Big science Big God

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BIG SCIENCE – BIG GOD

Science and Faith in a strong embrace

John Houghton

Because there is a common belief that science and religion are opposed to each other, the expression Big Science–Big God may seem an oxymoron. I have deliberately put God and Science together in a strong embrace because I believe that they are not in opposition; that they are opposed is in fact a relatively recent idea. I hope that by thinking more carefully and deeply about them both and putting them alongside each other will persuade you otherwise and that in fact they support each other in ways that are mutually enriching.

The Big Bang

Science is concerned both about things that are very small and things that are very big (Fig 1). Let us start with a 'human' size of one metre and go down in size in factors of ten until we reach the size of a typical molecule of about one millionth of a metre (10^{-6} m). But we can go much further than that. A further six factors of ten takes us to one millionth millionth of a metre at the size of a typical nucleus (10^{-12} m) and one ten thousandth of that (10^{-16} m) to the size of the smallest particles we know, the quarks that make up the particles that make up the nucleus. If we go up in size from the 'human' size of one metre, one million million metres (10^{12} m) is about the diameter of the solar system out to the planet Pluto, one million million million metres (10^{18} m) is about the diameter of our galaxy and ten million million million million (10^{25} m) is about the diameter of the whole universe[1].

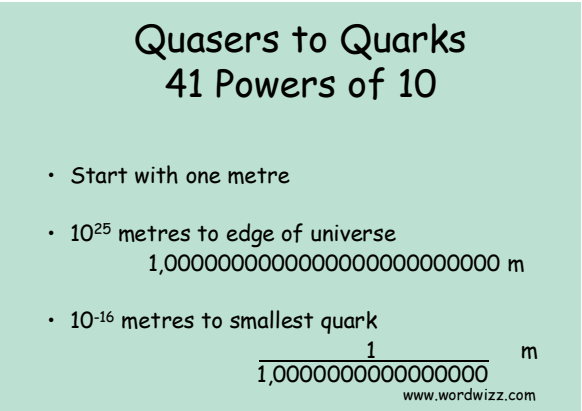

Fig. 1, 41 powers of 10 in size between the whole universe and the smallest particle we know.

One of the triumphs of science over the last fifty years has been the way in which the physics of the very small and of the very big - spanning 41 orders of magnitude - have come together to describe the beginning of the universe as we know it. About 14 thousand million years ago the universe began with what is known as the Big Bang. At that time all the matter and energy in the universe, concentrated in an extremely small volume at unbelievably high density and temperature, began to expand. That expansion has continued ever since. I want to mention three things about the universe, its size, energy and precision.

…three things about the universe: its size, energy and precision

Its **size** in both space and time is completely mind boggling. We begin with the solar system – the Sun with its eight planets[2] orbiting around it. If we made a scale model such that the sun and all the orbital planets would fit into a typical house in the middle of London, the sun would be about the size of a pea; the Earth and other planets specks of dust. The nearest star to us would be 100 kilometres away at Oxford. The galaxy of stars to which our sun belongs, that

we see as the Milky Way in the night sky, is shaped rather like a flat disc. It contains 100 thousand million stars. On our scale model, the farthest edge of the galaxy would be beyond the moon's orbit - well over 100 million kilometres away. But then there are more than a thousand million galaxies in the universe, the farthest galaxies on our model being nearly a million million kilometres away. Light emitted by those farthest galaxies takes about 10 thousand million years to reach us – we say they are 10 thousand million light years away from us.

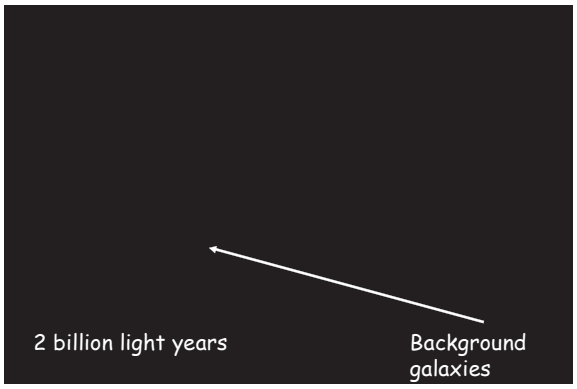

Fig. 2 An image taken with NASA's Hubble Space Telescope of a Galaxy Cluster two billion light years away from us. Galaxies further away – about 5 billion light years – appear as smudges around the nearer galaxies; their light has been distorted by the gravitational fields of the nearer galaxies

The **energy** in the universe is no less stunning. We are familiar with dramatic natural releases of energy that occur on our Earth in volcanoes, earthquakes or thunderstorms. But these are minuscule compared with what occurs in the rest of the universe. The biggest event of all was the big bang at the universe's beginning. As the matter expanded from that event, regions of higher density condensed under the force of gravity to form stars. Stars shine because of the energy from reactions between atomic nuclei. At the high temperatures inside stars, hydrogen nuclei turn into helium releasing more energy. The nuclei of more complex elements are also formed, carbon, nitrogen, oxygen, for instance, and all the way up the periodic table to iron. Eventually as stars run out of fuel some expand and cool. Other larger stars as they grow older blow apart in enormous explosions called super novae. One such explosion, only 500 light years away in our own galaxy, was observed by Chinese astronomers on the 4 July 1054. It is now known as the Crab Nebula in the constellation of Taurus. In the enormous temperatures and forces of supernovae explosions, the nuclei of heavier elements (for instance, platinum, lead, gold and uranium) are created.

Fig. 3 The Crab Nebula in Taurus first seen as an exploding supernova by Chinese astronomers on 4th July 1054

The swirling clouds of dust and debris that result from these explosions mix with more hydrogen and helium from interstellar space. Within this mixture new stars are formed. Our sun is such a second generation star. Around the sun, from

some of the rich mixture of material, containing all the 92 stable elements we know in nature, planets including our Earth were formed.

The third word I have used to describe the universe is **precision.** We are familiar enough with the very exact movements of stars and planets in the sky. But the beginning of the universe in a 'big bang' does not suggest anything very precise. In fact, in order for the universe to evolve in the way I have described enabling all the chemical elements to be formed and for human life to be possible within it, the conditions at the start had to be extremely special. The big bang needed to be incredibly controlled and fine-tuned.

To open a combination lock by chance with four dials each with ten digits has a probability of one in ten thousand (10^4, 1 followed by 4 zeros). As the Astronomer Royal, Lord Rees has pointed out in his book *Just six numbers* the balance between the big bang force causing the universe to expand and the force of gravity pulling it together had to be set to one part in 10 to the power of 60 (10^{60},1 followed by 60 zeros), the precision required to hit a target one millimetre square at the edge of the universe! If that seems a large number, there is a further number that is far, far bigger. Sir Roger Penrose[3], an Oxford mathematics professor, has considered the degree of order required at the universe's start and found that it was set to one part in 10 to the power of 10^{123}. If all the trees on earth were turned into paper and all the paper covered with zeros to follow the 1, that would be nothing like enough zeros to define that number. If a zero could be placed on every atom in the universe, it would still fall far short of the number of zeros required. What precision in that fine-tuning!

'…the precision required to hit a target 1mm. square at the edge of the universe!'

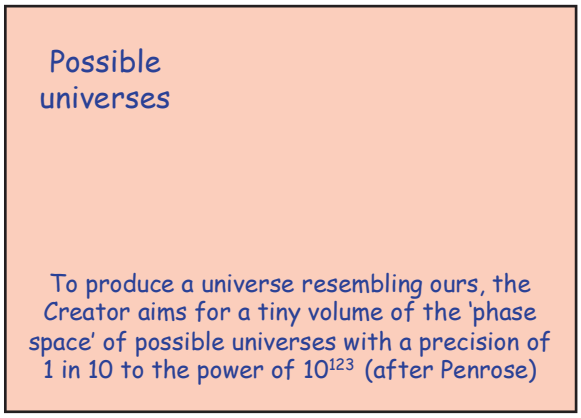

Fig. 4 The extraordinary precision required to 'fine tune' the universe at the start of the Big Bang (from R Penrose, *The Emperor's New Mind*, OUP 1989)

Size, energy and precision – all requiring descriptions beyond our wildest imagination - such is the wonder and magnificence of the universe God has created. Size, energy and precision are Divine characteristics. And for us humans to exist the whole universe is needed with its enormous size and time scale.

That is the story of the universe very briefly told. Another story can also be told of our Earth where life in all its richness and variety has developed.

The Laws of Nature

Despite the immense complexity of the universe, it is sometimes said that the most complex object we know in the universe is the human brain that amazingly has the capacity to understand something of the universe's design and structure. We find it to be ordered according to *scientific laws* – the law of gravity, Newton's laws of motion, the laws connecting magnetism and electricity, the laws of quantum mechanics, and so on. Where do these laws of nature come from? They are not invented by human brains. Rather they are discovered because they too

'…the most complex object we know in the universe is the human brain'

are part of God's creation. They are God's laws. The science humans explore is God's science.

The great scientist Albert Einstein once said that the most incomprehensible thing about the universe is that it is comprehensible. This comprehensibility is an expression of the unique characteristic humans possess, that we have been made in *God's image* (Genesis 1 26) bringing with it capacities of understanding and creativity. The early scientists of the seventeenth century believed that in their science they were exploring the works of God. Johannes Kepler who discovered the laws that govern the orbits of the planets described it as 'thinking God's thoughts after him.' The even greater magnificence of the universe as we now understand it originates and is kept in being by the Creator God. Even more therefore should we see science as God's science.

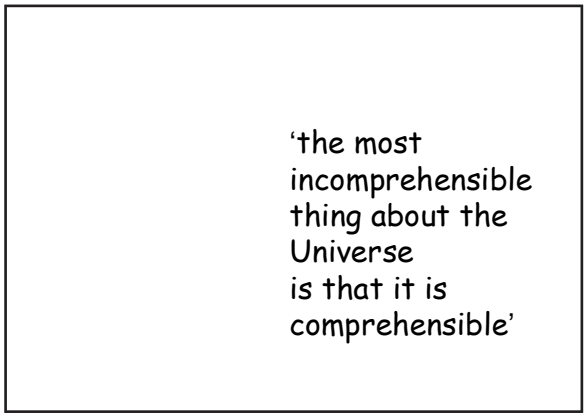

Fig. 5 A famous quotation from Albert Einstein

Paul in his epistle to the Romans asserts that creation leads to knowledge of God whose 'invisible qualities , eternal power and divine nature have been clearly seen, being understood from what has been made, so that men are without excuse[4].' Paul's assertion is even more true today; we know so much more about creation and its wonders.

What sort of God?

But what sort of God are we talking about? Did God, for instance, just set up the laws that determine the operation of the universe, light the blue touch paper to start it all off and then retreat to a safe distance without any further engagement – a God commonly known as a *deist* God?

Many scientists are willing to accept the idea of an intelligence behind the universe. Albert Einstein described himself as a 'deeply religious non-believer'. He said 'If something is in me that can be called religious then it is the unbounded admiration for the structure of the world so far as our science can reveal it.' Einstein could not accept that God might be more than a deist God, a personal God to whom humans might be able to relate. Even Richard Dawkins accepts the possibility of God in the Einstein sense although prefers not to use the word God. But with religious fervour he vehemently opposes the whole idea of a personal God. In his book *The God Delusion* he argues passionately that science tells the *whole* story and leaves no room for a Creator or for a divine being to whom humans can in any way relate. To him Christianity has no more credence than a fairy tale and God, like Father Christmas, is just a figment of our imagination.

'...Dawkins and others are going outside the boundaries of what science is about'

In trying to argue that science has somehow disproved God, Dawkins and others are going outside the boundaries of what science is about – in fact they are misusing science. The scientific enterprise is a voyage of discovery. It searches

'The view that science tells the whole story is an extremely blinkered one.'

to find out the details of creation, how things fit together and the laws and the mechanisms that govern how things behave including the basic laws of physics with their remarkable mathematical basis. Science seeks to answer *How* questions but cannot address ultimate *Why* questions. Science neither proves nor disproves that God exists; that question is outside its remit. The view that science tells the *whole* story is an extremely blinkered one.

Intelligent Design

Largely because of the arguments of scientists like Dawkins who argue so passionately for science disconnected from God, there has arisen particularly in the United States the Intelligent Design (ID) movement. Proponents of ID argue that there are areas of science, especially concerned with the evolution of living systems, where the degree of complexity is such that explanation on the basis of scientific law is impossible. They call them areas of irreducible complexity. Therefore, they argue these areas must have been 'intelligently designed' by a supernatural agent.

There are two big problems with this approach. The first and most obvious is that as scientific knowledge expands so does scientific understanding. Things that seem impossible to understand today may eventually come within the ambit of scientific description. New laws or insights are coming to light all the time. Suppose we take some phenomenon that completely eludes our present scientific understanding and label it as due to direct divine action so plugging the gap in our knowledge. Suppose sometime later a scientific description emerges. The gap in our knowledge has gone away and the supposed divine action is no longer required. The 'God of the gaps' is bound to diminish as science advances.

This 'God of the gaps' has been around for a long time. For instance, in the seventeenth century the laws of gravity discovered by Isaac Newton accounted for the orbits of the planets around the sun and of the moon around the earth. But Newton found difficulty in accounting for the rotation of the earth on its axis. He wrote, 'The diurnal rotation of the planets could not be derived from gravity but required a divine arm to impress it on them.' Newton was plugging this gap with God. As science has advanced, this God of the gaps has become smaller and smaller.

'Nor can scientists feel comfortable with a supposed scientific description that is presented in terms of a supernatural agent'

Scientists cannot in general accept that in the normal behaviour of the natural world there might be areas of irreducible complexity that can never be amenable to scientific investigation. Nor can scientists feel comfortable with a supposed scientific description that is presented in terms of a supernatural agent. Most of the examples of ID that are put forward are from biology – I am not a biologist so cannot comment on them in detail. Francis Collins, a distinguished biologist and head of the Human Genome project, has addressed some of them in his excellent book *The Language of God* published in 2006.

But you may say what about miracles, for instance events in the life of Jesus, in particular his resurrection that we label as supernatural? It is not these that ID is addressing. As one-off events that appear outside the realm of natural law, they are outside the normal scientific story. Although scientists are bound to be sceptical about them, science cannot rule them out. Their significance comes from a special connection with God, and it is largely theological arguments that must be employed in addressing their reality and importance.

The second problem with the ID approach is even more fundamental in that it is based on a misconception of the nature of scientific law. The scientific laws

themselves are not created by scientists but are an expression of the Creator God's orderly activity. The *whole* of creation is God's intelligent design, both the part where we have discovered the laws by which it is controlled (they are God's laws!) and the part where we as yet have no description in terms of scientific law. The arguments of the ID movement are based on a misunderstanding of the nature of science and lead to a God who is far too small. It is vital that Christians especially those who are scientists take the high ground and insist that the Creator God is the Originator and Sustainer of the whole of creation and that our scientific descriptions all provide evidence of his intelligent design.

'The whole of creation is God's intelligent design'

A Personal God

A deist might go so far as to speak of God as the Creator of the physical universe. But if we refuse to allow God any function other than creating the laws of nature and setting off the big bang - or however the universe started - our deist belief is not of much importance to us. It certainly demands nothing of us and in that sense it seems a comfortable position. But it does beg the question whether there is more to the great Creator; can we get to know more about this God?

Science may not provide proof of God's existence, but it does provide *perspective*. Part of this perspective is the awe and the wonder that many, probably most, scientists feel as they are encounter the greatness of creation with its fantastic scale, energy and precision. Behind it all are the laws of nature that scientists discover and which exist in some absolute sense independent of the scientists who discover them. The cosmologist Paul Davies in his book 'The mind of God'[5] provides a detailed review of the history of the universe and concludes

'The laws of nature...independent of the scientists who discover them'

'Through science we human beings are able to grasp at least some of nature's secrets. We have cracked part of the cosmic code. Why should this be, just why Homo sapiens should carry the spark of rationality that provides the key to the universe is a deep enigma. We who are children of the universe -animated stardust -can nevertheless reflect on the nature of that same universe, even to the extent of glimpsing the rules on which it runs. How we have become linked into this cosmic dimension is a mystery. Yet the linkage cannot be denied. What does it mean? What is Man that we might be party to such privilege? I cannot believe that our existence in this universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama. Our involvement is too intimate. The physical species Homo may count for nothing, but the existence of mind in some organism on some planet in the universe is surely a fact of fundamental significance. Through conscious beings the universe has generated self-awareness. This can be no trivial detail, no minor byproduct of mindless purposeless forces. We are truly meant to be here'.

Following this quotation, it is not surprising that Paul Davies writes 'Personally I feel more comfortable with a deeper level of explanation than the laws of physics'. However, he is not sure 'whether the use of the term 'God' for that deeper level is appropriate'[6] ; nor is he sure that 'this postulated being who underpins the rationality of the world bears much relation to the personal God of religion'. Paul Davies is not alone in wanting a deeper level of explanation. Stephen Hawking hints at it in the closing paragraph of his book 'A brief history of time'[7] when he looks forward to the possible discovery of a complete theory of the universe which would enable there to be more complete discussion of 'why it is that we and the universe exist'. 'If we find the answer to that' he writes 'it would be the ultimate triumph of human reason -for then we would know the mind of God'.

Davies and Hawking when writing of God are thinking very much of a God as the Great Mathematician who thought up and gave realisation to the basic equations at the structure of the universe. A mathematical role for God has been around a long time. Plato is said to have remarked that God geometrizes continually and fifty years ago Sir James Jeans described God as the Great Mathematician[8]. Such a role for God does not, however, move us very far in our quest for meaning. As Stephen Hawking has commented 'One can of course define God as the answer to the question 'Why does the universe bother to exist?' but that does not advance one very much unless one accepts the other connotations that are usually attached to the word God'[9]. Hawking goes on to say that his position on that is open.

I want to pursue further this latter point made by Hawking - that it only makes sense to think of God in a context much larger than that of a great mathematical designer – by asking the question, 'What about His relationship to us? We have seen evidence that suggests the universe has been designed with conscious beings like ourselves in mind. We have also seen that we possess the capability both to understand and to appreciate something of the grand design, of its order and precision, its reliability and consistency and perhaps most surprising of all its mathematical basis. We can also take in something of its beauty, elegance, economy and extravagance. All this is possible because we have developed within us minds, consciousness and self-awareness. These are properties that currently are not easily included in our scientific descriptions; their understanding represents perhaps the greatest challenge to our contemporary science. Since we possess these characteristics it is, I believe, reasonable to argue that they should also be characteristics of the Creator God. After all, if God is there at all, he must be much greater than we can conceivably imagine and our human personality must reflect the much greater personality possessed by the Creator. Indeed, when Hawking and others talk of the 'Mind of God' they are not, I believe, thinking merely of an enormous computer, but of a conscious entity. In so doing they are perhaps inadvertently, attributing personal qualities to God.

'...our human personality must reflect the much greater personality possessed by the Creator'

Personal qualities have to be expressed through relationships. Supposing there is a Creator, therefore, we should be confident in our search for God's revelation of his personality to us. The first chapter of the Bible[10] in fact tells us that humans were created in the image of God and to have a close relationship with Him. Forming a personal relationship with the One who has created the whole universe is the most wonderful and exciting possibility that is open to humans. It is something worth pursuing more than anything else in the world.

A common objection to the Creator God having any relationship with humans is that we are too small a part of the vast universe to be of any importance. Stephen Hawking for instance has said that it is inconceivable that we who are such a small and insignificant part of the vast universe could have personal contact with the God who made the laws[11]. But even our considerations of significance transcend calculations of relative sizes in space or time. And if God is big enough (and by definition he must be!) that supposed insignificance cannot be a problem.

Let me summarize where we have got to. If concern about the conception of the design of the universe or the origin of the laws of nature were our only reason to bring the idea of God into our thinking, whether or not a Creator God exists would merely be a matter for academic debate -a suitable topic for after-dinner conversation in Oxford common rooms. But our scientific exploration of the place of humans in the universe and our asking the question *why* have led to us asking whether the Creator God might be known by us. Is it possible that human

persons might be able to have a personal relationship with God? From our scientific exploration we are led to the need for religious exploration. Hugh Montefiore writes 'Natural theology[12] only permits us to view God from afar. We are, as it were, out of range of his voice, too distant to recognize more than his bare outline. That is why we need so badly his further self-disclosure.'[13] Or as William Temple wrote sixty years ago 'Natural Theology ends with a hunger for that Divine Revelation which it began by excluding from its purview'[14]

'Is it possible that human persons might be able to have a personal relationship with God?'

God's Relation to the Universe

Let us briefly explore further the nature of God and his relation to the universe. In a remarkable book, *The Road to Reality,*[15] Roger Penrose has brought together the basic science of space, time and matter from the very small to the very big. In it he constantly emphasises the elegance and beauty of the mathematics – the algebra, geometry and the equations – that lies at the basis of the descriptions, principles and laws that make up physical science as we know it. He refers to his earlier book, *Shadows of the Mind* in which he discusses how the human mind - with its consciousness, self awareness and ability to make free choices - might be related to physical processes and laws. He places all this in the context of other related areas of knowledge in a diagram that includes three 'worlds' or 'mysteries', the physical world, the mental world and the world of truth. He argues that the world of truth includes the laws of nature with their fundamental mathematical basis, calling it 'truth' because of its absolute quality, independent of the scientists who discover it. To *truth*, following Plato's world of ideal forms, he adds *beauty* – another quality that not only characterises the mathematics but is also evident in many areas of our experience – and *morality* or the laws and principles that govern human behaviour.

Fig. 6 Sir Roger Penrose's book, *The Road to Reality*

I show two versions of this diagram. The first is exactly as published in Penrose's book. The arrows on the diagram express (1) that the structure and operation of the physical world originate from the laws of nature, (2) that the mental world as

we know it is dependent on and located within the physical world and (3) that the mental world connects with beauty and morality in the world of truth.

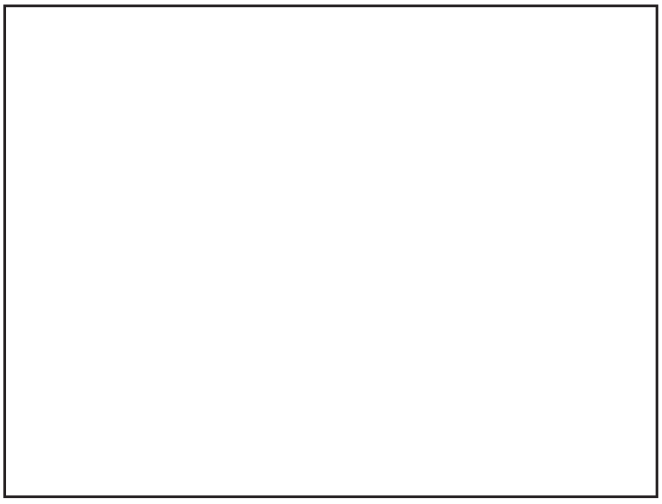

Fig. 7 The *Three Worlds* diagram from Roger Penrose's book *The Road to Reality*

In the second diagram, I have added colour to identify the region around the 'world of truth' that I believe belongs to God and describes his character. I have also added an arrow that leads to the world of mentality from the world of truth, beauty and morality because I believe these aspects and qualities ultimately originate within and reflect the character of God.

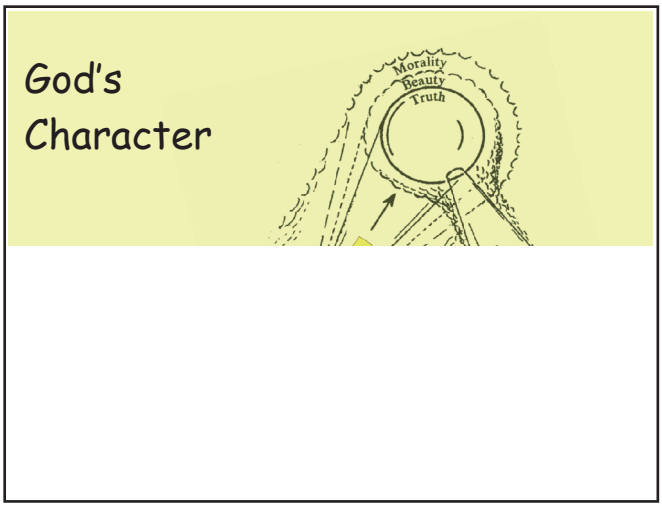

Fig. 8 Penrose's *Three Worlds* diagram modified to illustrate the Divine origin of Truth (including natural law), Beauty and Morality

One can of course debate the sense of the connections that exist between the three worlds or their components. What I find helpful about the diagram is that it brings together theological and scientific aspects of our thinking in a way that appears more as a synthesis than a conflict. The perspective of the God it attempts to portray is not of one remote from the universe but intimately connected with it. There are areas of relationship between the Creator and the created. These relationships and the character of God with which they are involved encourage us to ask more theological questions about the personality of God and how we humans might relate to him.

I conclude with two biblical studies that address in more depth the relationship of God to the universe and to us human beings.

1. The wisdom of God in Creation and in Jesus (Proverbs 8)

A beautiful expression of the wisdom of God in the works of creation is found in the Judaeo Christian scriptures in the book of Proverbs chapter 8 verses 22 to 31. Here, wisdom is seen as involved in all the work of creation and is

personified as 'God's craftsman at his side, filled with delight day after day, rejoicing always in his presence, rejoicing in his whole world and delighting in mankind.' Because we also are creative we can also at least in some small way share in the sheer delight experienced by God the Creator.

In the New Testament, this personified divine wisdom is identified with Jesus[16] and in the early verses of John's gospel, Jesus is described as the agent of creation, the one 'through whom all things were made.'[17] Paul describes Jesus as the Creator and Sustainer of the universe – the one *'by whom all things were created'* and as the one – *'in whom all things hold together.'*[18] It is in Jesus, the *Word made flesh* that the spiritual and the material come together. The *whole* of creation is involved – *God so loved the cosmos…* (John 3.16). It is Jesus who, as the Originator and Redeemer of the whole creation is at the centre of the Big Picture.

A schoolboy began an essay on science and religion with the sentence, 'The difference between science and religion is that science is material and religion is immaterial'. That (with its ambiguity of meaning) may seem to express a simple and easy divide but I believe it is a misconception of both science and religion. Our involvement in the material world and our scientific study of it are not outside God's Big Picture but intimately woven into it.

In the next study I introduce the concept of The Two Books, God's two revelations in his Works and His Word. These are not to be viewed separately but together. As humans we have two eyes to view the world. Their combined 'binocular' vision enables us to see depth in scenes that cannot be identified with either eye on its own. when we open together both our spiritual eye and our material eye , we will appreciate a depth and richness, the existence of which we could not have imagined.

A poem by William Cowper, published in the Olney Hymns in 1779, based on this passage from Proverbs beautifully describes the wisdom of God in creation and in Jesus.

Ere God had built the mountains,
Or raised the fruitful hills;
Before he filled the fountains
That feed the running rills;
In me, from everlasting,
The wonderful I AM,
Found pleasures never wasting,
And Wisdom is my name.

2. When, like a tent to dwell in,
He spread the skies abroad;
And swathed about the swelling
Of ocean's mighty flood;
He wrought by weight and measure,
And I was with him then;
Myself the Father's pleasure,
And mine, the sons of men.

3. Thus wisdom's words discover
Thy glory and thy grace,
Thou everlasting lover
Of our unworthy race!
Thy gracious eye surveyed us
Ere stars were seen above.
In wisdom thou hast made us,
And died for us in love.

4. And couldst thou be delighted
With creatures such as we!
Who when we saw thee, slighted
And nailed thee to a tree?
Unfathomable wonder,
And mystery divine!
The voice that speaks in thunder,
Says, Sinner I am thine!

'He wrought by weight and measure, And I was with him then'
COWPER

2. The Two Books (Psalm 19)

Let me take you back 300 or 400 yrs to the birth of modern science as we know it. A group of pioneering scientists that included Isaac Newton, Robert Boyle,

Christopher Wren, John Ray and many others met together regularly to exchange information about their latest experiments as they excitingly investigated the workings of nature in all its aspects. Many of them were keen Christians and realised that in their science they were investigating and learning about God's creation. They believed that their pursuit of science was for the glory of God. They talked about God's revelation in the form of *two books*, the book of God's works (his creation as investigated by science) and the book of God's Word (as found in the Bible).

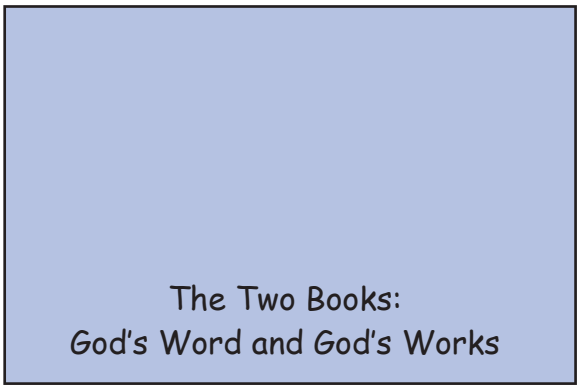

Fig 9 The Two Books of God's revelation in his Works and his Word

The 'two books' idea is generally attributed to Francis Bacon (1561-1626) who wrote, 'Let no man…think or maintain that a man can search too far or be too well studied in the book of God's word or in the book of God's works…but rather let men endeavour an endless progress of proficience in both' – words that are quoted on the flyleaf of the first edition of Charles Darwin's *Origin of Species*.

In fact the idea is much older. In particular, it is embedded in the structure of this remarkable Psalm 19 authored by king David some 1000 years before Christ. C.S.Lewis[19] has described it as 'the greatest poem in the psalter and one of the greatest lyrics in the world.' The first six verses speak of God's Works in creation; the following three verses (6-9) about God's Word in scripture. Verses 10-11 enthuse about the value of the book of God's Word and the final three verses encourage us to apply the Word to our personal actions, words and thoughts.

It is the heavens, the skies and the sun on which David concentrates in the early verses of the psalm. As a shepherd boy he must have spend many hours looking upwards at the starry sky and becoming familiar with the constellations, the moon and the planets all speaking of God's glory. He tells how 'the creation shouts, gossips and exclaims the glory of God in wordless revelation'[20] and in wonderful poetic imagery describes the sun's daily journey round the sky. With his naked eye David could only see about 3000 stars. He must have wondered about their origin, the differences between them and what causes the regular movements that are observed each day, month and year. But his limited knowledge was enough for him to realise that, as a human being made in God's image, he was able to understand and appreciate something of the *Magnificence of God's Works*.

'David puts the two parts of God's revelation alongside each other without apology'

The second part of the psalm is about the book of God's Word. David puts the two books of God's revelation alongside each other without apology or explanation. In doing so he draws a clears parallel between God's laws that control the physical universe with all their intricacy and precision, and God's moral laws that regulate human behaviour and relationships both within the human family and towards the divine Creator.

David describes the laws in a wonderful poetic hexapla – six different words and two things about each. Just reflect on the words and descriptions he uses – laws, statutes, precepts commands, fear and ordinances. Are these words and descriptions we would naturally use about God's moral laws? He goes on to say that they are more precious than gold and sweeter than honey. I am very fond of honey with its superb texture and mellow sweetness. Every Christmas, a friend sends us a 'Winnie the Pooh' calendar that we hang on our kitchen wall. It usually includes a picture of Pooh with his head inside a jar of honey. The word 'mellifluence' means like honey. David's delight could not be expressed more vividly – the *Mellifluence of God's Word.*

Fig. 10 The laws of the Lord are like honey (Psalm 19)
A A Milne's character Winnie the Pooh, displayed on a calendar

Yet David had only a small fragment of the Word in the books of Moses. We have so very much more: we have the whole Bible. In particular, we have the person of Jesus, the perfect image of God, the Son of man and Son of God, who became part of creation. He is described by John (John 1:1-3) both as the Word of God and also as the agent of the whole creation. God's two books come together in the unique revelation of God in Jesus.

'God's two books come together…in Jesus'

We live in a world where God is ignored, the Bible is largely unknown, God's rules are not followed and people do their own thing, think what they want and do what they like. When the world is seen in this subjective way, facts are ignored and even the objective truth of science is questioned and viewed as just another opinion. Psalm 19 places the objectivity of both natural law and moral law alongside each other. We are encouraged to revel in the excellence of both; we are bound to obey the former and the imperative of the latter demands our obedience too.

'Psalm 19 places the objectivity of both natural law and moral law alongside each other'

Putting both God's books together has big implications for the way we care for creation. Let me take the example of human-induced climate change. From our study of science we learn that human activities – the burning of fossil fuels, coal, oil and gas with emissions into the atmosphere of the greenhouse gas, carbon dioxide – are beginning to lead to rapid and damaging climate change. The growth in wealth of the rich nations has largely occurred through the availability of abundant cheap energy, without us realising the damage that would ensue. The poorer nations will bear the greater proportion of the damage from sea level rise and from the much higher frequency and intensity of climate extremes such as floods and droughts whose average impact is greater than that of any other natural disasters the world experiences. Our Christian stewardship demands that we care for the whole of God's creation, and especially for our poorer neighbours wherever they may be, remembering the words of Jesus at the end of his parable about stewardship in Luke 12 48, *From him to whom much is given, much will be required.*

There is therefore an unmistakable Christian imperative that cannot be ignored, to take individually and corporately, urgent action to reduce our 'carbon' emissions so that some of the worst damage of climate change can be avoided. A further challenge we face is to be much more generous in helping those in the developing world who lack so many of the resources that we consider essential, as they seek to develop in sustainable ways. In these actions, a wonderful opportunity exists to make appropriate use of the wealth of science and technology that is available within God's creation.

Let us rejoice as David did in both the *Magnificence of God's Works* and the *Mellifluence of God's Word*. The psalm ends as David prays very beautifully for God's help with the obedience that must necessarily follow, so that he can be completely in tune with God's revelation as presented in both his books. It is a prayer that we can regularly make our own.

'David prays very beautifully for God's help with the obedience that must necessarily follow…'

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[1] Web site www.wordwizz.com provides illustrations for each of the 41 factors of 10.
[2] Excluding Pluto that is no longer designated a planet because Eris, discovered in 2006 and some other objects in the solar system larger than Pluto are now known.
[3] R.Penrose, The Emperor's New Mind OUP 1989
[4] Romans 1 v 20
[5] P. Davies, The Mind of God, Simon and Schuster, 1992, p232
[6] P.Davies loc cit p189
[7] Bantam Press 1988
[8] Sir James Jeans 'The mysterious Universe' CUP 1945 p 122
[9] S.Hawking 'In defence of A brief history' Cambridge review, 1992, **113**, pp 16-17
[10] Genesis 1 v 26
[11] S Hawking in interview on BBC Radio 4 Today programme, 30 Nov 2006
[12] 'Natural Theology' is concerned with what we can learn about God from study of the natural world.
[13] H. Montefiore, The probability of God, SCM Press, 1985, p177
[14] W Temple 'Nature, Man and God' Macmillan 1934 p 306
[15] Vintage Books, 2004
[16] I Cor 1, 24 & 30
[17] John 1 v3
[18] Colossians 1, 15-17
[19] C S Lewis, Reflections on the Psalms
[20] a quote from C H Spurgeon's exposition of Ps 19 in *The Treasury of David*

BIG SCIENCE – BIG GOD

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