might motivate scientists, and they may be evoked by scientific studies, but they do not occur in scientific theories. Good scientists may even fail to have them. Steven Weinberg famously commented that the more he understood the Universe, the more pointless the Universe seemed. Yet the understanding of the complexity, magnificence and rich variety of the physical Universe that science can bring is precisely one of the things that might give the Universe a point or intrinsic value. Questions of value and purpose, of the place of consciousness in the Universe, of the moral importance of human persons, and indeed of the importance and status of science itself, must pay close attention to scientific data, but science does not provide conclusive answers to them

A fundamental element of belief in God is that there is intrinsic and objective value in such things as beauty, intellectual understanding, creativity, and empathetic and cooperative personal relationships. For a theist, those values are instantiated supremely in God, and the Universe expresses some aspects, images, or reflections of them, insofar as they can be embedded in time. Human fulfilment consists in shaping human awareness to appreciate them more fully, to celebrate them, and to create new temporal expressions of them. This is what gives human existence its purpose – as the Westminster Confession puts it, the human purpose is '*to love God and enjoy him forever*'.

2.6. Death and Suffering

There is much in the Universe as scientific observation discloses it that tends to support such a religious view. But there are undoubtedly problems too. The hardest problem for any theist is to account for the existence of death and suffering in the cosmos, if it is created by a benevolent God. This is not a new scientific problem, but an old philosophical problem of rational consistency.

The sciences do, however, adduce some relevant facts. One of the most significant is the discovery that destruction and suffering seem to be essential and in-eliminable parts of the cosmic process. Without the destruction of stars, heavy atoms would not form. Without the law of entropy or universal long-term decay, the temporal process would

have no direction. Without the competition of species for survival, the selective effects of evolution would not occur.

The emergent properties of the cosmos come about through a sort of creative exploration of possibilities that inevitably involves failures as well as successes. In the light of much modern science, it becomes plausible to say, as Steven Weinberg does allow, that humans, as the emergent carbon-based life-forms we are, could not exist in any other Universe than this, with its laws of gravitational attraction, electro-magnetism, strong and weak nuclear forces, and entropy, that entail destruction as well as creative emergence throughout the Universe. God might have created another Universe, but it would not have us in it. So if God wants us to exist, with the distinctive values we can realise, this is the Universe there has to be. This is not a scientific remark, but perception of the universal interconnectedness and destructive-creative polarity of the Universe derives from a plausible interpretation of modern science.

In this way, discoveries about the nature of the Universe may affect our conception of a personal creator. It has, I think, become implausible to think of God directly intending every part of this Universe to be as it is, since much in the Universe is either destructive or random (not fully determined). But it remains plausible to think that God has created the laws and processes of the Universe, for the sake of the distinctive sorts of value the Universe will produce. God sets up basic structures in the cosmos that will guarantee the achievement of a desired goal, but also allows enough indeterminism within those structures for intelligent creatures, when they evolve, to make reasoned choices between alternative futures. It is plausible to think that the ideal goal that exists in the mind of God will have some specific causal influence on the physical processes of the Universe. We may find it difficult to conceive of how such influence will be felt, since we lack a theoretical model that is adequate to it. But if we have made the initial postulate of God, the observed facts seem compatible with a view that sees God not as determining every event, and not as interfering occasionally in a closed and complete physical system, but as exercising a general attractive or teleological influence that may be felt as a propensity to life, consciousness, and intelligence in an open and emergent Universe, that will be more apparent in some crucial instances than in others. God's influence on the world might be real, and yet limited by many other causal factors that are necessary

conditions for the existence of carbon-based intelligent beings.

2.7. Is Science Incompatible with Belief in God?

The so-called 'new atheists' argue that acceptance of science is incompatible with belief in God. They claim to have a completely rational, indeed the only rational, view of the world and human life. But there are five important respects in which these writers often fail to meet the canons of rationality that they supposedly insist upon.

* First, they have no initial sympathy with religious language, practices, or beliefs, and thus neglect the first principle of critical rationality, which is to appreciate and state one's opponents' views as fully and fairly as possible.

* Second, they do not admit the limits of scientific theory, and that there are many factual questions which fall outside any such theoretical framework.

* Third, they do not see or admit the philosophical weaknesses of materialism as a philosophical theory, and the strength of more theistic or idealist views, which have been almost universally espoused by the Western philosophical canon.

* Fourth, they fail to draw an important distinction between the well-attested findings of natural science and wider worldviews of a philosophical nature, like materialism, empiricism, and idealism, that remain underdetermined by science.

* And fifth, they seem to have a deeply emotional antipathy to the idea of a moral and spiritual purpose for human life, which antipathy is rooted in a view of religion as anthropomorphic, literalistic, life, joy, and freedom-denying. To characterise all religion in this way is to fail to make important discriminations between various kinds of belief in God.

Belief or disbelief in God, like all beliefs entailing definite practical commitments, can be a highly emotional matter. But there is a place for reason in considering such beliefs. It is ironic that those new atheists who like to place themselves under the banner of reason, themselves break some of the basic rules of rational discussion. Even worse, they espouse a worldview that makes reason an accidental by-product of a long and pointless struggle for survival. On such a view, it is hard to see why reason should be regarded as a reliable path to truth. If, however, you believe in a God who, as the first verse of John's Gospel states, created the world through reason (*Logos*), then you

would expect the Universe to be as intelligible and ordered as it apparently is. The final irony is that it is belief in a rational God that makes science possible, whereas in an atheistic Universe it is a complete surprise that there is any rational structure to the Universe, or that human reason can make any sense of it. Far from there being a war between science and religion, it seems that belief in a rational and supremely valuable God is an important support for good science.

Keith Ward is a Professorial Research Fellow at Heythrop College, London and an ordained priest of the Church of England. A Fellow of the British Academy, he was formerly Regius Professor of Divinity at Oxford University. He has taught philosophy and theology at a number of British and American Universities. His main work is a five volume comparative theology, but he has also written books on science and religion from a philosophical perspective, most notably *'God, Chance, and Necessity'* (Oneworld Press, 1996), *'The Big Questions in Science and Religion*' (Templeton, 2008) and *'Pascal's Fire*' (Oneworld Press, 2006).

3. NATURAL LAW, REDUCTIONISM, AND THE CREATOR

by Eleonore Stump

3.1. Natural Law as the Laws of Physics

Trying to summarize the view of the world given by the secularist appropriation of science now common in Western culture, Simon Blackburn describes things this way:
'*the cosmos is some fifteen billion years old, almost unimaginably huge, and governed by natural laws that will compel its extinction in some billions more years, although long before that the Earth and the solar system will have been destroyed by the heat death of the Sun. Human beings occupy an infinitesimally small fraction of space and time, on the edge of one galaxy among a hundred thousand million or so galaxies. We evolved only because of a number of cosmic accidents . . . Nature shows us no particular favors: we get parasites and diseases and we die, and we are not all that nice to each other. True, we are moderately clever, but our efforts to use our intelligence . . . quite often backfire . . .That, more or less, is the scientific picture of the world*' (Blackburn, 2002, p29).

I will call a view such as this 'the secularist scientific picture' (SSP, for short), to distinguish it from a mere summary of contemporary scientific data. It remains a widely held picture of the world, even though, as I will show in what follows, research in various areas is making inroads against some parts of this view.

On SSP, as I will understand it for purposes of this paper, the natural laws Blackburn refers to are typically taken to be the laws of physics, and all other laws are supposed to be reducible to the natural laws of physics. All *things* in the world are thought to be reducible to the fundamental units of matter postulated by physics and governed by the natural laws of physics.

One important presupposition of SSP is a metaphysical rather than a scientific principle, namely, that a thing made of parts is identical to the parts that are its constituents. On this view, there is nothing to a

whole other than the sum of its parts. And, of course, the same holds for each of the parts. Each part is also nothing more than the sum of *its* parts, and so on down to the most fundamental level. Ultimately, everything is identical to the most fundamental parts that constitute it. On SSP, these are the elementary particles governed by the natural laws of physics.

The metaphysics incorporating the principle that constitution is identity is one version of reductionism. As Robin Findlay Hendry puts it, '*the reductionist slogan is that x is reducible to y just in case x is 'nothing but' its reduction base, y*' (Hendry, 2010, p209). Applied to theories rather than things, reductionism holds that all the sciences reduce to physics, and all laws are reducible to the laws of physics, together with bridge laws connecting theories in the higher-level sciences to theories in physics.

Reductionism is often thought to rest on another metaphysical claim as well, namely, the claim that there is causal closure at the level of physics. Apart from quantum indeterminacy, there is a complete causal story to be told about everything that happens; and that complete causal story takes place at the level of the elementary particles described by physics. On the view of natural laws in SSP, then, any causality found at the macro-level is just a function of the causality at the micro-level of physics. Because there is causal closure at the lowest level, the causal interactions among the fundamental particles of a thing are not open to interference by anything which is not itself at the most fundamental level and governed by the natural laws operating on that level. And everything that happens at any higher level, from the chemical to the psychological, happens as it does just because of the causal interactions among the fundamental physical particles involved.

So, for example, any act of a human being is explained by events at the level of bodily organs and tissues; these are explained by events at the level of cells; these are explained by events at the level of molecules; these are explained by events at the level of atoms – and so on down to the lowest level, at which there are the causal interactions among the elementary particles postulated by physics and governed by the natural laws of physics. The causal interactions of things at this lowest level thus account for everything else that happens, including those things human beings do.

Or, to put the point of this example in a more provocative way, on SSP love and fidelity, creativity, the very achievements of science, and any other thing that makes human life admirable or desirable is itself just the result of the causal interactions of elementary particles in accordance with the natural laws of physics.

For many people, me included, the implications of SSP seem highly counter-intuitive. Can the laws of all the other sciences really be reduced to the laws of physics? Is everything really completely determined by causal interactions at the microphysical level? Could it really be the case that the mental states of a person are causally inert as far as his own actions are concerned? Could an act of will really be both free and yet also causally determined?

3.2. Natural Law in the Thought of Thomas Aquinas

It is instructive to reflect on SSP by contrasting it with the very different view of the world held by the medieval philosopher Thomas Aquinas. Aquinas talks of natural law, too; but the notion of natural law in the thought of Aquinas is nothing like the notion of natural law in SSP. With respect to the notion of the natural law in Aquinas's thought, human persons and human agency are not rendered marginal or even invisible, as they seem to be in SSP. They are at the centre of the discussion. [For more discussion of Aquinas's notion of natural law and its place within Aquinas's metaethics and normative ethics, see the chapter on goodness in Stump (2003).]

When Aquinas explains his notion of natural law, he says that the *natural* law is a participation on the part of a human person in the *eternal* law in the mind of God (*Summa Theologiae* IaIIae.91.2). And, when he explains the *eternal* law, he says that it is the ordering of all created things as that ordering is determined in the mind and will of the Creator (*Summa Theologiae* IaIIae.91.10). For a created person to participate in the eternal law of God, then, is for that person to have a mind and will which reflect their origin in the Creator: the natural law in created human persons is an analogue of the eternal law in the Creator.

So one way to understand Aquinas's account of natural law is as a gift

of the Creator to the human persons he has created. It consists in a pair of habits, one in the will and one in the intellect, which is given to human beings either by means of the innate light of reason or through the Creator's revelation of his own mind to his creatures. Although, apart from revelation, these gifts are implanted innately, they are so far in the control of the creature that a person's exercise of his free will in evil acts can corrupt them. Nothing about God's rendering the natural law innate in human persons takes away from them their free agency.

Just as many people find the implications of SSP counter-intuitive, so, for many people, the implications of Aquinas's account of natural law, grounded as it is in his metaphysics and theology, seem counter-intuitive too. Can everything in the world really be traced back to an omnipotent, omniscient, perfectly good Creator? Could it really be the case that a human person has the causal powers of intellect and will which reflect the eternal law in the mind of the Creator? Or, to put the question in a less theological way, could the action of something at the macro-level, such as a human being, exercise causality, from the top down, as it were, without being itself determined at the micro-level?

3.3. Double Vision

Any attempt to hold in one view the very different notions of natural law in SSP and in the outlook of Aquinas can induce vertigo. How is one to understand the differences in worldview between the two, and how could one even begin to adjudicate their competing claims?

It will be profitable to begin by considering their highly various foundational metaphysics.

As has often been remarked, one notable difference between the notion of natural law in SSP and the Thomistic notion of natural law is that, for Aquinas but not for SSP, natural law is the law of a law-giver, whose mind is the source of the law and whose relation to and care for other persons lead him to promulgate the law. On the view of natural law in SSP, the whole notion of law is only metaphorical or analogous. A natural law of physics understood as SSP sees it is just a generalization describing the nature of the world at the microphysical level.

This dissimilarity is correlated with a much greater difference as regards the ultimate foundation of reality. On SSP, the ultimate foundation of reality consists in those elementary particles described by the ultimately correct version of contemporary physics and their causal interactions governed by the natural laws of that physics. All the sciences are reducible to physics. And everything that there is is reducible to the elementary particles composing it. Persons are no exception to this claim. Persons too are reducible to the elementary particles that constitute them. At the ultimate foundation of all reality, therefore, there is only the non-personal.

What is challenging for SSP therefore is the construction of the personal out of the impersonal. The mental states of persons, their free agency, their relations with each other all have to be understood somehow as built out of the physically determined interaction of the non-personal.

On Aquinas's view, things are in a sense exactly the other way around. That is because for Aquinas the ultimate foundation of reality is God the Creator. On the Thomistic worldview, the ultimate foundation of reality is therefore precisely persons.

It would not be hard, I think, to trace the notable differences between SSP and Aquinas's worldview, as implied by their varying notions of natural law, back to the great dissimilarity in their metaphysical views regarding the ultimate foundation of reality. But, given this radical difference between SSP and the Thomistic worldview as regards such foundational matters, is it so much as possible to reason about their competing claims?

Even if the recent history of philosophy did not make us pessimistic about the prospects for success when it comes to arguing over the existence of God, it is clear that it would not be profitable in a short paper to tackle a disagreement of this magnitude head-on. It is, however, possible to evaluate these two differing worldviews with regard to one somewhat smaller metaphysical issue. This is the issue of reductionism.

3.4. Reductionism

The brief sketch of Aquinas's views given above makes clear that Aquinas's metaphysics is incompatible with reductionism, unlike SSP, which is committed to it. [For a defense of the claim that Aquinas's metaphysics rejects reductionism, see Chapter 1 of Stump (2003)]. Although reductionism comes in many forms, they share a common attitude. In virtue of supposing that everything is reducible to the elementary particles composing it, reductionism holds that ultimately all macro-level things and events are a function only of things and events at the microstructural level. That is one reason why reductionism is often taken to imply a commitment to causal closure at the microphysical level.

For a helpful discussion of the general problem of reductionism relevant to the issues considered here, see Garfinkel (1993), who argues against reductionism by trying to show that reductive micro-explanations are often not sufficient to explain the macro-phenomena they are intended to explain and reduce. He says, '*A macrostate, a higher level state of the organization of a thing, or a state of the social relations between one thing and another can have a particular realization which, in some sense, 'is' that state in this case. But the explanation of the higher order state will not proceed via the micro-explanation of the microstate which it happens to 'be'. Instead, the explanation will seek its own level...*' (p.449). Aquinas would agree, and Aquinas's account of the relation of matter and form in material objects helps explain Garfinkel's point. A biological system has a form as well as material components, so that the system is not identical to the components alone; and some of the properties of the system are a consequence of the form of the system as a whole. Garfinkel himself recognizes the aptness of the historical distinction between matter and form for his argument against reductionism. He says, '*the independence of levels of explanation ... can be found in Aristotle's remark that in explanation it is the form and not the matter that counts.*' (p.149). See also Kitcher (1993). Particularly helpful and interesting on this subject is a book by John Dupre (995), who argues that causal determinism falls with the fall of reductionism.

One way to understand reductionism, then, is that it ignores or discounts the importance of levels of organization or form, as Aquinas would put it, and the causal efficacy of things in virtue of their form.

This feature of reductionism also helps explain why it has come under special attack in philosophy of biology. [See, for example, Garfinkel (1993) and Kitcher (1993)]. Biological function is frequently a feature of the way in which the microstructural components of a thing are organized, rather than of the intrinsic properties of the micro-components themselves. Proteins, for example, tend to be biologically active only when folded in certain ways, so that their function depends on their three-dimensional structure. But this is a feature of the organization of the protein molecule as a whole and cannot be reduced to properties of the elementary particles that make up the atoms of the molecule. [According to, for example, Richards (1991, p54–63), for relatively small proteins folding is a function of the properties and causal potentialities among the constituents of the protein, but '*some large proteins have recently been shown to need folding help from other proteins known as chaperonins*'.]

One way to think about such recent anti-reductionist moves in philosophy is to see them as adopting a neo-Aristotelian metaphysics of a Thomistic sort. For Aquinas, a thing's configuration or organization, its form, is also among the constituents of things; and the function of a thing is consequent on its form.

On philosophical views such as these, a thing is not just the sum of its parts, reductionism fails, and there is not causal closure at the microphysical level. The component parts of a whole can sometimes explain *how* the whole does what it does. But *what* the whole does has to be explained as a function of the causal power had by the whole in virtue of the form or configuration of the whole.

3.5. An Example Drawn from Neuroscience and Psychology

Recent discoveries in neuroscience and developmental psychology suggest that we should go even further in this anti-reductionist direction. These discoveries suggest that in order to understand some cognitive capacities we need to consider a system that comes into existence only when two people are acting in concert, attuned to each other, as one.

Research on some of the deficits of autism have helped to illuminate such a system. Autism in all its degrees is marked by a severe impairment in what some psychologists and philosophers call 'mindreading' or 'social cognition'. We are now beginning to understand that mindreading or social cognition is foundational to an infant's ability to learn a language or to develop cognitive abilities in other areas as well.

For an infant to develop normally as regards mindreading, the infant's neural system has to be employed within the active functioning of a larger system composed of at least two persons, an infant and a primary caregiver. This system requires shared attention or joint attention between a child and its caregiver. Many lines of recent research are converging to suggest that autism is most fundamentally an impairment in the capacity for joint attention.

Trying to summarize his own understanding of the role that the lack of shared attention plays in the development of autism, noted psychologist Peter Hobson (2004, p183) says that autism arise '*because of a disruption in the system of child-in-relation-to-others*'. By way of explanation, he says, '*My experience [as a researcher] of autism has convinced me that such a system [of child-in-relation-to-others] not only exists, but also takes charge of the intellectual growth of the infant. Central to mental development is a psychological system that is greater and more powerful than the sum of its parts. The parts are the caregiver and her infant; the system is what happens when they act and feel in concert. The combined operation of infant-in-relation-to-caregiver is a motive force in development, and it achieves wonderful things. When it does not exist, and the motive force is lacking, the whole of mental development is terribly compromised. At the extreme, autism results*.'

On Hobson's views, then, autism cannot be explained apart from a complex system involving two human beings, an infant and its primary caregiver. Any attempt to explain this system in terms of reductionism and causal closure at the microphysical level would lose the understanding of the jointness in attention critical for normal infant development. On the contrary, as the phrase indicates, joint or shared attention cannot be understood even just by reference to one human being taken as a whole, to say nothing of the lowest-level components of a human being. Rather, it has to be understood in terms of a system

comprising two human beings acting in concert. This system enables the shared attention which in turn enables the connection necessary for typical infant development.

3.6. The Moral of the Story

SSP supposes that all macro-phenomena are reducible to micro-level phenomena and that there is a complete causal story to be told at the micro-level. The converging lines of research in the sciences and several areas of philosophy, however, make a good case that reductionism is to be rejected. And if reductionism is rejected, then it is not true that the laws of higher-level sciences reduce to physics. It is not the case that everything is determined by the causal interactions at the level of the microphysical. And it is therefore also not the case that things at the macro-level are causally inert. Rather, causal power is associated with things at any level of organization in consequence of the configuration or form of those things.

In a metaphysical system of this anti-reductionist sort, the place of persons is not imperilled. In fact, even a human pair bonded in love, as a mother and child are, can be a sort of whole, with causal power vested in their bondedness.

If reductionism is rejected, as the new work in the sciences and in philosophy argues it should be, then with respect to this one issue the Thomistic worldview is more veridical and more worthy of acceptance than SSP is. By itself, of course, this conclusion certainly does not decide the issue as regards the central disagreement between SSP and the Thomistic view. It cannot adjudicate the issue regarding the ultimate foundation of reality. And so, as far as the evidence canvassed in this paper is concerned, the central disagreement between SSP and the Thomistic view remains an open issue. Clearly, it is possible to reject reductionism and accept atheism.

For that matter, it is possible to reject atheism and accept reductionism. As I have described it, SSP is a secular view that combines contemporary scientific theories with certain metaphysical claims. But it is possible to have an analogue to SSP in which a reductionist scientific view of the world is combined with a commitment to religious belief, even religious belief of an orthodox Christian sort.

That is, SSP can have a theistic analogue, which includes most of the scientific and metaphysical worldview of SSP but marries it to belief in an immaterial Creator.

So, for example, consider Peter van Inwagen's explanation of God's providence. Trying to explain God's actions in the created world, Van Inwagen says that God acts by issuing decrees about elementary particles and their causal powers: *'[God's] action consists in His … issuing a decree of the form 'Let that [particle] now exist and have such-and-such causal powers*' (van Inwagen, 1995, p49). For van Inwagen, apart from miracles. God's actions in the world consist just in creating and sustaining elementary particles and their causal powers. This, Van Inwagen says, '*is the entire extent of God's causal relations with the created world*' (Van Inwagen 1995, p. 44). On his view, miracles are a matter of God's supplying '*a few particles with causal powers different from their normal powers*' (Van Inwagen 1995, p. 45).

For most people conversant with religious discourse in the Judaeo-Christian tradition, this religious analogue to SSP will seem a very odd mix. On their view, God not only issues decrees (about particles or anything else). God also cajoles, threatens, instructs, illumines, demands, comforts, and asks questions. At the heart of all these activities is the direct interaction between persons of the sort Hobson was trying to explain. Even if, *per improbabile*, all this and more could be reduced to decrees about particles, the reduction would have lost the personal connection that in both Judaism and Christianity has been the most important element in the relations between God and human persons.

For these reasons, reductionism does not fit well with theism. I am not claiming that it is incompatible with theism. The point is only that there is something awkward or forced or otherwise implausible about reductionism in a theistic worldview. It isn't natural there, one might say. On a worldview that takes persons to be the ultimate foundation of reality, reductionism to the level of elementary particles is not really at home.

By the same token, it seems to me that the rejection of reductionism is harder to square with a worldview in which the ultimate foundation of reality is impersonal. Here too the issue is not the compatibility of

the two positions. The point is rather this. The rejection of reductionism leaves room for the place ordinary intuition accords persons in the world. But, to me at any rate, the metaphysics that gives persons this place is more readily intelligible on a worldview that sees persons as the ultimate foundation of reality. Figuring out how to make it cohere with the picture Blackburn paints, even if we subtract reductionism from that picture, strikes me as much harder to do. [This paper is an abbreviated version of a much longer paper (Stump (2015) which gives a consideration of more nuances and examples with regard to arguments about reductionism.]

References

Blackburn, S. (2002), 'An Unbeautiful Mind,' *New Republic*, 5 and 12, p.29.

Boyd, R., Gasper, P. and Trout, J.D., eds (1993) *The Philosophy of Science*, (Cambridge, Mass.:MIT Press).

Dupre, J. (1995) *The Disorder of Things. Metaphysical Foundations of the Disunity of Science*, (Cambridge, MA: Harvard University Press).

Garfinkel, A. (1993) 'Reductionism', in Boyd et al (1993), pp. 443–459.

Hendry, R.F. (2010) 'Emergence vs. Reduction in Chemistry', in *Emergence in Mind,* ed. Cynthia MacDonald and Graham MacDonald, (Oxford: Oxford University Press), p.209.

Hobson, P. (2004) *The Cradle of Thought. Exploring the Origins of Thinking,* (Oxford: Oxford University Press), p.183.

Kitcher, P. (1993) '1953 and All That: A Tale of Two Sciences', in Boyd et al (1993), pp.553–570.

Richards, F.M. (1991) 'The Protein Folding Problem', *Scientific American* 264, 54–63.

Stump, E. (2003) *Aquinas*, (New York and London: Routledge).

Stump, E. (2015) 'Natural Law, Metaphysics, and the Creator,' in *The Future of Creation Order, Volume I: Perspectives from Philosophy, the Sciences, and Theology*. Govert Buijs, Gerrit Glas, Annette Mosher, and Jeroen Ridder (eds.) (Springer).

Van Inwagen, P. (1995) *God, Knowledge, and Mystery. Essays in Philosophical Theology,* (Ithaca and London: Cornell University Press), p.49.

Eleonore Stump is the Robert J. Henle Professor of Philosophy at Saint Louis University, where she has taught since 1992. She has published extensively in philosophy of religion, contemporary metaphysics, and medieval philosophy. Her books include her major study *Aquinas* (Routledge, 2003) and her extensive treatment of the problem of evil, *Wandering in Darkness: Narrative and the Problem of Suffering* (Oxford, 2010). She has given the Gifford Lectures (Aberdeen, 2003), the Wilde lectures (Oxford, 2006), and the Stewart lectures (Princeton, 2009). She is past president of the Society of Christian Philosophers, the American Catholic Philosophical Association, and the American Philosophical Association, Central Division; and she is a member of the American Academy of Arts and Sciences.

4. THE ORIGIN AND END OF THE UNIVERSE: A CHALLENGE FOR CHRISTIANITY

by David Wilkinson

In March 2014, the 'spectacular' discovery of evidence for cosmic inflation was hailed by the press. The BICEP2 experiment presented evidence of twists in the cosmic microwave background radiation with the interpretation that they were produced by gravitational waves during inflation, a period in the first fraction of a second of the Universe's history. Such discoveries routinely lead on to popular discussion about whether this replaces the need for a Creator. While many now question the BICEP2 results, due to whether they had correctly taken into account dust within our own Galaxy, the inevitable increase of our understanding of the early Universe does lead to theological questions.

Stephen Hawking's *The Grand Design* and Lawrence Krauss' *A Universe from Nothing* still top bestseller charts while making theological claims that God is not needed at the very first moment of the Universe (Hawking and Mlodinow, 2010; Krauss, 2012). In fact, following the publication of *The Grand Design,* The Times newspaper (Sept 2, 2010) led with headline 'Hawking: God Did Not Create the Universe.'

However, against the media stereotypes that these discoveries mean the death of a Creator, the interaction of Christian faith with the science of the origin and the end of the Universe is much more subtle and indeed fruitful. Sometimes these discoveries encourage a new dialogue with faith, and sometimes they lead to a new understanding of faith. The challenge of contemporary cosmology for Christianity, is not a direct attack, but an opportunity to take science seriously in theological thinking and in building bridges between faith and culture.

4.1. A Universe from Nothing – But What do we Mean by Nothing?

Hawking in his most recent work provocatively claims that '*philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics*' (Hawking and Mlodinow, 2010, p5) This reflects a widespread feeling among scientists that there has been a lack of *specific* understanding or engagement with theories such as inflation, string theory, or M-theory. Instead, theologians and philosophers continue to assert generalizations about creation.

Yet one of the great achievements of cosmology has been the Big Bang model of the origin of the Universe. It describes the expansion of the Universe from a time when it was only 10^{-43} seconds old. At that stage, 13.8 billion years ago, the Universe was an incredibly dense mass, so small that it could pass through the eye of a needle. This model is supported by the evidence of the redshift of galaxies, the microwave background radiation and the abundance of helium in the Universe. Of course, like any scientific model it has some gaps. A large proportion of the Universe is in the form of dark energy (over 70%) and at the moment we have little idea as to what it is. Another 23% of the Universe is in the form of dark matter; we know it is there but we are not sure what it is. The fact that we know only a tiny fraction of what the Universe is made of is somewhat embarrassing for cosmologists. Yet the power of science is that we know what we do not know, and we are able to design experiments at the Large Hadron Collider that might at least tell us what dark matter is.

Some questions are much more difficult. The standard model of the hot Big Bang describes the origin of the Universe as an expansion from a singularity, that is, a point of infinite density. But that singularity raises immediate problems. First, general relativity, which describes the expansion of the Universe so well, suggests that time is not completely independent of space, and that gravity is then explained as a consequence of this space-time being curved by the distribution of mass-energy in it. Thus, the distribution of mass determines the geometry of space and the rate of flow of time. However, at a singularity there is infinite density and infinite curvature of space-time. General relativity is unable to cope with this infinity and predicts its own downfall; that is, the theory breaks down at the singularity. Second, general relativity as a theory is inconsistent with quantum

theory. General relativity, which is extremely successful in describing the large-scale structure of the Universe, needs to specify mass and its position in order then to describe the geometry and rate of flow of time. At a singularity, where the gravitational field is so strong and the whole Universe is so small that it is on the atomic scale of quantum theory, it is believed that quantum effects should be important. Quantum theory, however, says that one can never know both the mass and position without an intrinsic uncertainty. One cannot have both general relativity and quantum theory to describe a situation.

The singularity problem therefore is that general relativity is unable to give a description of the singularity; in other words, general relativity cannot explain the initial conditions of the expansion of the Universe. Present scientific theories are thus unable to predict what will come out of the singularity. They can describe the subsequent expansion but are unable to reach back beyond an age of 10^{-43} seconds to zero. This 'limit' of scientific theory, unable to reach back to the very beginning, was frustrating to physicists but attractive to some theologians. Is God needed to 'fix' the initial conditions of the Universe? If science is unable to describe the initial moments, is this 'the gap' where God comes in to set the Universe off?

However, many scientists rightly resist this trajectory. Hawking attempts to use the laws of physics to explain not just the evolution of the Universe but also its initial conditions. In order to do this one must bring quantum theory and general relativity together into a quantum theory of gravity. Such a theory he suggests can explain how the blue touch paper of the Big Bang lights itself. The core of Hawking's theory, in John Barrow's phrase, is that '*once upon a time there was no time*' (Barrow, 1993). According to Hawking, the Universe does have a beginning but it does not need a cause, since in this theory the notion of time melts away. Hawking's Universe emerges from a fluctuation in a quantum field. No cause as such is necessary.

Hawking believes that the best theory for explaining the Universe's initial conditions is M-theory, which is in fact a whole family of different theories where each theory applies to phenomena within a certain range. It suggests eleven dimensions of space-time. However, for Hawking it also suggests that our Universe is one in 10^{500} universes that arise naturally from physical law. And for him, '*their creation does not require the intervention of some supernatural being or god*'

(Hawking and Mlodinow, 2010, p8). It must be stressed that Hawking's thinking on this is not fully accepted by the rest of the scientific community. There are other proposals on how to deal with the problem of the laws breaking down, and it remains difficult to know whether quantum theory can be applied to the whole Universe.

If Hawking's attempt to explain scientifically the first moment of the Universe's history is indeed successful, then this does demolish a 'god of the gaps.' But the God of Christian theology is not a God who fills in any gaps of current scientific ignorance, nor interacts with the very first moment of the Universe's history and then retires a safe distance. Hawking's use of M-theory may eventually work, but the Christian theologian, while applauding enthusiastically, will also raise the question of where M-theory itself comes from. God is the one who creates and sustains the laws of physics, which science assumes but does not explain.

Such a god-of-the-gaps argument has sometimes been used in apologetic arguments in attempts to prove the existence of God. The argument that the Big Bang needs God to start it off is called the 'cosmological argument' in temporal form and has been used in different contexts for centuries. However, it has a number of weaknesses. Augustine pointed out many years ago that the Universe was created with time, not in time. Therefore to ask the question what came *before* the Universe is an attempt to use the concept of time before time itself came into existence. In addition, the first-cause argument derives from a notion that the Universe is a thing or event. It is easy to say that everything has cause, but is the Universe a thing or event?

More importantly, as scientists explain more and more of the Universe, there is a temptation to look for unexplained gaps in the knowledge of the natural world in order to find space for God. But this 'god of the gaps' is always in danger of becoming irrelevant as science fills in more of its own story. In contrast, the Bible understands that the whole Universe is the result of God's working. God is at much at work at the first 10^{-43} second as at any other time. A scientific description of that moment in time does not invalidate it as being the activity of God as any other event. Indeed, the biblical images are not of a deistic god who breaks a bottle against the hull of the Universe and then waves it off into the distance saying, '*Good-bye, see you on judgement day*.'

Paul in his letter to the Colossians speaks of Jesus as '*In him all things hold together'*. This gives much more a picture of God as the one who keeps the Universe afloat and together. God is the basis of the natural order, the basis of the physical laws. This is much more the God of Christian theism rather than deism. Don Page, a long-time collaborator of Hawking, sums it up with these words: '*God creates and sustains the entire Universe rather than just the beginning. Whether or not the Universe has a beginning has no relevance to the question of its creation, just as whether an artist's line has a beginning and an end, or instead forms a circle with no end, has no relevance to the question of its being drawn*' (Page, 1998).

4.2. The End of the Universe – But What about a New Beginning?

If scientific work on the origin of the Universe challenges Christian understandings of creation to reject deism and re-energise theism, work on the long-term future of the Universe challenges a renewed emphasis on new creation as the central category of Christian hope.

This work was recognized recently in the award of the Nobel Prize for physics (Palmer, 2011). In 1998, astronomers began to look at distant supernovae explosions of stars. Their results showed something that was completely unexpected. The Universe is accelerating in its rate of expansion due to some unknown type of force, the so-called dark energy (Perlmutter et al. 1999, 2003, Riess, A.G. et al., 1998). There had been no theoretical prediction of this, apart from Einstein's original inclusion of his cosmological constant in his solution of the equations of general relativity for the Universe. It led to near panic among theorists, and to a range of possible explanations, none of which at the time of writing come anywhere near to a generally accepted understanding.

Yet the accelerating Universe points to a future of futility for the physical and with it the end of the survival of intelligent life within the Universe. An accelerated heat death is a bleak end. When the Universe is 10^{12} years old, stars cease to form, as there is no hydrogen left. At this stage all massive stars have now turned into neutron stars and black holes. At 10^{14} years, small stars become white dwarfs. The

Universe becomes a cold and uninteresting place composed of dead stars and black holes.

While some physicists such as Freeman Dyson (1988) and Frank Tipler (1994) have tried to argue that the ability of humans in manipulating the environment will lead to the creation of forms of life able to survive such a Universe, Paul Davies suggests that an 'almost empty Universe growing steadily more cold and dark for all eternity is profoundly depressing' (Davies, 2002). Some theologians will say that this is so far in the future that it is irrelevant, while others have concentrated their thinking on the future of the Earth, the individual believer, or the church.

Yet here, Christianity can face the challenge and rediscover within its own tradition resources that give hope (Wilkinson, 2010). The theme of new creation, that is a new heaven and Earth, is present within a range of biblical genres. This is not about some other worldly existence that has no connection with the physical Universe. It is about God doing something with the totality of existence. At the same time it is about something new, not about keeping this creation alive for as long as possible — which is the hope of such 'eschatological scientists' as Dyson and Tipler.

This new creation is a possibility because of a Creator God. The new creation is continually linked to God's original creative work, and hope for the future is built on an understanding of God as Creator. Whatever the circumstances, creation is not limited to its own inherent possibilities because the God of creation is still at work. The evidence of this work is focused in the resurrection of Jesus which is also the model by which the continuity and discontinuity between creation and new creation are held together. If as Paul argues, the resurrection is the first fruits of God's transformative work, then there should be both continuity and discontinuity in the relationship of creation and new creation just as there was in the relationship of Jesus before the cross and Jesus risen. The empty tomb is a sign that God's purposes for the material world are that it should be transformed and not discarded. If resurrection affirms creation, then it also points forward to new creation. Continuity and discontinuity in the transformation of the physical Universe may be located in the nature of matter, space, and time. To take time as an example, the resurrected Jesus does not seem limited by space and time. In new creation the continuity may be

that time is real but the discontinuity is that time no longer limits us in the way that it does in this creation. It could be argued that the resurrection body is characterized by decay's reversal, that is, a purposeful flourishing. In this creation, time is associated with decay and growth, but in new creation might time be simply about growth? We are therefore suggesting that our experience of time in the physical Universe is a small and limited part of an ontologically real time that we might call eternity.

Such insights are offered as a structure for dialogue. They do not set out to map the biblical account exactly onto the scientific account, or to see them as completely independent. The Christian will come to the scientific description of the future of the physical Universe with much to learn but also much to offer.

The distinguished cosmologist Martin Rees comments, '*What happens in far-future aeons may seem blazingly irrelevant to the practicalities of our lives. But I don't think the cosmic context is entirely irrelevant to the way we perceive our Earth and the fate of humans*' (Rees, 2003). This is a challenge to all theologians, not least those who take science seriously.

References

Barrow, J.D. (1993) *The Observer*, 7 May.

Davies, P. (2002) 'Eternity: Who Needs It?' in *The Far Future Universe: Eschatology from a Cosmic Perspective* (ed. G. F. R. Ellis; Radnor: Templeton Foundation), 48.

Dyson, F. (1998) *Infinite in All Directions* (New York: Harper & Row).

Hawking, S.W. and Mlodinow, L. (2010) *The Grand Design* (London: Bantam)

Krauss, L. M. (2012) *A Universe from Nothing: Why There Is Something Rather Than Nothing* (London: Simon & Schuster).

Page, D. (1998) 'Hawking's Timely Story,' *Nature* 333, 742–43.

Palmer, J. (2011) 'Nobel Physics Prize Honours Accelerating Universe,' http://www.bbc.co.uk/news/science-environment-15165371.

Perlmutter, S. et al. (1999) 'Measurements of Omega and Lambda from 42 High-Redshift Supernovae,' *Astrophysical Journal* 517, 565.

Perlmutter, S. (2003) 'Supernovae, Dark Energy, and the Accelerating Universe,' *Physics Today* 56, no. 4, 53–60.
Rees, M. (2003) *Our Final Hour* (New York: Basic), 4.
Riess, A.G. et al. (1998) 'Observational Evidence from Supernovae for an Accelerating Universe and a Cosmological Constant,' *Astronomy Journal* 116, 1009.
Riess, A.G. et al. (2001) 'The Farthest Known Supernova: Support for an Accelerating Universe and a Glimpse of the Epoch of Deceleration,' *Astrophysical Journal* 560, 49–71.
Tipler, F. (1994) *Physics of Immortality* (Anchor Books, New York).
Wilkinson, D. (2010) *Christian Eschatology and the Physical Universe* (London: T&T Clark).

David Wilkinson is Principal of St John's College, a Methodist minister and also Professor in the Department of Theology and Religion at the University of Durham, England. His background is research in theoretical astrophysics, where he gained a PhD in the study of star formation, the chemical evolution of galaxies and terrestrial mass extinctions. He also holds a PhD in Systematic Theology. His books include *God, Time and Stephen Hawking* (2001), *The Message of Creation* (2002), *Christian Eschatology and the Physical Universe* (2010), *Science, Religion, and the Search for Extraterrestrial Intelligence* (2013) and *When I pray, what does God do?* (2015).

5. EVOLUTION, FAITH, AND SCIENCE

by Kenneth Miller

5.1. Voices against both Evolution and Faith

In 2005, the very first amendment to America's Constitution was put to the test in a Federal courtroom. The issue was not freedom of speech, freedom of the press, or the right to assemble, all of which are guaranteed by that amendment. Rather it was the amendment's language forbidding Congress, and by extension other governing bodies, from passing any law '*respecting an establishment of religion*.' Eleven parents in the small town of Dover, Pennsylvania, had gone to court alleging that the town's school board had violated that provision by requiring that students be taught about 'intelligent design' (ID), a religiously-inspired alternative to the theory of evolution.

I took the stand as an expert witness during the first two days of that seven-week trial, testifying as to the scientific standing of the theory of evolution as well as to the intellectual bankruptcy of the flawed arguments made on behalf of 'intelligent design.' The outcome of that trial, featured in a 2006 BBC program entitled '*A War on Science*,' was a resounding victory for the parents and the scientific community that had supported them, and a signal defeat for the anti-evolution movement in America.

Unfortunately, the attention received by the Dover trial lent itself to the temptation of oversimplification. Like similar confrontations, including the famous 1925 Scopes 'monkey trial,' it was far too easy to characterize the proceedings as a 'God vs. Science' confrontation. Critics of the decision were quick to see it as a blow against religious free expression, and an example of the willingness of Darwinist elites to censor competing ideas.

In reality it was none of these things, but the perception of scientific hostility to religion in general and Christianity in particular nonetheless lies at the very root of anti-evolution movements in the United States and Europe. It is certainly true that these movements have had plenty of help in making the point that evolution can be used as a weapon

against religious faith. An oft-cited book review written by philosopher David Hull is one of their prime examples:

> *Whatever the God implied by evolutionary theory and the data of natural history may be like, He is not the Protestant God of waste not, want not. He is also not a living God who cares about his productions. He is not even the awful God portrayed in the book of Job. The God of the Galápagos is careless, wasteful, indifferent, almost diabolical. He is certainly not the sort of God to whom anyone would be inclined to pray* (Hull, 1991).

Hull's point seems to be that God, if He exists, is a pretty nasty fellow. His evidence, naturally enough, is nature red in tooth and claw, a natural world containing an evolutionary process he regards as '…*rife with happenstance, contingency, incredible waste, death, pain, and horror*' (Hull, 1991). No God could allow such horrors, so there can be no God, according to Hull and his view of evolution. The evolutionary biologist Richard Dawkins has been even more explicit on this point, making it clear that his view of the evolutionary process is at least as bleak as Hull's:

> '*In a Universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won't find any rhyme or reason in it, nor any justice. The Universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind pitiless indifference*.' (Dawkins, 1995. p.133)

5.2. Wonder and the Purpose of Existence

Curiously lost in this rush to assert the pointlessness of life is the sense of wonder with which Darwin himself approached the evolutionary process — namely, that '*from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved*' (Darwin, 1859). The modern view, it would seem, has wrung the sheer delight out of Darwin's vision, and enlisted it in a philosophical assault

against religion. Reading such pronouncements, one cannot help but notice how neatly they fit into the strategic plans of the anti-evolution movement. Indeed, it is by making evolutionary science the enemy of God, according to University of California emeritus professor Phillip Johnson that the religious aims of ID can be realized:

> *The objective [according to Johnson] is to convince people that Darwinism is inherently atheistic, thus shifting the debate from creationism vs. evolution to the existence of God vs. the non-existence of God. From there people are introduced to 'the truth' of the Bible and then 'the question of sin' and finally 'introduced to Jesus.'* (Boston, 1999)

Considerations such as these led columnist Madeleine Bunting of the Guardian newspaper to explain to her readers '*Why the intelligent design lobby thanks God for Richard Dawkins,*' noting that '*Anti-religious Darwinists are promulgating a false dichotomy between faith and science that gives succor to creationists*' (Bunting, 2006). Exactly so.

As an experimental scientist, what I find especially noteworthy in pronouncements from individuals such as Hull and Dawkins is an assumption implicit in their use of evolutionary science in philosophy. That assumption is that science alone can lead us to truth regarding the purpose of existence — which is, of course, that it does not have one. This may be true, of course, but it is not a scientific statement because it is not testable by the methods of science. In fact, David Hull's pronouncements about the 'waste' and 'horror' of existence have no more scientific standing than a faith-based assertion one might make echoing the words of Darwin to describe the profusion of '*endless forms most beautiful and most wonderful*' in the world of life.

Indeed, most biologists would agree that the capacity for evolution, as well as life itself, is built into the fabric of the natural world itself as part of the physics and chemistry of matter. If this is true, then the apparent chaos of that world actually contains the seeds to produce, by its own means, the order, design, and beauty of life in which we so delight. As a result, the Christian notion that we live in a Universe of meaning and purpose is validated rather than contradicted by the ever-expanding evolutionary possibilities of existence.

5.3. The Nature of Evolution to a Person of Faith

But doesn't evolution contradict the role of God as Creator, described so dramatically in the Book of Genesis? An answer to that question turns, of course, on what we suppose the Creator might have fashioned. If we misconstrue Genesis as natural history, we find profound contradictions between its creation story and the modern sciences of astronomy, geology, and biology. Such science has shown that heaven and Earth were not fashioned 6,000 years ago, all living organisms did not appear simultaneously, and the Earth's geological formations were not laid down in a single worldwide flood.

What the modern theory of evolution does show is that the origins of all species, including our own, are found in natural processes that can be observed and studied scientifically. In other words, that our own existence is woven into the very fabric of the natural world. Seen in this light, the human presence is not a mistake of nature or a random accident, but a direct consequence of the characteristics of the Universe. What evolution tells us is that we are part of the grand, dynamic, and ever-changing fabric of life that covers our planet. To a person of faith, an understanding of the evolutionary process only deepens our appreciation of the scope and wisdom of the Creator's work.

The particular solution for people of faith, therefore, is not to oppose science, but to develop an understanding of science that is in harmony with religious faith. Taking up this task, I am convinced, is the key to making peace between science and religion, a peace that is much to be desired. I am hardly the first person to make this point. The notion that religion must respect the finding of scientific reason is, in fact, a traditional western view that has been expressed by many writers in the Christian tradition, none more eloquently than St. Augustine.

> *Even a non-Christian knows something about the Earth, the heavens, … the kinds of animals, shrubs, stones, and so forth, and this knowledge he holds to as being certain from reason and experience. Now it is a disgraceful and dangerous thing for an infidel to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an*

> *embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn* (Augustine, 411. Section 1:19).

This remarkable passage points out that believers and non-believers alike have equal access to observations of the natural world. Therefore, nothing could therefore be worse for people of faith than to defer to the Bible to as a source of scientific knowledge that contradicted direct, empirical studies of nature. Augustine, one of the most prolific and influential of the early Christians writers, got the relationship between Scripture and empirical science exactly right. He warned of the danger inherent in using the Bible as a book of geology, astronomy, or biology, admonishing the faithful that to do so would hold the book up to ridicule and disproof. To Augustine, the eternal spiritual truth of the Bible would only be weakened by pretending that it was also a book of science.

For Christians today, the scientific successes of evolutionary theory present a genuine opportunity to come to grips with the reality of the natural world that gave rise to us. That science, no question about it, presents genuine challenges to religion, but it also provides religion with an extraordinary opportunity to inform and enlighten the scientific vision of our existence.

As if to illustrate a pathway to such understanding, several months ago one of my scientific friends sent me this passage, and asked me to guess its author:

> *According to the widely accepted scientific account, the Universe erupted 15 billion years ago in an explosion called the 'Big Bang' and has been expanding and cooling ever since. … In our own solar system and on Earth (formed about 4.5 billion years ago), the conditions have been favorable to the emergence of life. While there is little consensus among scientists about how the origin of this first microscopic life is to be explained, there is general agreement among them that the first organism dwelt on this planet about 3.5–4 billion years ago.* (ITC, 2004. Paragraph 64).

The ‘author’ of that brief but straightforward account of scientific natural history was, according to my colleague, Pope Benedict XVI. To be perfectly accurate, he wasn’t exactly the ‘author,’ since the passage actually comes from the 2004 report of a committee known as the International Theological Commission, but Joseph Cardinal Ratzinger (later to be Pope Benedict) did indeed supervise the work of the Commission, and clearly approved its final form. Significantly, the report goes on to make specific comments about evolution that clearly relate to the evolution-creation struggle:

> *Many neo-Darwinian scientists, as well as some of their critics, have concluded that, if evolution is a radically contingent materialistic process driven by natural selection and random genetic variation, then there can be no place in it for divine providential causality.… But it is important to note that, according to the Catholic understanding of divine causality, true contingency in the created order is not incompatible with a purposeful divine providence. Divine causality and created causality radically differ in kind and not only in degree. Thus, even the outcome of a truly contingent natural process can nonetheless fall within God’s providential plan for creation.* (ITC, 2004, Paragraph 69)

Evolution is indeed a ‘truly contingent natural process,’ and the Commission’s clear statement that such a process can fall within the sphere of Divine causality is nothing more than a reaffirmation of the teachings of Aquinas and other Christian writers on Divine and natural causality. This kind of clarity, unfortunately, is remarkably rare in public statements on both sides of the religion and science debate today.

Ultimately, the religion and science debate continues because of a deep antagonism between extremists on both sides of the issue. The solution is not to split the difference, but to come to a genuine understanding and appreciation of the true depth of scientific and religious thought on the issues at hand. In the specific case of evolution, the sophistication of Christian thinking on natural processes and Divine will is routinely underestimated by those who would use science as a weapon against faith. Conversely, the Christian community often fails to appreciate the self-critical nature of science

and the clear recognition of most scientists as to the limitations of scientific inquiry. In the final analysis, both sides may come to realize, as Charles Darwin did, that there is indeed beauty, wonder, and even grandeur in the evolutionary view of life.

References

Augustine of Hippo (411) *The Literal Meaning of Genesis*, Ancient Christian Writers 41 (New York: Newman Press, 1982), book 1, chapter 19.

Boston, R. (1999) '*Missionary Man*,' Church & State Magazine(April).

Dawkins, R. (1995) *River out of Eden: A Darwinian View of Life*. New York: Harper Collins, 1995), p. 133.

Hull, D. L. (1991) '*The God of the Galápagos*,' Nature 352: 485–486.

International Theological Commission (2004) '*Communion: Human Persons Created in the Image of God*,' Report of the International Theological Commission, paragraphs 64 & 69.

Bunting, M. (2006) '*Why the Intelligent Design Lobby Thanks God for Richard Dawkins*,' Guardian Unlimited, March 27, 2006.

Kenneth R. Miller is Professor of Biology at Brown University, in Providence, Rhode Island, in the United States. A cell biologist, he is the co-author of numerous biology textbooks widely used in American schools. He is also the author of the popular book '*Finding Darwin's God – a Scientist's Search for Common Ground between God and Evolution*.' In 2014 he was presented with the Laetare Medal by Notre Dame University, an award described as the '*the oldest and most prestigious honor given to American Catholics*.'

Author's note: Portions of this essay have been excerpted from Miller's previous essays, including a 2009 article in the March/April issue of BBC Knowledge, and his 2009 Terry Lecture at Yale University (published in '*The Religion and Science Debate – Why Does It Continue?*' Yale University Press, New Haven, Connecticut).

6. IS THERE MORE TO LIFE THAN GENES?

by Pauline M Rudd

6.1. The Body

The body is a unit, though it is made up of many parts; and though all its parts are many, they form one body. If the foot should say, '*Because I am not a hand, I do not belong to the body'*, it would not for that reason cease to be part of the body. And if the ear should say, '*Because I am not an eye, I do not belong to the body'*, it would not for that reason cease to be part of the body. If the whole body were an eye, where would the sense of hearing be? If the whole body were an ear, where would the sense of smell be? The eye cannot say to the hand, '*I don't need you!*' And the head cannot say to the feet, '*I don't need you!*' On the contrary, those parts of the body that seem to be weaker are also indispensable.

In 1 Corinthians 12:13, St. Paul is referring to parts of the body that you can see, but equally important are the millions of molecular machines and processes that we cannot see but nevertheless sustain our every waking moment. These are no less a part of the body and it makes no sense for the neurons say to the heart '*I don't need you*', neither can proteins say to the sugars or lipids, '*I don't need you*', nor can the genes to say to the proteins, '*I don't need you*'.

And so, continues St. Paul, '*We should make no division in the body, but its parts should have equal concern for each other. If one part suffers, every part suffers with it; if one part is honoured, every part rejoices with it*'.

The body is a highly complex entity which is constructed in such a way that it can interact effectively with the environment on which our survival depends. We are part of a holistic system – the body cannot say to the atmosphere, '*I don't need you*', and live; we cannot say to other people and other species, '*I don't need you*' and continue to live.

If we wish to describe a human being or any other organism, it is hard to know where to begin because there is no single beginning. We might try to begin chronologically, but everything, including the

fertilisation of the egg by a sperm, takes place in an environment that was prepared before the event. We might try to begin with an atom or the smallest component of a cell but very quickly there would be so many options that a linear story would shortly become impossible. The organisation of a human being, or any other creature, does not have a single, simple hierarchy. There is no means of describing ourselves in a linear fashion for there are countless starting points and hundreds of feedback loops that pass information around the body. This allows us to respond to our constantly changing environment and to engage in the co-operative behaviour that enables us to survive in a challenging world.

6.2. Our Genes

However, in our search to discover ourselves, our genes are a good place to start for they make each of us unique. They do not act unilaterally, they do not constitute a blueprint for our bodies; however, they do contain information that represents potential and imposes constraints.

We each have our own particular version of the human genome inside our cells. From our 30,000 or so genes, the systems they operate and the environment that surrounds us within and without, we derive purpose, assume agency, transcend the limitations of our environment and accept constraints that we cannot change. To this extent our genes are indeed us; these we can claim are peculiarly our own.

So what are genes? The way in which geneticists describe genes is changing. They were once defined as units of inheritance. A more recent definition is that genes are DNA-based units that can exert their effects on the organism in which they are located through RNA or protein products. Genes are one of the three biological alphabets that provide the building blocks of the natural world. They are composed of combinations of 4 bases (Adenine, Thymine, Guanine and Cytosine) and are assembled on very long linear molecules of deoxyribonucleic acid. One strand of DNA with the 4 bases attached and its complementary partner combine to form the famous double helical structure. Genes are arranged on 23 pairs of chromosomes in humans (a chromosome pair is composed of two molecules of DNA).

Some are bigger than others and they are numbered roughly in order of size. There is enough DNA in the human body to stretch to the Sun and back 600 times!

6.3. Genes and Proteins

Genes can replicate themselves. Also the DNA can be specifically unravelled to expose particular genes when they are needed to make proteins. The genes are copied to make messenger RNA which finds its way to the ribosomes located in a part of the cell called the Endoplasmic Reticulum. In the ribosome mRNA is edited and translated into proteins. These are linear molecules composed of amino acids linked together. Three bases code for one amino acid. Human beings make 21 different amino acids. The gene is 'read' from one end to the other and amino acids are linked together in the order specified by the base triplets to form the protein.

Genes can be altered, that is mutated, when the order of the bases is changed. Mutations alter protein sequence and structure which may or may not alter the function of the protein, might lead to new opportunities or sometimes to disease.

Many genes code for proteins that have multiple functions – all cells contain all of them but genes are only expressed in specific temporal and spatial locations. They are carefully controlled switches that allow the growth, repair and differentiation of the body. Very few genes give rise to a single consequence or even act alone. For example, 100 genes are related to height, and of course nutrition also plays a role – determining height is a very complex process and no wonder that we cannot add one cubit to our stature by worrying about it!

Genes respond to signals from their environment telling them that the protein they code for is needed. They are devices for extracting information from the environment. To a large extent genes have the potential to determine the organisation of their own body within an awe-inspiring complexity. Just as music has an existence of its own but requires an instrument to be realised, genes need a body in which to be expressed. However a person may have the genetic background to be a great violinist but if they are never given an instrument or do

not practise, their gift will never be developed. Some things are less about genes and more about opportunity.

Genes have interchangeable parts that code for important functions. During evolution when a protein had a useful function the key parts of it were retained– that is why we have large numbers of genes in common with fruit flies, the roundish flat worm and the stickleback. Epidermal growth factor, which has a crucial role in cell growth and proliferation, is present in hundreds of species from lampreys to chimpanzees. The gene may mutate a little and the protein sequence will change but if that change is so great that it means an essential protein cannot function adequately then the mutation will be lethal and will not persist in the species.

6.4. Genetic Mutation and Diversity

Genes can be altered (mutated). This happens for example, when one base changes, perhaps because of miscopying. This in turn changes the sequence of amino acids and thus alters protein structure. This may do nothing but if it is a sensitive part of the protein it can have a dramatic effect. It might give the protein an alternative useful function but more often it builds an inactive protein that can cause serious disease – as in the family of disorders known as Congenital Disorders of Glycosylation. In one case, the mutation in a single critical gene, Mgat 2, that makes an enzyme involved in sugar processing, leads to a heavily compromised individual who has a seriously impaired immune system.

Another genetic variation, this time of the HLA-B gene, HLA-B53, which some people carry make a particular immune molecule which protects them against severe malaria. So the sequences of our personal genomes can give us protection against some pathogens but be risk factors for others.

Genetic diversity not only makes each of us unique, it also helps to ensure the survival of our species. Darwin's finches on the Galapagos Islands have been studied for many years. There are several subspecies with different kinds of beaks that are specialised for different types of food. Some birds do better in dry seasons, some in

the wet. Whatever the conditions one or other subspecies will be adapted to survive.

Our individual genetic differences have enabled us to withstand plagues, and also to specialise and divide our tasks within a community, liberating time for creativity and imagination – we could never have progressed if we could not share skills. Economies arose because of exchange of objects and agreements to specialise. Our culture did not shape us as a species, it developed because of our collective abilities and because of our development of language and technologies and our expanding brains.

6.5. Our Brains

Our brains are the most complicated organ we have, and we only just beginning to understand its genetics, its proteins and sugars and how it works. We do know that many of our activities are not normally exercised under conscious control. The brain is smart – there are about 40 firings/sec at the conscious level compared with 40 million at the subconscious level. This allows the brain to give maximum attention to things that need conscious, intelligent, executive decisions.

The brain is plastic and continues to develop and adapt from 3 weeks after conception until the end of our lives. It responds to experience, forming new pathways and, for example, the prefrontal cortex is not fully developed until about the age of 25.

We have outlined a path that takes us from genes to the most complex organ on the planet, the human brain. We have seen that the cell can take messages from its environment, transcribe genes to proteins to produce fully functional molecules. At each step we can see that small components such as bases, give rise to entities that are more complex and diverse (the genes, the proteins), and that these complex and diverse entities can themselves be viewed as simple and unified when we analyse what is happening the next level of complexity (the cells, the tissues, the organs) and eventually the whole person). But the big question is: Who or what is ultimately in control?

6.6. Life – Going Beyond Genetic Determinism – We Are More Than Our Genes

One thing we have learned in recent decades is that life is infinitely more intricate than we imagined. New technologies have enabled us to open up the field of biology to explore the chemistry that underpins it. We can now appreciate that we are made up of thousands of dynamic systems, many completely outside our conscious control. It seems that there is nothing ultimately in control, no single thing directing and micro-managing us. Each small part faithfully carries out its role, unaware of the place it has in the big picture until finally we reach the level of consciousness. Even then it seems that this is a co-operative integrated process with many inputs from inside and outside of our bodies. So what initiates action?

It used to be axiomatic that reductionism was the scientific method that would allow us to describe and control everything, and indeed it is still an essential part of scientific investigation. But it is not enough; in modern biology we have reached the limits of our ability to rebuild the whole picture from analysing its parts. As we begin to appreciate the level of detail that underlies the most simple of operations in our bodies we need all the power of modern bioinformatics to work out how to assemble large amounts of non-linear information.

Trying to deal with complexity and emerging properties is a major challenge that defies a simplistic view of the world. Many things do not fall neatly into boxes and we are currently trying to understand the tipping points that lead to committed action such as the differentiation of a stem cell. We need to come to terms with the reality that everything is dynamic, many entities have several options when it comes to activity and we need to visualise thousands of interactive pathways, preferably simultaneously.

At the biochemical level we are certainly more than our genes. Genetic determinism is not a general feature of our individual genomes for the external and internal environments are the backdrop that triggers gene expression. Our inner worlds matter too, for our brains have given us the possibility of imagining what we cannot see and have not experienced. It is remarkable that our material brains can engage with abstract ideas that come from other people and emotions that are non-material and then take action. As many sages and ordinary people

have testified it is also entirely possible for us to experience insights that did not arise from rational conscious deduction, and at the time, were beyond description.
The challenge now is to discover how we can relate all the detailed information we have about our physical bodies to the deepest yearnings and insights of the human spirit. Science is an incredibly effective way of understanding the world but alone it is not enough. An intellectual understanding of causes and dealing with the consequences are not the same thing.

Science may provide a rationale for the basis of our ethics, our relationships with others and our deepest experiences of love, joy, beauty and hope. But understanding how we work is not the same thing as understanding how we should live. Science, like Nature, is ethically neutral; we have to think out the rest for ourselves.

To be more specific, if we reject predestination imposed by absolute genetic determinism and if we no longer subscribe to the concept of a god who controls our lives through divine intervention, then we ourselves become responsible for determining the purpose of our lives, and that means taking into account the consequences of our personal genomes, those of others and our environment. Even if it did turn out that we are genetically predetermined or controlled like puppets by some god out there it would not really help because few of us really believe that we have no personal freedom or responsibility. Our perception of ourselves as having some level of self-determination and agency might just be an illusion I suppose, but the alternative, that we have neither of these, would seem to fly in the face of common sense.

In any case, this is in fact how we live, for regardless of our certain knowledge that our lives are finite, that the Earth will eventually be subsumed and in the end all that we know will no longer exist, we continue to imbue our existence with meaning. This demanding approach to life, which in the long term appears to be rather irrational seems to need addressing. To approach this question, I believe we need more than a mechanistic view of our world, indispensable though that is. If we are to make the complex choices that confront us with sound judgment then we need to complement the magnificence of our modern scientific insights with experience from other windows on the

world. These include art, music, literature and the great philosophies and religions of the world.

6.7. Combining Imagination and Rationality – Our Experience of God

The scientific enterprise itself is enabled when imagination and insight are combined with rational thinking. Bringing ideas from our unconscious 'knowing' to the conscious mind where they can be evaluated and codified is a practice that every scientist, artist, mathematician and philosopher will recognise. Scientists use model systems and equations to express ideas that begin in the imagination. Religious thinkers use poetry, ritual, symbol and myth to express theirs. Scientists test their models in experiments. Religious leaders and philosophers develop internally consistent doctrines and dogmas. Those who follow a spiritual path test their inner experience in their own lives.

For millennia people have projected their profound internal awareness onto higher beings of all kinds in attempts to link the sacred with the secular. Many reasons have been rehearsed by anthropologists for this practice. However, God in essence is unknowable – if we claim to know God then it is not God that we know said St Augustine. Any description will be inadequate and even Moses could not gaze upon the face of God.

Perhaps what we are doing is describing a profound experience, projecting on to it attributes that are the best that we know such as justice, mercy, steadfast love, truth, compassion, charity, harmony, forgiveness and redemption, eternal life and even ultimate reality. This experience is not a reality in the scientific material sense that it can be measured, but it is powerful. It can profoundly affect human behaviour. It is hard to define precisely because by engaging with it we personalise it. We can add our own insights to the whole and draw on the insights of others in our personal quests for meaning, purpose and courage.

Our experience of God is a deep one. When we experience something we choose to name God we may not be able to prove that we are

communicating with any external reality, yet we can say that we understand that the Universe beyond us is not empty of consciousness – deep communicates with deep. Or as Newman put it, *Cor ad cor loquitur* Heart speaks unto Heart. Many people pray unceasingly that the great heart of our own heart will still hold our vision whatever befall. But note now how Newton's language and also mine is becoming less scientific and less precise than the earlier part of my article. This is really important because inspirational experience is particular to the individual. Furthermore, there needs to be space and flexibility in the language so we can relate to many insights from our own tradition and from others.

How can these insights inform and enrich our lives? The immense creative burst that is the Universe which has given birth to us is displayed in endless forms that inspire and delight us. We can only marvel at the vast power of matter and energy that combined to form everything from the stellar displays in the night sky to the unseen molecular machines that provide our cells with energy. Our Universe is the manifestation of this creative force that in most religions provides a foundation for the concept of God. Humans are also filled with creative energy and we bring this to birth in any number of forms including art, music, drama, science and literature. Innate biological systems control the mechanisms that sustain life, our cultural inheritance helps us to make the most of our environment, yet a truly original creative discovery by an individual is novel – it develops and is not pre-programmed or learned. Once we become aware of new insights our impulse is to create something which will allow us to articulate our inner experience so that we can integrate it into our own lives and share it with others. This is not an easy process and we are continually challenged to bring our informed and intuitive inner knowing to a reality that we can integrate into other forms of art or language to use as a platform of consolidated ideas from which to step further into the unknown.

There is no single entity in control of us. Not our genes, not our brains, not god. Every cell in our body has a completed copy of our genome and is sensitive to its own internal and external environment. There is no top down command system. Cells work in partnership with other cells around it. As we mature, we recognize that we can be in a co-creative partnership with God. Attempts at total control exercised either by ourselves or by God may satisfy our desire for security, but

it doesn't really fit with our observance and experience of nature, or indeed with experience of ourselves at the level of intentional action. It appears, instead, that there is openness, a range of possibilities within nature. If either we envisage God as someone who designed everything once and for all at the beginning of creation, or we envision ourselves as the ultimate controllers of the natural world through science, then we need to take care that we do not preclude the possibility of creation itself being creative as it responds in harmony with changes to itself. Perhaps our understanding of God's involvement with us is such that together we can attain real novelty, contingency and opportunity that preserve the integrity of life in the process?

6.8. Conclusion

To summarise – human beings live in a glorious technicolor world in which we are required to deal decisively with the messiness of everyday life on a minute by minute basis, despite the complexity of the information that both drives and informs us. We continually integrate simple information into more complex systems. Our most basic decisions are guided by the possibilities and limitations imposed by not only our genes but by many other molecules and by the environment. The transcription factors that enable gene expression, the metabolic systems that supply our muscles with energy, the repair mechanisms that enable us to survive environmental insults and our immune systems that combat disease operate largely without any conscious intervention by us, according to principles that we increasingly understand.

However, living a fulfilled human life is far more complicated than simply remaining alive. As individuals we need to become integrated into an even more complex world so that we can find a niche where we can flourish physically and emotionally. Our cultural environment teaches us how to relate to others, and gives us the practical skills and learning that we need to deal with the complex world of work and family.

Yet most of us expect to achieve even more in the fleeting moment of consciousness that we are privileged to experience. Expressing our own particular creative ideas and responding to beauty, love, joy,

sorrow, death and loss requires even more complex information and courage than our genes and culture alone can provide. This level of self-expression that is uniquely our own arises from a synthesis that takes place deep within the human psyche; it culminates in an awareness of an environment that we grasp first as tenuously as a dream, which, even as it slips through our fingers, we struggle to articulate so that it can be of lasting value to ourselves and to others.
So let us return to St Paul. Finally, brethren, whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things of good report; if there be any virtue, and if there be any praise, think on these things. Philippians 4:8. Maybe in such an environment we will educate our genes.

Pauline Rudd is Research Professor of Glycobiology at University College, Dublin and at the National Institute for BioProcessing Research and Training in Ireland (NIBRT). She is also an Associate of the Anglican Community of St Mary the Virgin in Wantage Oxon. Her GlycoScience team sets out to define pathways involved in disease processes and to ensure the safety and efficacy of bio-therapeutic drugs for cancer and autoimmune disorders. She has developed strategies for analysing glycans and discovering clinical markers for the diagnosis and treatment of cancers. Professor Rudd is a Fellow of the Royal Society of Medicine. She received a Waters Centre of Innovation Award in 2012 and an Honorary Doctorate at the University of Gothenburg in 2014. Before moving her group to Dublin in 2006, she was Reader in Glycobiology at Oxford University.

7. PSYCHOLOGICAL SCIENCE AND CHRISTIAN FAITH

by David G. Myers

Psychological scientists who are people of faith live with two assumptions:

1) There is a God.
2) It's not us.

If, indeed, we humans have dignity but not deity—if we are finite, fallible creatures—then our surest conviction can be that some of our beliefs err. Thus, we had best hold our own untested beliefs tentatively and assess others' beliefs with open-minded scepticism. Moreover, when appropriate, we can use observation and experimentation to winnow truth from error.

Such faith-based humility and scepticism helped fuel the beginnings of modern science. This science-supportive attitude—which is supported by my own 'Reformed and ever-reforming' Christian heritage—not only tolerates our participation in free-spirited scientific inquiry, it mandates it. The whole truth of God's creation cannot be discovered by introspectively searching our own finite minds.

So, we submit our tentative ideas to the test. If they survive, so much the better for them. If they crash against a wall of evidence, so much the worse for them. So advised Moses (Deut. 18:22): '*If a prophet speaks in the name of the Lord but the thing does not take place or prove true, it is a word that the Lord has not spoken.*'

Such ever-reforming empiricism has many times changed my mind, leading me to believe that parenting practices have but modest effects on children's later personalities and intelligence; that crude-seeming electroconvulsive therapy can often relieve intractable depression; that the automatic unconscious mind dwarfs the conscious mind; that traumatic experiences rarely get repressed; and that sexual orientation is a natural, enduring disposition (not a moral choice).

Faith-supported scientific inquiry also has led me to *dis*believe certain spiritualist claims ranging from aura readings to out-of-body 'frequent flyer programs.' If, for example, aura-readers really can detect auras

above a person's head, then they should be able to guess the person's location while seated behind a screen. If, indeed, they can do so, then so much the better for their claims. If not (as seems the case), let's consider the claim discounted.

For Christians, the consistent failures to confirm such paranormal claims confirm the distinction between deity and humanity. We assume we are not little gods with powers of *omniscience* (reading minds, foretelling the future), *omnipresence* (travelling out of body), and *omnipotence* (levitating objects or eradicating tumours with our mental powers). As Isaiah 44:6, 7 records, '*I am God; there is none like me.*'

So far, I have suggested that Christians in psychology feel called to explore God's human creation with a spirit of humility. Believing, with John Calvin, that '*in everything we deal with God,*' we also feel called to worship God with our minds—through disciplined scientific inquiry—as we search God's world, seeking to discern its truths.

7.1. Psychology–Religion Intersections: An Overview

Beyond this, psychology and faith intersect in six additional ways.

1. *When teaching, writing, researching, and practicing psychology, we reflect on our assumptions and values.* As psychology's Marxist, feminist, and Christian critics have observed, the discipline is not value-neutral. When first drafting my psychology textbooks, I posted on my office door C. S. Lewis' reminder that '*We do not need more Christian books; we need more books by Christians about everything with Christian values built in.*' When choosing to study and write about value-influenced topics such as evil, pride, prejudice, peace-making, sexuality and altruism, we subtly and inevitably express our values.

2. *We apply psychological insights to the community of faith.* For some psychologists, this implies a Christian influence on their counselling and practice, sometimes aided by seminary training programs for clinicians and pastoral counsellors. As a social psychologist, I have suggested how social influence principles

might assist the creation of memorable, persuasive homilies and more effective evangelism.

3. *We study the psychology of religion.* Psychologists have studied various universal human phenomena, including sleep, sex, anger, and hunger. Some 68 per cent of humans report that religion is '*important in their daily lives*' (in a recent Gallup World Poll that my colleagues and I analysed). So why not also put religious belief and behaviour under the psychological microscope?

4. *We compare psychological and religious understandings of human nature.*

5. *We observe the apparent effects of religion. Is religiosity associated with with prejudice, altruism, or human flourishing?*

6. *We probe points of seeming tension between psychological science and faith*. What do experiments on illusory thinking and tests of intercessory prayer suggest about the integrity of our prayers? What does research on sexual orientation and the human 'need to belong' imply for the church's stance on same-sex relationships and ordination?

My own interests include these latter three points of intersection.

7.2. Human Nature in Psychological and Christian Perspective

As Malcolm Jeeves and I explain in *Psychology Through the Eyes of Faith* there are striking parallels between the image of humanness in psychological science and biblical and theological scholarship. Whether viewed through the lens of today's science or ancient biblical wisdom, human nature looks much the same. Some examples:

The Unity of Mind and Body

- *Biblical and theological wisdom:* In Hebrew-Christian tradition, humans are embodied creatures, not immortal souls. We are bodies alive, and death is real. Afterlife is envisioned as a 'new creation,' a resurrected *body*.

- *Psychological science:* In keeping with this tradition (but not with New Age dualism), today's cognitive neuroscience is ever tightening the links between mind and brain. Our minds do not operate without a brain. The very idea of thinking without a body is akin to running without legs.

Pride

- *Biblical and theological wisdom:* In the Christian tradition, pride is the fundamental sin—the deadliest of the seven deadly sins.

- *Psychological science:* The well-documented counterpart to pride in today's psychological science is 'self-serving bias'—a powerful and often perilous tendency to perceive and present oneself as better than others.

Rationality and Fallibility

- *Biblical and theological wisdom:* According to biblical teaching, humans are made in the divine image, yet they are finite and error-prone.

- *Psychological science:* In recent psychological science, the emerging image of humanness similarly combines remarkable cognitive capacities and illusory thinking (as Nobel laureate Daniel Kahneman explains in his magnum opus, *Thinking Fast and Slow*).

Behaviour and Belief

- *Biblical and theological wisdom:* Christian thinkers have often reminded us that faith predisposes action, yet it also grows through obedient action.

- *Psychological science:* Amen, say social psychologists: attitudes influence behaviour, and attitudes follow behaviour (as illustrated by racial attitudes changing *after* changed interracial behaviour, and by experiments in which people come to believe in their induced actions).

7.3. Religious Engagement and Human Flourishing

Medicine abused can kill people. Medicine wisely practiced enhances life. Is the same true of religion?

Religion abused kills. The insane courage that enabled the terror of 9/11, 2001 *'came from religion,'* noted Richard Dawkins. But so has the motivation behind the founding of hospitals, hospices, universities, and civil rights movements. Understandably, evolutionist Stephen Jay Gould noted that much of his 'fascination' with religion lay '*in the stunning historical paradox that organized religion has fostered, throughout western history, both the most unspeakable horrors and the most heartrending examples of human goodness.*'

While acknowledging religion's historic horrors and heroes, social scientists have explored religion's links with volunteerism, non-materialistic values, and charitable giving. In survey after survey, people who are religiously engaged, or who say that religion is '*important in their daily life,*' exhibit, on average, greater generosity with their time and money. In a Gallup World Poll, for example, religiously engaged people in Europe, the Americas, Africa, and Asia were about 50 per cent more likely to recall having donated to a charity in the last month.

Religious engagement also has been associated with longevity. Thanks partly to social support from faith communities, healthier living, and a greater sense of meaning and hope, epidemiology studies (which track lives through time) have consistently found that the

'religion factor' is roughly on a par with aerobic exercise and not-smoking as a predictor of life expectancy.

Is religious engagement similarly predictive of human happiness? The answer (now put on your thinking cap) differs dramatically by whether we compare *places* (such as more versus less religious countries or states) or *individuals.* (The same paradox occurs in politics: In the U.S., low-income *states* tend to favour Republican presidential candidates while low-income *individuals* tend to favour Democratic presidential candidates.)

Consider these findings: harvesting Gallup World Poll data, I found a striking *negative* correlation across 152 countries between national religiosity and national well-being. Secular countries such as Denmark are happier places than highly religious countries such as Pakistan or Nigeria. Within the United States, I have also found that secular states, such as Oregon and Vermont, exhibit greater human flourishing than do highly religious states such as Alabama and Mississippi. In the less religious states, people live longer, smoke less, commit less crime, have lower teen pregnancy rates—and the list goes on.

Yet survey data from the U.S. and many other countries reveal (though especially in more religious countries) a *positive* correlation between religiosity and happiness *across individuals.* Moreover, actively religious *individuals* live longer, smoke less, commit less crime, have lower teen pregnancy rates—and the list, again, goes on.

Princeton economist Angus Deaton and psychologist Arthur Stone have also been struck by this religious engagement paradox. They ask, '*Why might there be this sharp contradiction between religious people being happy and healthy, and religious places being anything but?*'

These are the sorts of findings that excite behavioural science sleuths. Surely there must be some confounding variables. With religiosity, one such variable is income—which is lower in highly religious countries and states. Control for status factors such as income (as Louis Tay did for and with Ed Diener and myself), the negative correlation between religiosity and well-being disappears and even reverses to a slightly positive correlation. Likewise, low-income states differ from high-income states in many ways.

I believe the most important story is found where life is lived—at the level of the individual, where *religious engagement predicts human flourishing*. Nevertheless, there are practical uses for these data. If you want to make religious engagement look bad, use the aggregate, macro-level data. If you want to make religious engagement look good, use the individual data.

7.4. Prayer Experiments

Amid these striking parallels between big biblical and psychological ideas and the evidence of the benefits of religious engagement, there have been two points of tension. One concerns prayer. Some studies identify thinking errors (such as 'illusory correlation' and 'the illusion of control') that underlie superstitious thinking in realms such as gambling, stock investing, and beliefs about supposed extrasensory perceptions. These tendencies to believe that one thing causes another when they really are only coincidentally correlated, and to assume that we are controlling events that are actually beyond our control, could easily lead people to perceive their prayers as effective, whether they are or not.

So are intercessory prayers effective? Is prayed-for rain more likely to fall on parched Earth? Are people more likely to sail through cardiac bypass surgery if many people are praying for them (i.e., is prayer a medical antidote)? As I explain in *A Friendly Letter to Skeptics and Atheists,* a series of actual experiments that tested a magical understanding of prayer consistently indicated *No* (as I had publicly predicted). If it is heretical to think too little of the power of our prayers, it is at least equally heretical to think of God as a celestial Santa Claus. My conclusion as a result of the medical prayer tests:

> Do we err in searching for a 'God effect' that is a slight subtraction to, for example, the number of stillbirths or coronary deaths? In the historical Christian understanding, God is not a distant genie who we call forth with our prayers, but rather the creator and sustainer of all that is. Thus, when the Pharisees pressed Jesus for some criteria by which they could validate the kingdom of God, Jesus answered, '*The*

kingdom of God is not coming with things that can be observed . . . . For, in fact, the kingdom of God is among you.'

The Lord's Prayer, the model prayer for Christians that I pray daily, does not attempt to control a God who withholds care unless cajoled. Rather, by affirming God's nature and our human dependence even for daily bread, it prepares us to receive what God is already providing. One can approach God as a small child might talk with a benevolent parent who knows the child's needs but also cherishes the relationship. Through prayer, people of faith express their praise and gratitude, confess their wrongdoing, voice their heart's concerns and desires, open themselves to the Spirit, and seek the peace and grace to live as God's own people.

7.5. Sexual Orientation

No issue divides Christians, including those in the worldwide Anglican Communion, more than their differing understandings of sexual orientation and their attitudes and policies *vis a vis* marriage and ordination of those with same-sex attractions and a gay or lesbian identity.

Some of my writings, including *What God Has Joined Together: The Christian Case for Gay Marriage* (with Letha Dawson Scanzoni), have sought to bridge the divide between traditionalists (who want to support and renew marriage) and progressives (who believe that sexual orientation is not a choice and is best lived out within the context of a committed partnership). My bottom line, as a marriage-supporting social scientist, is that a) sexual orientation is a natural, enduring disposition, and b) the world would be a happier and healthier place if love, sex, and marriage routinely went together.

To expand that nutshell synopsis just a bit, psychological science now has substantial evidence supporting some undergirding conclusions:

- All humans have a deep '*need to belong'*—to connect with others in close, intimate, enduring relationships.

- As one important example of such relationships, marriage contributes to flourishing lives—to healthier and happier adults, and to children who thrive when co-parented by two parents who love each other and together love their children.

- Toxic forces, especially radical individualism and the media modelling of impulsive sexuality, are corroding marriage and the health of communities.

- Sexual orientation is a natural (largely biologically influenced) disposition, most clearly so for men. Scientists have discovered a host of gay-straight differences, including differing brain centres, fingerprint patterns, and prenatal influences.

- Sexual orientation is also an enduring disposition, which is seldom reversed by willpower, reparative therapy, or and 'ex-gay' ministry.

But '*what about the Bible?*' Out of 31,103 Bible verses, only seven speak directly of same-sex behaviour—and often in the context of idolatry, promiscuity, adultery, child exploitation, or violence. Moreover, the Bible has nothing to say about an enduring sexual orientation (a modern concept) or about loving, long-term same-sex partnerships. A Christian case for gay marriage arises from the human need to belong, from the biblical mandate for justice for everyone, from the benefits of a culture-wide norm of monogamy, and from a refutation of popular arguments against gay marriage.

The conservative religious position against same-sex partnerships is having an apparent counter-evangelism effect. As Harvard researcher Robert Putnam and Notre Dame sociologist David Campbell have noted (from U.S. data), '*The association between religion and politics (and especially religion's intolerance of homosexuality)*' is '*the single strongest factor*' in alienating young people from the church. A recent Ford Foundation-funded U.S. national survey for the Public Religion Research Institute confirmed their conclusion: '*Among millennials who no longer identify with their childhood religion, nearly one-third say that negative teachings about, or treatment of, gay and lesbian people was either a somewhat important (17 per cent) or very important (14 per cent) factor in their disaffiliation from religion.*'

Attitudes about sexual orientation are rapidly becoming more accepting of gay rights and relationships. Moreover, there is a large generation gap, with most older adults opposing gay marriage and most younger adults supporting it. Given that the forces driving the attitude changes are likely to continue, and given generational succession, it appears that the culture war over gay marriage and gay ordination will gradually be resolved in the years to come, much as were previous culture wars over minority and women's basic rights. As this happens, perhaps the winsomeness of Christian faith can be renewed for younger adults.

7.6. Synopsis

- Faith-rooted humility mandates the ever-reforming empirical spirit that helped give birth to modern science and which survives in our efforts to love God with our minds by exploring the human creation.

- Psychological science and religious faith have many points of contact, as psychologists reflect on their underlying assumptions and values, apply psychological findings to the faith community, study the psychology of religion, connect their respective wisdom about human nature, study the associations of religious engagement with human flourishing, and explore points of possible tension between psychological science and personal faith.

- Psychological and biblical understandings of human nature are strikingly congenial. Both affirm a unity of body and mind, the powers and perils of pride, the capacities and limits of human thinking, and the interplay of belief and behaviour.
- Research indicates positive associations (across individuals) between religious engagement and human flourishing, as indicated by generosity, longevity, and happiness.

- Studies of illusory thinking and intercessory prayer, and of sexual orientation, challenge the church to affirm and practice its ever-reforming heritage in a spirit of humility and love.

David G. Myers is Professor of Psychology at Hope College in Holland, Michigan (USA). His scientific writings, supported by National Science Foundation grants and fellowships, have appeared in three dozen academic periodicals. He has also digested psychological research for the public through articles in four dozen magazines and seventeen books, including general interest books and textbooks for introductory and social psychology.

8. WHAT IS A PERSON? – INSIGHTS FROM NEUROSCIENCE AND CHRISTIANITY

by John Wyatt

What does it mean to be a person? Is it possible to be a human being but not a person? Is it possible to be a person but not a human being? These are more than abstract speculations of philosophers. In fact disagreements about 'personhood' lie at the heart of many current controversies in bioethics, human rights, law and politics.

I worked for many years as a neonatologist, providing intensive medical care for critically unwell newborns. Many of my patients were extremely premature infants, some born at the limits of viability at 22 or 23 weeks of gestation and weighing 500 grams or less. I and my colleagues invested time, energy and resources aiming to give these tiny beings the best chance of survival. Our goal was to treat each baby as a unique and precious individual, to act in their best interests and maximise their chances of healthy survival.

8.1. Secular Definitions of 'Person'

But not everybody celebrated and supported our activities. Some philosophers and ethicists have challenged the view that all newborn babies can be regarded as persons, to whom we owe a duty of care and protection. For Peter Singer a 'person' is a being who has a capacity for enjoyable experiences, for interacting with others, and for having preferences about continued life. It is clear that a newborn baby is not capable of interacting in any meaningful way and is unable to have preferences about their continued life. He argues '*When I think of myself as the person I now am, I realize that I did not come into existence until some time after birth.*' Hence a newborn baby is a human being but not a 'person'.

This means that we do not have a duty to protect the life of a newborn baby in the same way as we might an older child or adult. Singer puts it like this; '*only a person can want to go on living, or have plans for the future, because only a person can understand the possibility of a future existence for herself or himself. This means that to end the lives*

of people against their will is different from ending the lives of beings who are not people…killing a person against his or her will is a much more serious wrong than killing a being who is not a person.' Singer goes further and argues that '….*the decision to kill a newborn infant is no more – and no less – the prevention of the existence of an additional person, than is a decision not to reproduce.*'

Two philosophers Giubilini and Minerva caused international controversy in 2012 when they published a paper in the Journal of Medical Ethics arguing that the same ethical reasons which supported abortion of a fetus that was disabled, or merely unwanted, could also be applied to a newborn baby. They suggested that instead of using the terms infanticide or neonatal euthanasia, the act of medical killing of an unwanted baby could be described as 'after-birth abortion'. The paper was entitled *'After-birth abortion – why should the baby live?'.*

The same kind of thinking leads to the conclusion that individuals with severe learning disorders, brain injury or advanced dementia also cannot be regarded as persons. Personhood becomes defined by high-level cognitive functioning, an advanced level of brain function. In fact in order to be regarded as a person you must have a completely developed and normally functioning cerebral cortex.

Those who meet the criteria of being 'persons' have moral rights and privileges. They deserve to be protected from those who would injure or kill them. They should be allowed to exercise their own choices or autonomy as much as possible. But the same rights and privileges do not extend to 'non-persons.'

8.2. Problems with Such Definitions

Of course there are major problems with this kind of definition of personhood. Why should high-level cognitive functioning be the vital criterion that distinguishes those beings whose lives are precious and to be protected from those who are effectively disposable? Why should the functioning of the cortex, a layer of neurones millimetres in thickness, be the central and crucial moral discriminating feature between beings?

In this way of thinking personhood becomes a remarkably fragile and contingent property. At the moment as you read this article you can be regarded as a person. But if, when you walk out of your door, a brick falls on your head leading to cortical damage, you are no longer a person. Of course if, following rehabilitation, your cortical function recovers, then you will become a person again. Can something that seems so fundamental to human identity and significance be so fragile? Suppose I suffer severe brain injury but have the prospect of gradual recovery to normal consciousness over the next 10 years. Am I a person in the intervening period? If someone killed me during the recovery period are they guilty of the serious crime of killing a person or the less serious crime of killing a non-person??!

8.3. Substance Dualism

At the heart of this secular philosophical perspective is the idea that you earn the right to be called a person by what you can do, by demonstrating that your brain is functioning adequately, by thinking and choosing. The modern liberal emphasis on personal autonomy is profoundly dualistic. 'I' the mysterious inner self is free to choose and to determine what happens to my body. The conscious self is disconnected from the body and is seen as its controller, governor and master. This conception of the human individual is rooted in the philosophical perspective of mind-body dualism pioneered by Descartes. The mind is conceived as a substance, a form of 'stuff' that is different from the physical stuff of the body, and the two substances interact in a mysterious way within the brain. Although substance dualism was popular at the time of the Enlightenment it has become deeply unfashionable within the modern neuro-scientific community.

The dominant position of modern neuroscience is that there is no mysterious thinking 'stuff' connected to the brain. Most neuroscientists are resolutely materialist or physicalist in their understanding. The brain is a physical, material organ like all the other organs of the body and hence consciousness and self-awareness must have a physical origin within the activity of brain cells.

Some have argued that our sense of being a conscious, unitary, choosing self is merely an illusion created continuously by our brains because it has some survival advantage for us as a species. Francis

Crick called this the 'astonishing hypothesis' – '*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.*' In the words of science journalist Matt Ridley, '*There is no 'me' inside my brain; there is only an ever-changing set of brain states, a distillation of history, emotion, instinct, experience, and the influence of other people – not to mention chance.*'

According to this perspective our conscious awareness and our internal sense, our 'first person perspective', of being a unitary, choosing self is merely an epiphenomenon, a kind of mental 'froth' that is of no causal significance for our bodily actions and behaviour. In reality our actions are determined by the neuronal machinery independent of our conscious thoughts and intentions.

Some philosophers and neuroscientists have claimed support for this perspective from a series of experiments first pioneered by the neuroscientist Benjamin Libet in 1983. Libet asked volunteers to press a lever at a time of their choosing, whilst recording the EEG continuously as well as the precise time at which the volunteer noted their intention to press the lever. Experiments of this kind have shown that EEG changes (called the readiness potential) indicating neuronal preparedness to muscular action can be detected significantly *before* the time at which the volunteer reports an experienced intention to press the lever. This has been interpreted to support a form of hard determinism, in which the actions of a subject are determined by unconscious neuronal mechanisms and the subject's belief that their actions were a result of voluntary choice was due to retrospective rationalisation. Experiments of this kind have been subject to a range of criticisms within the neuro-scientific community and their relevance to philosophical questions of free will and determinism is questionable.

8.4. Non-Reductive Physicalism

An alternative philosophical perspective is that of non-reductive physicalism. Again the brain is seen as entirely physical and material in nature, and there is no other non-physical or mental 'stuff'. However in this view it is possible for mental states to 'emerge' from physical neuronal processes in a way that leads to new possibilities, including 'top-down causation' in which mental states influence neuronal activity as well as the reverse. In other words mental states can have causal efficacy in the physical world. How it is possible for mental states to provide top-down causation within a purely physical world remains highly mysterious and controversial.

Of course all attempts to use our brains to understand how our brains work may be doomed to failure. It has been said that '*If the human brain was so simple that we could understand it, we would be so simple that we couldn't understand anything……*' Nonetheless the very process of scientific research demands that our thinking processes have a remarkable degree of independence from mechanical causal processes.

In order to do scientific research, including neuro-scientific research, you have to believe that it is possible for the human brain to investigate and determine the scientific processes and regularities on which the Universe is based. If our mental processes were merely determined by unconscious neuronal mechanisms it is hard to see how this should be possible. Not only that, but in order to do scientific research you also have to believe that you are *genuinely free* to create hypotheses and models, to design experiments, to assess evidence and to choose the most consistent interpretation of the data. As any experienced scientist will testify original research is an intensely creative activity.

Modern science is not possible without these fundamental beliefs in the creative power and freedom of our thoughts. But if you are a committed to a physicalist understanding of the brain you have to ask whether these beliefs make sense. If the human brain evolved to give us mental states in order to provide a survival advantage on the African Savannah it seems unlikely that the same human brain could determine the fundamental and highly counterintuitive physical principles of the Universe.

8.5. Comprehensibility of the World

In 1916 Albert Einstein published his General Theory of Relativity, describing in precise mathematical detail how space and time were warped by the effects of gravity. His theory predicted how a massive gravitational body would disturb space and time in its vicinity. On the basis of Einstein's equations two phenomena were predicted, the 'geodetic effect', (warping of space-time vectors around a massive object), and 'frame-dragging', (the amount a spinning object twists space and time with it as it rotates).

In 2004 NASA launched a satellite Gravity Probe B to test whether Einstein's equations were accurate or not. The satellite carried the most mechanically precise gyroscopes ever engineered in order to measure the amount that space-time was warped by the presence of the spinning Earth. It was calculated that the geodetic effect should cause the axes of the gyros to move 0.0018 degrees per year whilst frame dragging should cause a separate perpendicular movement of 0.000011 degrees per year. This was described as equivalent to detecting the thickness of a sheet of paper held edge-on 100 miles away.

And after years of work with more than 100 scientists employed and the expenditure of millions of dollars the conclusion was that exactly the amount of warping of space-time predicted by Einstein's equations was in fact what was observed. The abstract equations worked in the real world to the most mind boggling level of accuracy.

But why should complex and abstract mathematical equations which were invented by the brain of a carbon-based life form describe with astonishing accuracy the counter-intuitive behaviour of the Earth as it drags space and time around with it? As many philosophers have noted there appears to be a strange connection, a homology, between the mind and thoughts of this pathetic and insignificant life form and the fundamental structures of the cosmos. As Einstein himself put it, '*The eternal mystery of the world is its comprehensibility*'.

Reflections like this have led some secular philosophers to conclude that mental states and consciousness are not merely a coincidental product of neo-Darwinian survival mechanisms, but represent in some way a fundamental part of the cosmos. For example the philosopher

Thomas Nagel states, '*The intelligibility of the world is no accident. Mind… is doubly related to the natural order. Nature is such as to give rise to conscious beings with minds; and it is such as to be intelligible to conscious beings.*' Nagel proposes a form of 'panpsychism' in which consciousness or mind is a universal feature of all physical objects. The Universe is not just merely physical – it is a world of minds of varying degrees of awareness and sophistication.

8.6. A Christian Understanding of the Nature of 'Person'

So what does it mean to be a person in the light of the Christian faith? Christian theism conceives of reality as consisting of more than just matter and energy. There is another foundational category of reality and that is not 'mind' or 'consciousness' but the *personal*. As Martin Buber put it – reality does not only consist of 'I – it' relationships – there are also 'I-thou' relationships. Persons are not reducible to matter and energy and they are not limited to matter and energy. In technical terms personhood is a category of reality that is ontologically foundational – persons cannot be defined in terms of other more basic categories or substances. Persons are different from everything else in the cosmos.

Persons are *knowers* – they perceive and understand things about reality. Persons are *agents* – they do things, they have intentions and volitions, they make things happen. Persons are *rational* – they understand and use logical analysis to comprehend and change reality. Persons are *communicative* – they speak with the intention to be understood by other persons, and the expectation that their communication will be successful. Persons are *creative* – they are genuinely innovative and free. Persons are *moral* – they understand good and evil and are accountable for their moral choices. Persons are *lovers* – they enter into profound and committed relationships with other persons.

None of these characteristics of persons can be explained or reduced to the nature of the physical Universe, to the characteristics of matter and energy. Persons are a different kind of reality.

In the history of philosophy, the very idea of a person has been strongly influenced by a Christian understanding of what it means to

be a human being. The original Greek word for person (*prosopon*) meant literally 'the face', but in ancient Greek it also referred to the mask which actors used to represent the character they were playing in the theatre. In the world of Graeco-Roman thought what mattered about a human being was the face they showed to the world, the role they played in society. We have retained this meaning when we refer to someone's 'persona'. It is the public face they show to the world.

It is interesting that this is how the word is used in the Greek New Testament. At several points in Paul's epistles God is described as one who shows no favouritism. The literal Greek says that he is not a respecter of persons, meaning that he is not influenced by our external and social role.

However in Hebrews 1:3 the Son is described as the exact representation of God's nature and a different word is used for the divine nature, the word *hypostasis* which means literally 'what lies under'. The early Church Fathers, as they reflected on the nature of the Triune Godhead, fastened on this word *hypostasis* to describe the three persons of the Trinity. God's ultimate being, (what 'lay under' his activity), was in the form of persons, persons giving themselves to one another in love.

8.7. Made in the Image of God

And the Christian revelation makes the remarkable claim that human beings are made in God's image. We are created to reflect the divine character and being. We reflect God's nature in our personhood. So in Christian thinking human beings are not self-explanatory. Philosophical reflection and neuro-scientific analysis can never fully determine what it means to be human. The structure of our humanity, and the values and purposes of our human lives, only make sense in the light of our creation in God's image.

Because we are God-like beings our thinking, our mental processes and subjective awareness, are somehow homologous to the mind of God, and hence to the fundamental structures of the cosmos. So the Christian faith provides a conceptual framework in which the homology between the mind of human beings and the structures of the Universe

makes sense. As the astronomer Johannes Kepler put it, '*I am thinking God's thoughts after him*..'

8.8. Human Uniqueness – Made for Relationship

Just as the three persons of the Trinity are individually unique, yet give themselves continually in love, so each human person is unique, yet made for relationship with others. 'Personhood' is not something we can have in isolation – in Christian thinking it is a relational concept. Persons are constituted by their relations – their being is derived from the movement of communion, from the freedom to give oneself to the other. Descartes famous statement, '*cogito ergo sum,* I think, therefore I am', places individual conscious awareness as the bed-rock of existence. By contrast we might suggest an alternative Christian version, '*You love me, therefore I am*'. My being comes not from my rational abilities but from the fact that I am known and loved. In the words of the Christian philosopher Joseph Pieper, '*Love is a way of saying to a person, "It's good that you exist, it's good that you are in the world'".*

So in my professional work as a neonatologist I was called to recognise the innate personhood even of the critically ill preterm baby in my care. Instead of focussing on their limited functional abilities and reducing them to the status of a 'non-person', or merely a 'potential person', I was called to recognise them as a mysterious other, one to whom we as professionals owed a duty of care and protection. It is notable that contemporary understandings and practices of medicine and law in neonatology still reflect a Christian understanding of personhood from the moment of birth, rather than the preference utilitarianism of Singer and colleagues.

8.9. Conclusion

To conclude; it seems to me that both Christian thinking and contemporary neuroscience resist the substance dualism of Descartes, and emphasise the unity of our being. Human beings are not made out of two different substances. But Christian thinking cannot accept a physicalism that fails to give ontological respect to the

immaterial aspects of being human. From a biblical Christian perspective the human being is seen as a profound unity, a unity that has both a physical, material aspect and an immaterial, personal aspect.

How these two different aspects, the material and the immaterial, interrelate and integrate within the unity of the human person is deeply mysterious. Perhaps there is a parallel in the traditional theology of Christology. The Council of Chalcedon in AD 451 wrestled with competing understandings of the being of Christ. They were at pains to preserve the unity of the personhood of Christ. They eventually agreed on the formula that 'Christ is one person (*hypostasis*) who is one being (*homoousion*) with the Father, and one being (*homoousion*) with us – one person in two natures'. Christ is both fully human and fully divine.

Of course it is unwise to press the comparison too far between our own human nature as created, limited and embodied beings, and that of Christ himself. But with due caution it may be possible to speculate that the unity of the human being –– one person with both material and immaterial aspects, parallels in some mysterious way the profound unity of the Second Person of the Trinity – each one of us is a person – at the same time fully material and fully immaterial.

Further Reading:

Wyatt, J (2009), *Matters of Life & Death*, InterVarsity Press

Zizoulas, J (2004), *Being as Communion*, St Vladimir's Seminary Press

Nagel, T (2012), *Mind and Cosmos,* Oxford University Press

Jeeves, M & Brown, W (2009) *Neuroscience, Psychology and Religion,* Templeton Science and Religion

John Wyatt is Emeritus Professor of Neonatal Paediatrics at University College London. He has pioneered the application of optical techniques to the assessment of neonatal brain injury and was co-Chief Investigator for the first major clinical trial of hypothermia as a practical treatment for babies who suffered birth injury. He has a long-standing interest in contemporary ethical debates about advances in medical technology and the beginning of life, and has frequently

engaged in public and media debates about controversial issues in medical ethics. He is currently leading a research project into the philosophical and theological implications of advances in robotics and artificial intelligence. He is a member of the Ethics Advisory Committee of the Royal College of Paediatrics and Health, and the Medical Study Group of the Christian Medical Fellowship and a board member of the Kirby Laing Institute for Christian Ethics and BioCentre. His book *Matters of Life and Death* is published by InterVarsity Press.

9. DO THE MIRACLES OF JESUS CONTRADICT SCIENCE?

by Mark Harris

This article will look at one of the most divisive issues that arises for Christianity in the modern scientific world, namely the Christian tradition of belief in miracles, and especially of belief in the miracles surrounding the person of Jesus. I will look at this by considering the oft-framed question, '*Do the miracles of Jesus contradict science?*' As I hope will become clear, a considerable amount of ground needs to be cleared before we can address this question directly, and even then a simple yes or no will not suffice.

Jesus is universally acknowledged – even by those disinclined to religious belief – to have been a wise teacher who still has challenging and relevant things to say to us today. The stories of his miracle-working have fared less well though, even among many practicing Christians, some of whom find the miracles to be a more-or-less dispensable part of the Jesus tradition in comparison with the teachings. Much of this reticence towards miracle stems from the modern scientific worldview, which is often held as having proved that miracles are (a) scientifically impossible, and (b) a bygone relic of a primitive and gullible age. For these reasons, it is not unusual to hear the opinion voiced that science has disproved miracles in general, and the miracles of Jesus in particular. And yet, such sweepingly sceptical generalisations are unsustainable in light of the complexity of the relationship between miracle and science, and in light of the complexity of the miracle traditions of Jesus. This short article will hopefully go some way towards explaining the current state of play in research on the theology of miracle, and on the miracles of Jesus.

9.1. Hume's Definition of Miracle

Before turning to Jesus, it is first necessary to ask, what is a miracle? One of the old chestnuts of philosophy and theology, the definition of miracle is a long-standing problem with many solutions, only some of which place miracles in direct conflict with science. Hence, in spite of

the modernist assumption that science has ruled miracles out of court, the truth is considerably more subtle. The solution of David Hume (1711–1776), the philosopher of the Scottish Enlightenment, is often taken as the starting point, since his definition places miracles in direct conflict with science (or at least, with 'the laws of nature'). Hume's definition appears in Chapter X ('On Miracles') of his *An Enquiry concerning Human Understanding* (1748), and its most succinct statement in an endnote: 'A miracle may be accurately defined, *a transgression of a law of nature by a particular volition of the Deity, or by the interposition of some invisible agent*' ('*On Miracles*', X.12, Endnote). Note the juridical language here. A 'transgression' is of course a wrongdoing, and Hume also uses the word 'violation' ('On Miracles', X.12), both terms communicating the sense that a miracle involves a rigid framework being abused.

This negativity gives rise to the first criticism that is often made of Hume's view, that it sets up a stratospherically-high view of the laws of nature, whereby they cannot be bypassed, adjusted or approximated, but can only be violently abused; nature is seen to be a rigid and closed system. This may have seemed a fair conclusion when science was dominated by the clockwork determinism of the Newtonian worldview, but can hardly be said to be the case today in the face of scientific developments such as quantum mechanics, complexity, and emergence.

The second criticism highlights the lack of coherence in Hume's use of the juridical metaphor of 'law of nature'. For in Hume's statement above, a miracle can only occur when the Deity (or an invisible agent, i.e. something beyond experience, and which is therefore supernatural) transgresses the laws. This means that the law-*maker* and law-*enforcer* must also be the law-*breaker*. Not only does this provide an incoherent picture of God, it also stretches the juridical metaphor of law of nature to its breaking point.

In addition to these direct criticisms of Hume's definition of miracle, indirect criticism can also be made, on the grounds that an event need not contradict the laws of nature in order to be accredited as a miracle. A good example is provided by Colin Humphreys' study of the miracle texts of Exodus (*The Miracles of Exodus*, 2004). He provides naturalistic explanations for all of the miracle stories, interpreting them as unusual but thoroughly natural phenomena that just happened to

occur at the right time for the deliverance of the Israelites. The miracle is in the timing, as it were, but otherwise the stories are fully explicable scientifically, according to Humphreys.

Mention of biblical texts such as Exodus as sources of evidence for miracles leads us on to a second point made by Hume, a point that is far more robust than his definition of miracles. As a thought experiment, Hume explores the kind of evidence we would need in order to believe in the resurrection of the famous Tudor Queen, Elizabeth I, whom the history books tell us died in 1603. Let us suppose that evidence comes to light that she died in 1600, and then came back to life, reigned for a further three years, and finally died a second time in 1603. What kind of historical testimony would convince us of this? Would the written evidence of doctors, of numerous courtiers of good character convince us? Certainly not. Hume's point is that no amount of witness evidence or testimony would convince us of this ridiculous story. Hume carefully avoids making the obvious connection with the resurrection of Jesus (and with the Gospel accounts as 'evidence'), but he is clearly attempting to sow seeds of doubt there.

Notwithstanding Hume's scepticism towards evidence for a miracle, I believe that his approach actually makes possible some positive perspectives on miracle. My point is that no one has anything invested in the resurrection of Elizabeth, so we are far more likely to assume the default position of scepticism in her case, that dead people simply do not come back to life. We might not, however, as Christians be so sceptical when it comes to Jesus. But with Elizabeth no one stands to gain anything one way or another, so we are most likely conclude there must have been some mistake or fraud. Hume's point is this: '*that no testimony is sufficient to establish a miracle, unless the testimony be of such a kind, that its falsehood would be more miraculous, than the fact, which it endeavours to establish.*' In other words, according to Hume, for a potentially miraculous event to be accepted, the witness to it must be so unimpeachable that it is more plausible to believe in the miracle than to believe the witness might be wrong. Hume's point is, of course, that no witness or report is going to be so persuasive; we will always be sceptical.

Hume is, I believe, absolutely right that we would always assume scepticism with an example such as the resurrection of Elizabeth. The

case of Jesus is quite different though, because countless Christians have believed in his resurrection. We are left with the question of why so many are ready to believe in the resurrection of Jesus when the hypothetical parallel of Elizabeth would inspire widespread disbelief. The answer must rely on our individual (subjective) predispositions based on religious faith. In other words, belief in Jesus' resurrection, for so many Christians, does not rest on the witness testimony of the Gospels, which, as Hume has demonstrated, is insufficient to inspire belief taken alone and assessed purely as historical evidence (although I suspect that N T Wright would disagree with me). Rather, Christian belief in the resurrection of Jesus is crucially affected by individual worldview and predispositions towards faith. Many Christians profess to a personal and living relationship with Jesus which transcends and prefigures considerations regarding texts and evidence for a miracle.

This leads us to emphasise the complex subjective factors at play in assessing and defining a miracle, despite Hume's attempt to arrive at a single objective definition. There is a balance to be achieved between subjectivity and objectivity. This balance will always involve a value judgement for any given event that might be deemed miraculous, regarding its level of remarkability, and the interpretation of its underlying theological significance; these factors will vary according to each individual's faith presuppositions. But the balance must also allow for the possibility that miracle can be spoken of in meaningful ways that the whole Christian community can accept.

9.2. The Miracles of Jesus

In order to see this point more clearly, it is worth turning now to the miracles of Jesus. Here, our sources are predominantly the Four Gospels. Jesus is one of the best attested historical figures of antiquity. He is also noted as a miracle worker, not only in Christian sources, but in some non-Christian sources too. Whatever our predispositions for or against miracles, it is clear by any reasonable historical approach that Jesus was known as a miracle worker in his day, especially a healer and exorcist.

However, Jesus' miracles are very diverse: if the problem of defining miracle itself is complex, the complexity increases when we look at

how miracles arise in the story of Jesus. In fact, if we examine the story of Jesus as presented in the Gospels, we see that miraculous happenings are reported at every stage of the story, from his birth to his death and resurrection, and at every stage in between (e.g., the temptations in the wilderness, the transfiguration). Also, the miracles proliferate during Jesus' public ministry, both in quantity and diversity. We see many stories of healings and exorcisms where human subjects are healed (and sometimes brought back from the dead), along with nature miracles where the remarkable element appears to involve divine manipulation of the natural or inanimate world (e.g., the feeding of the 5000, the stilling of the storm). Gathering these together, there is a great deal of complexity, with many disparate stories and traditions. Some of these stories are similar to those of other miracle workers known from this time in the Jewish and Greco-Roman worlds (e.g., Hanina ben Dosa), and some of the Jesus stories are similar to those told of legendary figures in the Old Testament (e.g., the ascension of Elijah). Other Jesus stories are unique, and it seems that Jesus was distinctive in his time for having more stories told about his abilities as a healer and an exorcist than for any other miracle worker.

We are finally in a position to turn to the question in the title of this piece, namely do the miracles of Jesus contradict science? Hume's ubiquitous definition of miracle might indicate that the miracles of Jesus must *by definition* contradict science, but I have been arguing here that the situation is considerably more subtle, both in terms of how a miracle ought to be understood, and in terms of the diversity of miracle traditions attributed to Jesus. In fact, the question of whether the miracles of Jesus contradict science can be answered accurately both in the negative and in the affirmative, as follows.

No – the miracles of Jesus do not contradict science. A good example is the miraculous catch of fish; this could be explained away as a coincidence (albeit a very unlikely one) whereby a large shoal of fish just happened to appear near the boat when Jesus told his disciples to cast their nets. This could even be said of the stilling of the storm, that it was a coincidence that the storm abated when Jesus commanded it to. Some of the rationalistic and naturalistic explanations of the miracles are closely related to this idea (e.g., that when Jesus was seen to walk on water, it was actually by means of a submerged sandbank), as is Colin Humphreys' suggestion mentioned above, that the miracles of Exodus are unusual natural phenomena

that just happened at the right time. Related also are social-scientific studies of the miracles of Jesus, which point out the similarities between many of Jesus' healing and deliverance miracles, and those of modern day folk healers. Research has established that taboos surrounding social exclusion and purity can result in psychosomatic effects in some cultures. Folk healers have been known to effect amazing acts of healing by addressing the underlying social causes of such medical conditions. The suggestion is that this might have been important in many of Jesus' miracles, effectively explaining them away in social scientific terms. In short, there are several rationalistic avenues open to us if we wish to retain the miracle stories as historical events, without needing to believe that they must automatically contradict science.

Yes – the miracles of Jesus do contradict science. In spite of the rationalisations mentioned in the previous paragraph, there are some miracle stories that largely defy such an approach, most obviously those miracles where Jesus is said to raise dead people such as Lazarus back to life. There is no clear rationalistic approach available to us here, unless we simply deny that Lazarus was dead in the first place. And this raises a further difficulty for the rationalisation approach of the previous paragraph, since it works by reading literally some of the details of the story but overlooking or denying others, especially those that relate the deeper cause, God's special action. But it is not clear that a miracle story can be read in such a piecemeal fashion, without effectively fabricating an alternative story. For instance, to explain Jesus' walking on the water as working by means of a submerged sandbank is to read some aspects of the story literally (what it looked like to the disciples), while denying others (the sense of what the story is trying to convey, namely that it really happened as the disciples perceived it to). Such an approach therefore completely misses the point (that this man could do what only God can do). In other words, rationalisation of a miracle story may force it into a scientific mould, but potentially at a significant cost, since the deeper significance may thereby be lost. By definition, this deeper significance goes beyond the boundaries of science and reaches to the subjective faith component of miracle. In short, there are deeper levels of meaning at play beyond the simple question with which we are so often fixated in our modern scientific age, namely what actually

happened in our (scientific) terms? I shall say more about this shortly.

The fact that the question of whether the miracles of Jesus contradict science can be answered both affirmatively and negatively – each with good reasons – suggests that it is not a particularly penetrating question. A further suspicion about the worth of the question arises when we return to the points we considered earlier about the definition of miracle, and the need to balance both subjective and objective factors. A rationalising view may seek to harmonise a miracle account with science before any other considerations were made, but a theological view would consider such an approach to be premature. This is because of the subjective nature of the miracles, which comes to the fore especially with the miracles of Jesus: they are told in the Gospels primarily to attest to his significance rather than to record neutral facts about happenings in the world, as in a newspaper report. In other words, in assessing his miracle stories theologically, we must take into account the present and subjective significance of Jesus in living Christianity to believers. He is not just yet another dead miracle worker of history, as it were.

This point about the deeper significance of Jesus in assessing his miracle traditions comes to the fore when we go beyond a surface reading of the text, and look at how the miracles function in the narrative, in relation to other events, and to Jesus' teachings. For deeper currents become apparent, currents which have very little bearing upon science. For instance, the sea miracles parallel Jesus' exorcisms in illustrating his power over creation to maintain order, and to vanquish the forces of chaos. The sea miracles certainly indicate that Jesus has power over nature – he can do what only God can do in the Old Testament – but there is also a strong connection with Jesus' message (in the Synoptic Gospels) that the kingdom of God is at hand (or in other words, the ruler of the world is about to change from the Devil to God). The miracles take on a cosmic significance in line with Jesus' teachings. A good example of the deeper significance of Jesus' miracles is provided by the story of the feeding of the five thousand, unusual in that it is the only miracle story to feature in all four Gospels. Here we find that the question of what really happened can be answered in various rationalistic ways, for instance that it was an unexpected

act of communal sharing by the crowd, rather than a nature miracle where matter was literally multiplied. However, such rationalistic approaches make little impact on the deeper significance of the story, as revealed by the multiple layers of symbolism regarding the post-Easter mission of the church, the Eucharist, and the Messianic banquet. To assume that the fundamental mystery behind the story can be answered by rationalising it is to miss this. Therefore, in order to appreciate the multiple levels of meaning in the story for what they are (and to learn from them), it is necessary to see the search for a rationalistic/scientific explanation as just one way in which such a story is to be assessed. At least as important is the more subjective assessment that takes each story on its own terms, and considers its impact on the assessor.

9.3. Conclusion

To conclude, I have given several reasons why the question in the title cannot be answered with a simple yes or no. I have tried to explain that this is not because we should be vague or non-committal about miracles, but because the question in the title does not penetrate to the heart of many miracle stories, especially those where the figure of Jesus is in view. I hope that it is clear then, that the question of whether the miracles of Jesus contradict science is actually rather different from the question, '*Do I believe in the miracles of Jesus?*' This is a whole new question, for another day.

Mark Harris is Lecturer in Science and Religion at the University of Edinburgh. His first academic career was in physics, but after studying theology as preparation for ordained ministry, he became enthralled with biblical studies. He is interested in the ways that modern science has affected biblical interpretation, especially in understandings of creation and of miracle. He is the author of *The Nature of Creation: Examining the Bible and Science* (Routledge, 2014).

10. CAN A SCIENTIST TRUST THE NEW TESTAMENT?

by N. T. Wright

10.1. Epicureanism and Scientism

'Science' covers many things. In modern western science, two different narratives can become twisted together: (a) the continual exploration of the natural world, from distant stars to tiny particles; (b) the post-Enlightenment intellectual and social development of the modern western world. When these two stories get muddled, we have, not science, but Scientism.

'Scientism' tries to extrapolate from the explosion of 'scientific' knowledge proper to the belief that we now know far more about the moral, social and cultural world as well. This modern belief in 'progress' results, not from observation of the natural world, but from a form of Epicureanism. For the Epicureans, the gods, if they exist, are far away and don't intervene. Instead, *the world works by itself*, evolving slowly and gradually. The great lie of today's Scientism is that 'science' has somehow proved Epicureanism.

What happened was rather different. When Darwin went on his famous voyage and wrote his famous book, his findings did indeed demonstrate the high probability of the evolution of species. But Darwin's findings were seized upon by those who (for political and social reasons) already wanted to believe that the world simply developed itself, without divine intervention. Science became contextualised within, and then taken over by, Scientism.

Scientism was then able to draw on the tradition of Descartes, approaching everything with systematic doubt. When asked if they could trust the New Testament, people in this tradition would say, '*Of course not. Where are the facts? Where is the scientific proof?*' (They would have to say the same about Caesar's account of the Gallic War, or indeed Churchill's account of the Second World War.) Anyone combining the Cartesian tradition with Epicureanism would say, '*Not only can we not trust it; it says things which we know, a priori, to be*

false.' Anyone then combining these traditions with the doctrine of 'progress' would say, '*And anyway, we know that these are only old fables, suitable for their time perhaps, but irrelevant to those who have escaped the dark night of superstition.*'

But science, by itself, cannot adjudicate between different philosophical positions. Once all sides accept an implicit Epicureanism, then every advance in our understanding of natural causation looks like another nail in the coffin of the 'god of the gaps'. This, very broadly, is where we are in western culture – despite the newer movements in science itself, such as General Relativity or Quantum Mechanics, which cast doubt precisely on some of the earlier 'certainties'.

10.2. Different Ways of Knowing – How and Why

There are, however, different kinds of *knowing*. Science studies the repeatable; history studies the unrepeatable. There are overlaps. Geology is, in a sense, the history of part of the natural world; so is astronomy. But we normally use 'science' for disciplines which repeat experiments. With history, however, we depend on testimony, sometimes intentional (written accounts, etc.), sometimes accidental (archaeological remains, coins, and so on). Here the strict Cartesian, let alone the positivist, ought to worry: can we *know* what happened in the past, in the same way that we know the composition of a hydrogen molecule? Yet historians claim that they *do* know certain things: the fall of the Berlin Wall in 1989, or of Jerusalem in AD 70. And the crucifixion of a young Jew called Jesus by Roman soldiers outside Jerusalem in Passover week, probably in 33 AD. And the fact that, shortly afterwards, his followers became convinced that he was alive again. As historians, we know all this as securely as we know about Jupiter's moons or the composition of the Cairngorm rocks.

Beyond science and history, there are different types of knowing. The most important things in life – music, faith, love, values, beauty, ethics, wisdom and hope – are not mere subjective fantasies. Somehow we have to hold together the work and findings of 'science' with the things that really matter to us personally.

The former Chief Rabbi, Jonathan Sacks, offers a model for this. In *The Great Partnership*, he proposes a formula: '*Science takes things apart to see how they work; religion puts things together to see what they mean.*' History, too, enquires after meaning: not just 'what happened' but 'why'. Why did people start the First World War, drop the atom bomb, launch the Crusades, crucify Jesus? Without 'meaning', science and history alike become dry and bleak. By itself, 'science' can tell you how to make a bomb, but not whether to drop it, or on whom. Scientism, however, is unwilling to allow for other spheres of enquiry, each with its own integrity. We must resist that intransigence. These spheres need to be held in partnership, in fruitful conversation.

All knowledge works by hypothesis and verification. An eternal dialogue takes place between our assumptions about how things make sense and our raw, unsorted encounters with the world. We form initial hypotheses, and test these against the data, reaching initial conclusions and modifying them in the light of subsequent experience or reflection. Sometimes, we have what Thomas Kuhn called a paradigm shift: new data doesn't fit, so the model itself tips over, generating a new paradigm. All this is well known; my point here is that all three areas I have mentioned, science, history and the worlds of religion, culture and art, proceed by this means. This is how we come to know *both* how things work *and* what they mean. That is the basis for our fruitful conversation.

Such a conversation can be found in the ancient Jewish tradition that Lord Sacks represents, and particularly (in my view) in the development of this which we find in Jesus and his first followers. And this brings us to the New Testament itself. I want to suggest not only that a scientist, qua scientist, can certainly trust the New Testament, but that the New Testament itself articulates modes of knowing which help us resist late-modern Epicureanism and the belief in automatic 'progress', and embrace wiser, more humane ways of thinking and being.

The roots of the New Testament are Jewish. The ancient Jewish vision of God is very different from that of Epicureanism. Israel's God, having made the world, continues in dynamic relationship with it, calling his people Israel for the sake of the world. This God declares *both* that he is the high and lofty one who inhabits a different space from us *and*

that he dwells amongst his people. The Temple symbolized all this, being seen as the place where heaven and Earth met.

Israel's scriptures express this belief from many angles; taken together, they form a narrative pointing ahead to a moment of truth. The New Testament claims that this moment arrived with Jesus of Nazareth, Israel's Messiah; that the God who made promises to Israel, promises involving creation itself, kept those promises in history, in Jesus. What might it mean to trust this testimony?

It means taking it seriously *as history*; which brings the problems into immediate focus. When people ask, 'Can a scientist – or anyone! – trust the New Testament?', they mean three things. First, can we trust the outline record of Jesus' public career? Second, can we believe in his 'miracles'? Third, in particular, can we believe in his resurrection? Let me take these in reverse order.

10.3. Can We Believe in the Resurrection?

As to the resurrection: it isn't only modern science that 'knows' that dead people don't rise. Here 'Scientism' overreaches itself, supposing it has discovered this for the first time. Believing that Jesus was raised from the dead always required a paradigm shift. Let us also be clear: the word 'resurrection' refers, not to 'life after death', but to a new, bodily life *after* whatever 'life after death' there may be. The resurrection of Jesus is *not* about 'going to heaven', but about the launching of new creation within the on-going old one.

So: can a scientist trust the New Testament's testimony about Jesus' resurrection? Scientism, of course, will say, '*Certainly not: we know things like that don't happen.*' But a genuine scientist might say, '*Well, this is outside any other knowledge we have, so we will be suspicious; but when we look at all the evidence about the rise of the early church, and the way it told these stories, different from anything in the imagination or mythology of the pagan world, different even from the pictures of 'resurrection' within the ancient Jewish world, it seems as though we have to take the claim seriously.*' And that would mean taking seriously the possibility that something quite new might have happened within the middle of human history, requiring other worldviews to be reworked around it. Either it is the new centre, or it is

just a bizarre oddity – which almost certainly means it is nothing at all. But the question of whether you are prepared to treat it as the new centre is not a question that can be answered by science alone, or indeed history alone.

10.4. Can We Believe In Miracles?

When it comes to the other 'miracles', we note how that word itself has slipped over the years. Today people 'hear' the word 'miracle' within an assumed Epicureanism: a normally absent divinity reaching in to the world, doing something bizarre, and then retreating again. The New Testament, however, asks us to consider two unexpected possibilities: first, that the God the Israelites invoked really was the creator of the whole world; second, that this God really had promised to come in person and bring the story of Israel, the story that would rescue the whole creation, to its unexpected and dramatic climax. The New Testament isn't suggesting that we fit these possibilities into our existing worldviews. It is offering these stories, knowing that they do not fit, but also knowing that, taken together, they constitute an invitation to reconstruct our worldviews in such a way that the story of Jesus – and everything else – will make a new kind of sense.

This, in principle, is the sort of thing scientists do regularly. Recently discovered prehistoric footprints in Norfolk will compel a new look on early human history. Science, qua science (as opposed to Scientism), cannot pronounce on the unexpected. Genuine scientists welcome data which challenges existing hypotheses.

10.5. Can We Trust the Record of Jesus?

But I would not, myself, begin with the so-called 'miracles'. They are, in a sense, the icing on the cake. The place to start is either the resurrection itself, or the picture of Jesus' public career in the gospels. Contemporary research on ancient Judaism continues, as I have argued elsewhere, to suggest that the gospels are not the retrojection of later fantasy onto a falsely historicized screen. Their stories make sense in the world they claim to describe, offering a vivid portrayal of Jesus as a man of his time and yet a man exploding *into* that time with news: now, at last, Israel's God was becoming king 'on Earth as in

heaven'. Debate rages on the trustworthiness of this historical picture; but this points to the larger question, whether we can trust what Jesus himself said. Might it after all be the case that then and there, in the first century, in Palestine, the world's creator was starting to take charge of his world, challenging the principalities and powers, and doing so with the weapons not of revolution or military force but of forgiveness, healing and love? The real question faced by all of us, scientists included, is not just '*Could these things have happened?*', but '*Could it be the case that there is after all a God who, having made the world, would come at last to sort it all out, and to do so in this way?*' And that, of course, is not a question upon which the professional qualifications of a physicist, an astronomer, a botanist or any other scientist would entitle them to pronounce.

Nor can it be answered by simply saying '*yes*' to all the particular questions about Jesus. Even if he did say and do those things, perhaps he was just a random freak. That brings us back to the resurrection. If Jesus had not been raised from the dead, his first followers would have concluded that it was all just a bizarre nonsense. The reason they didn't was that they believed, despite not having expected any such thing, that he had in fact been raised.

Jesus' resurrection, in fact, offers itself as a new centre not only of *what* we might know but of *how* we might know things. It doesn't fit into other philosophies, but then it doesn't claim to. It invites the question: what worldview or philosophy *would* you need to adopt if it *were* true? This is a regular scientific challenge: faced with data which doesn't fit the theory, you get a new theory. But with the resurrection something else seems to be going on, something which isn't just science and isn't just history, something in that larger, uncertain area about the meaning of all human life. What the resurrection offers is the introduction of a *new creation* – not a fresh creation out of nothing, but the rescue and revitalization of the old creation itself. It therefore offers a new mode of knowing, continuous with, and yet transcending, the modes appropriate for the present creation. The resurrection provides the bridge to speak the new word in language that can be heard in the old world, to invite the old world to recognise that new life has appeared even within its own sphere.

10.6. Conclusion

So: can the scientist – can any of us! – trust the New Testament? We certainly can't trust it to fit into our preconceived notions. But we can trust it to tell us about new creation, in such a way as to enable us to see that the old creation, with its own modes of knowing, is redeemed and taken up within it. And with that we can begin to rebuild 'trust' in other areas of life as well – something we badly need at present.

But how? Here the New Testament puts one of its central proposals before us. It speaks of *power*: a power which works *through* the message about Jesus and his resurrection, and generates new modes of knowing and being. 'Trusting the New Testament' isn't a matter of a cool, detached appraisal. It means opening oneself to the source of life itself. The New Testament tells a story which invites, not spectators, but participants.

'Trust' is a larger category than scientific knowledge. It involves the natural, physical world, but also the world of history, and that larger, hard-to-define category which includes the things that really matter. So we come back where we began. The challenge of the New Testament is to discern the picture of God that we see in Jesus, and to learn to trust this God.

The real question, then, is not, 'Can *we* trust the New Testament, and the God of whom it speaks?' The question, really, is, 'Can this God trust *us* – to follow him, to reshape our worldviews around him, and make his glory known in the world?' Trust works both ways.

NT (Tom) Wright read Classics and then Theology at Oxford. From 1978 to 1981 he was Fellow and Chaplain at Downing College, Cambridge. After a spell in Montreal, he returned in 1986 to Oxford as University Lecturer and Chaplain of Worcester College, Oxford. He became Dean of Lichfield in 1994, Canon Theologian of Westminster Abbey in 2000, and Bishop of Durham in 2003. In 2010 he was appointed Professor of New Testament and Early Christianity at St Andrews University. Tom has published over 80 books at both scholarly and popular levels, most recently *Paul and the Faithfulness of God* (London: SPCK, 2013) and *Simply Good News* (London: SPCK, 2015). He has also broadcast frequently on radio and TV.

11. QUESTIONS FOR PRIVATE THOUGHT OR GROUP DISCUSSION

by Eric Priest

Chapter 1 – Introduction

***** What do you see as the relationship between science and religion, and why?
***** If you are not a scientist, what do you imagine it is like to be one?
***** If you are a scientist, describe your experiences of the nature of science.

Chapter 2 – New Atheism

***** Give examples of scientific explanations for which experiments can or cannot be devised and which are or are not useful for improving the quality of life.
***** Give examples of axiological explanations, identifying the four major elements mentioned by Keith Ward.
***** What do you mean by God's consciousness?
***** What is the relation between God and space-time?
***** What do you mean by God being eternal and unchanging?
***** If you believe in God, what evidence can you give for that belief and in what sense is it rational?
***** Describe ideas of New Atheism that you have come across – what arguments would you suggest against them?
***** Describe examples from science of beauty, order and wonder.
***** What are the value and limitations of science?
***** What is your purpose as a human being?
***** Describe examples of destruction and of creative emergence at work in the Universe.

Chapter 3 – Reductionism

***** What is your reaction to the secularist scientific picture (SSP) described by Eleonore Stump at the beginning of her article?
***** Are the laws of all the sciences other than physics reducible to those of physics and, if not, why not?
***** Is everything determined by microphysical causal interactions?
***** Compare the SSP and Thomist notions of natural law.
***** Suggest examples, other than the example of autism, in which reductionism fails.

***** Give reasons for rejecting reductionism.
***** Discuss pros and cons of accepting the SSP or Thomist views for the ultimate foundation of reality.

Chapter 4 – Astronomy

***** What is the role of God likely to be at the beginning and end of the Universe?
***** What do you mean by '*God sustains the Universe*'?
***** In what ways can scientific work on the origin of the Universe re-energise Christian theology?
***** What is your reaction to the thought of a future Universe that is almost empty and is steadily growing colder and darker for all eternity?
***** In what ways can work on the long-term future of the Universe give a renewed emphasis on new creation and Christian hope?

Chapter 5 – Evolution

***** How would you testify about the scientific standing of evolution against intelligent design?
***** How does a person of faith view evolution?
***** What are the elements of an understanding of evolution in harmony with Christianity?
***** What do the first two chapters of Genesis and science tell us about the origin of the Universe?
***** What are the religious and scientific contributions to an understanding of the evolution of humanity?

Chapter 6 – Genes

***** Give several ways of describing the organization of a human.
***** Describe examples of where opportunity determines behaviour and of where the environment could perhaps determine the expression of genes.
***** Suggest examples of how genetic diversity has helped the survival or flourishing of our species.
***** Suggest examples of how our brains function at an unconscious level and at a conscious level.
***** Give examples of activity at the level of cells, at the level of organs and at the level of the whole person.
***** Discuss examples of complex choices that need sound judgment, in which scientific insights and insights from the arts, philosophy or religion are important.

***** Suggest examples of how religion has provided a basis for ethics and has helped us develop a purpose for living.
***** Discuss examples of how humans operate at a rational level and at an intuitive level.
***** How can we seek to lived fulfilled lives where we flourish physically and emotionally?

Chapter 7 – Psychology

***** Give examples of how an open-minded attitude has led to changes in your attitudes or ideas over the years.
***** Discuss examples of possible tension between psychological science and faith.
***** Compare a theological and psychological description of mind and body.
***** Compare biblical and psychological views to the relation between behaviour and belief.
***** Discuss examples of where religion has in the past fostered horrors and goodness.
***** Give examples of events in which one causes another and in which the two are only coincidentally correlated.
***** What are the purposes and effects of prayer?
***** What is your attitude to same-sex marriage?

Chapter 8 – Nature of Person

***** Discuss Peter Singer's definition of a person as someone with the capacity for enjoyment, for interacting with others and having preferences.
***** Should only those with high-level cognitive functioning have moral rights and privileges?
***** Should small babies be included in a definition of 'person'?
***** Should those with advanced dementia be included in a definition of 'person'?
***** Under what conditions would you sanction abortion?
***** Compare the evidence for and against a dualistic philosophy of mind and body and holistic philosophy. Which appeals more to you?
***** Is the sense of a conscious choosing self an illusion?
***** Discuss Einstein's quote '*The eternal mystery of the world is its comprehensibility*'.
***** Are persons a different kind of reality from matter?
***** How do you react to the suggestion that you are made in the image of God?

***** Discuss the statement '*You love me, therefore I am'*.
***** What are the practical consequences of defining persons in the way suggested by John Wyatt?

Chapter 9 – Miracles

***** Discuss Hume's definition of miracle.
***** How would you prefer to define a miracle?
***** Read accounts of the following miracles in the Bible and discuss your reaction to them:

the crossing of the Red Sea (Exodus 13^{17}–14^{29});
the healing of the blind man (Mark 8^{22-26});
the healing of the paralytic (Mark 2^{1-12});
the feeding of the five thousand (Mark 6^{30-44});
the miraculous catch of fish (John 21^{1-14});
the stilling of the storm (Luke 8^{22-25});
the raising of Lazarus (John 11^{38-44});
walking on the water (Mark 6^{45-52});
the resurrection (Mark 16^{1-13}).

***** In each case, what is the deeper significance of the story, beyond it simply being a miracle?
***** Do you believe in the miracles of Jesus?

Chapter 10 – Trusting the New Testament

***** Has science proved that the world works by itself?
***** Suggest some different philosophical positions for viewing the nature of reality – how would you adjudicate between them?
***** Compare the different types of knowing that come from science, history, philosophy and religion. Are they completely separate or overlapping?
***** Discuss the formula '*Science takes things apart to see how they work; religion puts them together to see what they mean*'. Suggest an alternative formula.
***** Does all knowledge work by hypothesis and verification?
***** Compare the Epicurean and Jewish visions of God.
***** Can we believe in the resurrection?
***** Can we believe in miracles?
***** Can we trust the record of Jesus?

RECOMMENDED READING

Barbour, IG (1997) *Religion and Science: Historical and Contemporary Issues,* HarperOne, New York.

Berry, RJ (2001) *God and Evolution: Creation, Evolution and the Bible,* Regent College Publishing, Vancouver.

Harris, M (2013) *The Nature of Creation: Examining the Bible and Science,* Acumen Publishing, Durham.

Harrison, P (2007) *The Fall of Man and the Foundations of Science,* Cambridge University Press, Cambridge.

Hedley Brooke, J (1991) *Science and Religion: Some Historical Perspectives,* Cambridge University Press, Cambridge.

McGrath, AE (2002) *The Dawkins Delusion,* SPCK, London.

McGrath, AE (2004) *The Twilight of Atheism: The Rise and Fall of Disbelief in the Modern World,* Rider, London.

McLeish, T (2014) *Faith and Wisdom in Science,* Oxford University Press, Oxford.

Numbers, RL (2009) *Galileo Goes to Jail and Other Myths about Science and Religion,* Harvard University Press, Cambridge, USA.

Oord, TJ (2010) *The Polkinghorne Reader: Science, Faith and the Search for Meaning,* SPCK, London

Peacock, A (1996) *God and Science: a Quest for Christian Credibility,* SCM Press, London.

Polkinghorne, J (1994) *Science and Christian Belief,* SPCK, London.

Sacks, J (2011) *The Great Partnership: God, Science and the Search for Meaning,* Hodder and Stoughton, London.

Southgate, C (2011) *The Groaning of Creation: God, Evolution and the Problem of Evil,* Westminster John Knox, Louisville, KY.

Templeton, JM and Herrman, RL (1998) *The God Who Would be Known: Revelations of the Divine in Contemporary Science,* Templeton Foundation Press, Philadelphia.

Ward, K (2010) *The Big Questions in Science and Religion,* Templeton Press, Philadelphia.

Wilkinson, D (2010) *Christian Eschatology and the Physical Universe,* T&T Clark, London.

Wright, NT (2003) *The Resurrection of the Son of God,* SPCK, London.

Wyatt, J (2009) *Matters of Life and Death: Human Dilemmaas in the Light of the Christian Faith*, Inter-Varsity Press, Nottingham.

INDEX