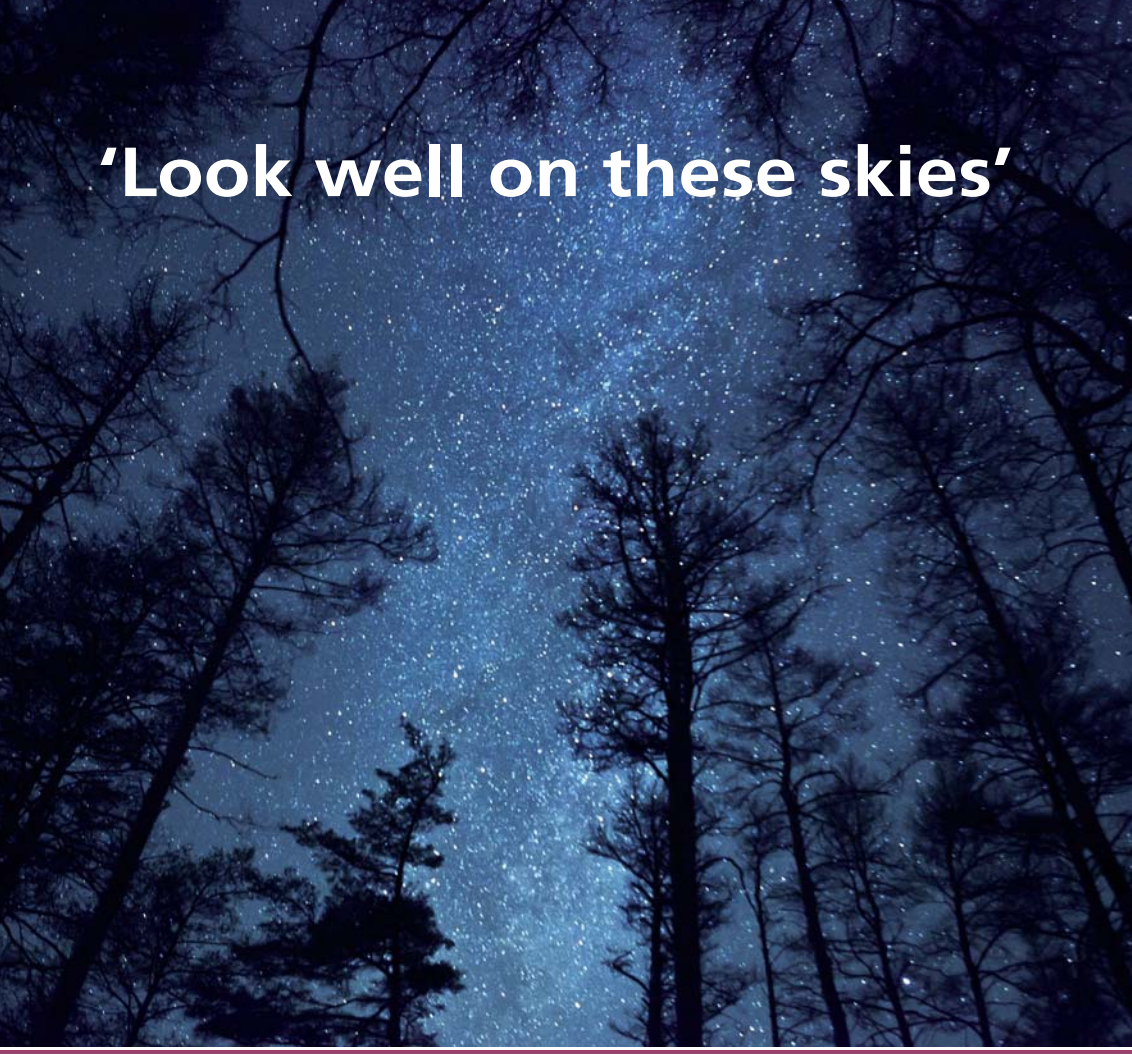

Amazed by Science, Illumined by Religion

Exploring the Debate on Science and Religion

This booklet, produced in 2016 by members of Mayfield Salisbury Parish Church, Edinburgh (Scottish Charity No: 000785), may be downloaded at **www.mayfieldsalisbury.org**.

Links to other contributors to 'Scientists in Congregations – Scotland' can be found at **http://arts.st-andrews.ac.uk/scientistsincongregationsscotland**.

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We are indebted to all of the members of the congregation who gave invaluable advice and shared wise insights during the preparation of the booklet.

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Contents

Introduction

> *Understanding the order of the universe and understanding the purpose of the universe are not identical but they are not very far apart.*

Charles Townes, joint Nobel Prize-winner for Physics 1964

It is fair to ask 'Why another booklet on science and religion?' when the topic is already so thoroughly addressed by eminent theologians and scientists. The idea for this booklet emerged when members of Mayfield Salisbury Parish Church, with backgrounds in teaching and research across a range of scientific fields, decided to respond to the 'Scientists in Congregations' initiative of the Templeton Foundation. In our largely secular culture, there is a deeply ingrained viewpoint that religious beliefs and practices are products of an earlier, less enlightened age that has been convincingly overtaken by science. The Scientists in Congregations project is timely in its aim of *'seeking to encourage conversation about faith and science within congregations across Scotland'*. The experience of each one of us has been that science sustains and deepens our Christian faith, contrary to the widely held perception of a head-on collision between science and the Bible.

Our approach is that religion and science are complementary, and as the scientific understanding of our physical and social worlds expands, so too does our spiritual wonder at the creativity of God. It is through the evolutionary emergence of human consciousness that our God-given rational discernment makes science possible.

We believe that God is beyond our best definitions. God is not to be conceived of as a supernatural being outside and separate from creation; neither is God to be perceived as an object in the universe, like other physical objects. Instead we believe that the universe exists in God and God is in the universe, as expressed by Paul writing to Christians in Corinth: *'Surely you know that you are God's temple and that God's spirit lives in you'* (1 Corinthians 3:16).

> *Any religion which does not say that God is hidden is not true.*
>
> **Blaise Pascal, philosopher and mathematician**

The booklet starts with reflections on the theme of **Creation in Scripture**. This is followed by **The Science Narrative**, a broad overview of current scientific thinking about the beginning of the

universe and the evolution of life, in terms that are generally taught and accepted as fundamental to modern astronomy, physics, biology and medicine.

In **Frequently Asked Questions** we have put forward responses, from the perspective of Christians who think of evolution as a remarkable work of God, to some of the challenges to faith championed by many influential critics.

> *Science and religion will converge in the long run because both are trying to understand our universe.*
> **Charles Townes**

- How might the Bible be read to ensure that the language and imagery of faith remains at the heart of our contemporary scientific view of the world?
- How do we respond to the critics who claim there is no longer a place for God in a universe that can be adequately described in the language of mathematics, physics, chemistry and biology?
- Does an evolutionary explanation of human behaviours, including religious practices, explain away all religious belief?
- How can the process of evolution, built on undeserved suffering, be the work of a loving creator God?
- What can we make of the biblical story of the 'Fall' of Adam as the origin of suffering?
- How do we respond to Creationism and Intelligent Design?

> *Science without religion is lame, religion without science is blind.*
> **Albert Einstein, Nobel Prize-winner for Physics 1921**

The next part of the booklet looks at **21st Century Challenges**. Insights from biblical creation stories can have immediate relevance to the way we approach difficult ethical decisions on issues as wide ranging as climate change, organ transplantation and genetic modification for the production of crops and the treatment of disease. These are just three examples, in areas we are familiar with, where Christian faith can shape our responses to the far-reaching changes taking place in the scientific understanding of our world.

Poems, some written by members of our own congregation, are included in the hope that these will stimulate reflection and discussion. Poetry can express feelings and spiritual insights brilliantly and memorably while also capturing the mysteries of science and the world around us – the abstract beauty of mathematics, uncertainties in physics and the enigmas of human consciousness.

A final section contains **Prayers and Reflections** on themes, touched on in the booklet, which may be helpful in private or for public worship in congregations.

Further Reading is a list of books, articles and websites we have quoted from and been stimulated by and is included as a resource for anyone inclined to look more into any of these questions.

We do not claim to have ideal answers to the questions raised in the dialogue between a scientific and religious outlook, but hope that this booklet will be a useful source of material for discussion, reflection and enjoyment and will encourage others, in a shifting world, to be truly amazed by science and illumined by religion.

The Eternal Moment

by Margaret Nuttall

Look well on these skies
these hills, this barley field
this thistledown, these slender
grasses, for such conjunction
of light and form shall never
again occur on this earth.

Mark well this moment,
for though it pass
it belongs to eternity.

Creation in the Book of Genesis

There are two creation stories in the opening chapters of the Book of Genesis (Genesis 1 – 3). These stories were written at different times: the first account (Genesis 1: 1 – 2: 3) was written c. 500 BCE, while the second account (Genesis 2: 4 – 3: 24) was written centuries earlier c. 900 BCE. The details of the stories are different, but there is no attempt to harmonise them. To some extent, the creation stories in the Bible are similar to other near-Eastern creation stories of the same period. However, there are differences: in the Mesopotamian traditions, there is a plurality of gods, with conflicts between the gods and humanity, and sometimes humanity is portrayed as slaves of the gods.

In the Bible, the creation narratives point us to theological truth. What do the stories tell us? The earlier story (Genesis 2: 4 – 3: 24) of Adam and Eve tells us that male and female are of the same substance and that we are made in the image of God – that is, we are formed from the dust of the earth and given life by the breath or Spirit of God. This is an explanation of what we are rather than how we were created. In the story, God told humanity to cultivate the Earth – that is, to care for the Earth, the animals and the environment, as those who bear the image of God.

In the first creation narrative (Genesis 1: 1 – 2: 3), the theological truth that we learn is that:

> *God stands at the beginning of all becoming.* **Hans Küng**

God is transcendent, eternal, and different from creation, yet God is in and through all things, holding all things in being: creation is ordered and there is unity. The story of the six days of creation is a poem, based on observation and is a description of the world as the ancients understood it.

The poem falls into two halves with the second half as a fulfilment or adornment of the first half. The first three days correspond directly with the second three days, so that there are three pairings: one and four, two and five, three and six.

The first pairing is about the creation of light and darkness. On the first day, God said:

The apse ceiling in Mayfield Salisbury Church

> *'Let there be light'; and there was light. And God saw that the light was good; and God separated the light from the darkness. God called the light Day, and the darkness he called Night. And there was evening and there was morning, the first day.* **Genesis 1: 3–5**

On the fourth day, in the corresponding couplet, God said:

> *'Let there be lights in the dome of the sky to separate the day from the night; and let them be for signs and for seasons and for days and years, and let them be lights in the dome of the sky to give light upon the earth.' And it was so. God made the two great lights—the greater light to rule the day and the lesser light to rule the night—and the stars. God set them in the dome of the sky to give light upon the earth, to rule over the day and over the night, and to separate the light from the darkness. And God saw that it was good. And there was evening and there was morning, the fourth day.* **Genesis 1: 14–19**

The second pairing is about the creation of the firmament and the waters. On the second day, God said:

> *'Let there be a dome in the midst of the waters, and let it separate the waters from the waters.' So God made the dome and separated the waters that were under the dome from the waters that were above the dome. And it was so. God called the dome Sky. And there was evening and there was morning, the second day* **Genesis 1: 6–8**

On the fifth day, in the corresponding couplet, God said:

> *'Let the waters bring forth swarms of living creatures, and let birds fly above the earth across the dome of the sky.' So God created the great sea monsters and every living creature that moves, of every kind, with which the waters swarm, and every winged bird of every kind. And God saw that it was good. God blessed them, saying, 'Be fruitful and multiply and fill the waters in the seas, and let birds multiply on the earth.' And there was evening and there was morning, the fifth day.* **Genesis 1: 20–23**

The third pairing is the fruitful populating of the Earth. On the third day, God said:

> *'Let the waters under the sky be gathered together into one place, and let the dry land appear.' And it was so. God called the dry land Earth, and the waters that were gathered together he called Seas. And God saw that it was good. Then God said, 'Let the earth put forth vegetation: plants yielding seed, and fruit trees of every kind on earth that bear fruit with the seed in it.' And it was so. The earth brought forth vegetation: plants yielding seed of every kind, and trees of every kind bearing fruit with the seed in it. And God saw that it was good. And there was evening and there was morning, the third day.* **Genesis 1: 9–13**

On the sixth day, in the corresponding couplet, God said:

> *'Let the earth bring forth living creatures of every kind: cattle and creeping things and wild animals of the earth of every kind.' And it was so. God made the wild animals of the earth of every kind, and the cattle of every kind, and everything that creeps upon the ground of every kind.*
>
> *Then God said, 'Let us make humankind in our image, according to our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the wild animals of the earth, and over every creeping thing that creeps upon the earth.' So God created humankind in his image, in the image of God he created them; male and female he created them.*
>
> *God blessed them, and God said to them, 'Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth.'*
> *God said, 'See, I have given you every plant yielding seed that is upon the face of all the earth, and every tree with seed in its fruit; you shall have them for food. And to every beast of the earth, and to every bird of the air, and to everything that creeps on the earth, everything that has the breath of life, I have given every green plant for food.' And it was so. God saw everything that he had made, and indeed, it was very good. And there was evening and there was morning, the sixth day.* **Genesis 1: 24–31**

In both creation stories of Genesis 1–3, we learn that God has a relationship with humanity: God can be encountered by humanity and, in our very core, we are of God; given life by the breath of God, we are at one with the Divine.

The stories also tell us that in the beginning, before energy, matter, space and time, God willed or desired that creation come into being. In response to the question, *'What was God doing before creation began?',* Augustine (354–430) said that the question was meaningless because the world was not created in time, but that time was created with the world.

In summary, the first two early creation stories of Genesis point us to who we are and our relationship with God. God desired our creation – the creation of conscious beings – with whom God may have a relationship.

Creation and Wisdom

Besides the well-known creation narratives in the Book of Genesis, the Bible contains other creation literature and theology. One distinct strand within Scripture is Wisdom literature. In the Old Testament, Wisdom literature is found in the books of Proverbs, Job and Ecclesiastes and, within the Roman Catholic tradition, in the inter-testamental writings of Sirach and the Wisdom of Solomon.

Wisdom literature is rooted in the belief that, because God fashioned creation, creation reflects God's wisdom. Wisdom writers believed the natural world to be orderly and, therefore, meaningful and instructive. There are no miracles in this strand of writing. Grounded in human experience, Wisdom literature is human discernment and reflection on the mystery of life and the nature of reality. Ethically, the Wisdom writers ask, 'What works?' and 'What risks may be taken and what can be trusted?' Human fulfilment comes when we discern God's Wisdom and align ourselves with it. Beyond ethics, the writers ask, 'What do we learn about God and reality by looking at the nature of the created order?'

Wisdom writers believed that we must always be open to new learning and that old understandings may need to be revised or abandoned. Human knowledge is forever incomplete and, as such, ethics are always provisional. Wisdom avoids conclusions that are absolute. The Book of Job is a protest against the accepted understanding about human suffering, and a reflection on God's justice and God's presence in the world. The Book of Ecclesiastes maintains that God is always hidden, always beyond human comprehension and that we must live in that reality.

Wisdom literature invites ongoing conversation, discussion and argument. There is an example of this openness to new insights in the Gospel of Mark (Mark 12: 13–34), in which Jesus debates with the Pharisees about paying taxes to the Romans, with the Sadducees about belief in the resurrection and with a scribe about the commandments of God. Intellectual wrestling is part of what it means to be a person of faith.

In the Book of Proverbs (8: 22–31), Wisdom is personified and poetically portrayed as a companion to God in the process of creation:

> *The Lord created me at the beginning of his work,*
> *the first of his acts of long ago.*
> *Ages ago I was set up,*
> *at the first, before the beginning of the earth.*
> *When there were no depths I was brought forth,*
> *when there were no springs abounding with water.*
> *Before the mountains had been shaped,*
> *before the hills, I was brought forth—*
> *when he had not yet made earth and fields,*
> *or the world's first bits of soil.*
> *When he established the heavens, I was there,*
> *when he drew a circle on the face of the deep,*
> *when he made firm the skies above,*
> *when he established the fountains of the deep,*
> *when he assigned to the sea its limit,*
> *so that the waters might not transgress his command,*
> *when he marked out the foundations of the earth,*
> *then I was beside him, like a master worker;*
> *and I was daily his delight,*
> *rejoicing before him always,*
> *rejoicing in his inhabited world*
> *and delighting in the human race.*
>
> **Proverbs 8: 22–31**

Wisdom has an intimate relationship with God. In the poem, it is through Wisdom that God creates all things. Wisdom is not only the Spirit or essence of the Divine; Wisdom is order, reason, justice and mercy. Wisdom was with God in the beginning, is present in all creation, is found in the reflections of the Wisdom teachers and, from a Christian perspective, is embodied in Jesus of Nazareth.

In the Gospel of John (John 1: 1–18), the Wisdom of God in Greek becomes the *logos* or Word of God. God's Wisdom or Word is the hidden rationality within God's creation. The apostle Paul refers to Jesus as 'the wisdom of God' (1 Corinthians 1 and 2). Centuries later, the Church developed the concept of Jesus as the Wisdom of God to formulate the doctrine of the Trinity, in which Jesus is understood and portrayed as the Second Person.

The Origins of the Cosmos

A picture of the beginning of our physical universe, generally accepted by the scientific community, is that everything (including time itself) started a finite time ago with a big bang. The theory of an expanding universe was proposed in 1927 by the Belgian priest and astronomer George Lemaître who coined the term 'Cosmic Egg' to describe the state of the universe at its beginning.

The 'Big Bang'

The evidence for the 'Big Bang' comes from a satisfying union of fact and theory. Astronomical observation finds that the largest structures, clusters of galaxies, are all flying apart from each other: the universe is expanding and one bit of the observable universe looks much like any other – it is uniform. Einstein's theory of gravitation predicts that a uniform universe must expand or it will collapse.

The consequence of the expansion is simple and inevitable. At earlier times than the present, everything was closer together. Each piece of space, containing a given amount of material and of energy, occupied a smaller space. A finite time ago, each bit of the universe was extremely dense and extremely hot; by measuring the current rate of expansion and the separation of the galaxies now, we can calculate that the expansion of the universe started 13.7 billion years ago – the time of the Big Bang.

Modern physics does not provide a complete explanation of what was happening in the very earliest moments but – amazingly – we can be fairly sure of what was going on minutes after the start, because two of the lightest of the chemical elements, hydrogen and helium, were created then, and their abundances nowadays is exactly as predicted by physical theory.

Party balloons that float in air are filled with helium gas, most of which was created when the universe was only a few minutes old.

The life of stars

During the expansion of the universe, gravity was at work causing lumps of matter to start collapsing, eventually stabilising as galaxies and stars. The stars, including the sun, are nuclear furnaces inside which the chemical elements such as carbon, nitrogen, oxygen and iron are formed by nuclear fusion. When a star runs out of hydrogen, it begins to die.

Gold, carbon and other elements in our planet formed deep within burning stars now long dead.

Some massive stars expand to form what is known as a *supernova*. Inside these, all of the 90 elements found on Earth are formed. When the supernova explodes, these elements are expelled into space and from this material later generations of stars are born. Our own sun was born five billion years ago and some of the material that did not end up in the sun formed a ring of planets around it – our solar system.

Many of the billions of stars in our Milky Way galaxy have planets around them. Thousands of planets beyond the solar system have already been discovered, so there are grounds for thinking our Earth is not the only place where life exists. Do other stars have their Bethlehem and their Calvary too? – This is the theme of the poem 'The Innumerable Christ' by Hugh MacDiarmid.

'Another one uninhabited. That's three down and several hundred billion to go.'

The Innumerable Christ

by Hugh MacDiarmid

Wha kens on whatna Bethlehems
Earth twinkles like a star the nicht,
An' whatna shepherds lift their heids
In its unearthly licht?

'Yont a' the stars oor een can see
An' farther than their lichts can fly,
I' mony an unco warl' the nicht
The fatefu' bairnies cry.

I' mony an unco warl' the nicht
The lift gaes black as pitch at noon,
An' sideways on their chests the heids
O' endless Christs roll doon.

An' when the earth's as cauld's the mune
An' a' its folk are lang syne deid,
On coontless stars the Babe maun cry
An' the Crucified maun bleed.

The beginning of life on Earth

Life on Earth is thought to have started about four billion years ago with the formation of single cells able to nourish and replicate themselves. Early oceans contained all of the chemical building blocks required for life to get started, but the full story of how and where the first living cells formed is incomplete. What we do know of the process clearly establishes an intimate connection between the birth of the universe and of ourselves – as Christine De Luca whimsically reminds us in her poem 'Common Science'.

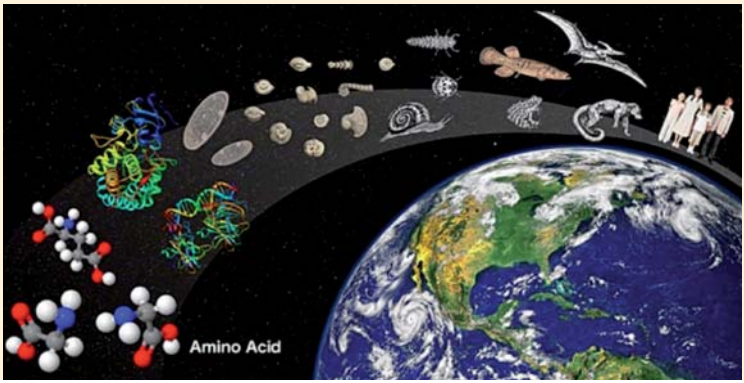
The chemistry of life

Life is based on carbon, an element that bonds with other elements such as hydrogen, oxygen and nitrogen to form the complex molecules, including proteins, lipids and DNA or RNA, found in every living cell.

Proteins are made up of chains of simpler molecules called amino acids. Remarkably, simple amino acids have been detected in interstellar space and in material that rains down still on Earth in meteorites. Amino acids can link together in myriads of different combinations to form large and complex proteins.

Molecules of DNA and RNA, the genetic code, assemble from smaller molecules called nucleotides, which in turn are likely to have formed in the early oceans. The complex chemicals that make up living cells may have come together in the extreme conditions at hydro-thermal vents on the sea floor or on the ocean surface with sunlight as the source of energy.

About four billion years ago, the first simple living cells may have formed by a series of chemical processes that can be largely copied in laboratories today.



Common Science

by Christine De Luca

Psychologists can prove
that images come at us upside
down, and that we've learned
to turn them right way up;

and scientists hold
that in this infinitude
which is the universe
there is no fixed point.
Earth tilts around a sun star
which in turn pulls all its planets
round the Milky Way.
At half-a-million miles per hour
it takes 500 times as many years
to birl right round; and even then
the starting point has shifted.
All is on the move, expanding, relative,
held in the tenuous grip of gravity.

Unshaken by this tyranny
that holds the heavens
I look out on my garden, stare
at the huge stability of trees
rooted downwards, their light leaves
right way up to the sun,
finding gravity a pushover,
the wind kittenish.

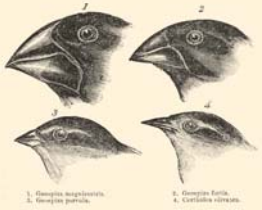
The Story of Evolution

Ideas about evolution emerged in the late 18th century, as naturalists began to record the remarkable diversity of plants and animals they encountered in different parts of the world.

Darwin and 'natural selection'

In *The Origin of Species by Means of Natural Selection* published in 1859, Charles Darwin (1809–82) first put forward the radical idea that all forms of life are continually adapting, shaped by changes taking place in their physical environments.

When he examined finches in the Galapagos Islands, Darwin noticed that populations of birds on separate islands had beaks of different sizes and shape, apparently as adaptations to local sources of food. He proposed that these characteristics were passed from parents to offspring, and that characteristics associated with greater reproductive success would gradually become more prevalent in a population at the expense of features that reduce reproductive fitness.



Darwin's finches: their differently shaped beaks could be explained by evolution

'Natural selection' described by Darwin is similar in many ways to the 'artificial selection' familiar to farmers who select and breed the varieties of plants and animals with the most desirable features.

Darwin's proposals were in sharp contrast to the prevailing notion that plants and animals had been created in their present unchanging forms as part of a completely designed creation. Remarkably, he described evolution at a time when nothing was known about genes or the role of chromosomes and DNA in the transmission of heritable traits from one generation to the next.

Gregor Mendel and genetics

The first insights into the genetic mechanisms driving evolution came from the experiments with pea plants carried out by the Moravian scientist and Augustinian friar, Gregor Mendel, one of the founders of modern genetics. Mendel recognised two different types of peas, round and angular, representing two separate traits. By cross fertilising large numbers of plants over several generations, Mendel discovered that the proportions of round and angular peas produced in each generation of plants

Gregor Mendel (1822–84)

consistently followed some simple rules – now known as 'Mendel's laws of inheritance'. These rules introduced the concepts of dominant and recessive traits and apply to all species. For example, they explain the distribution of colour blindness in people.

Classical genetics as it developed in the 20th century had far-reaching influences in medicine and agriculture and eventually provided detailed accounts of how natural selection takes place.

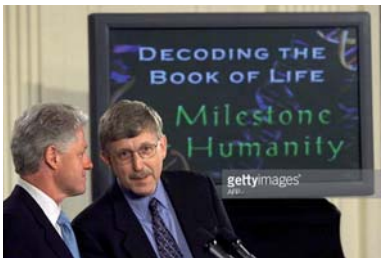
Discovery of the DNA molecule

The discovery of the double helix structure of DNA in 1953, by a group of scientists including Francis Crick, Rosalind Franklin, James Watson and Maurice Wilkins, ushered in the era of molecular genetics which has transformed biology.

Another landmark was reached in 2001, when US President Bill Clinton and UK Prime Minister Tony Blair, announced the completion of the first stage of The Human Genome Project. This was the culmination of work, for more than a decade, by groups of scientists, working in several countries, who had pooled their resources and skills to tackle one of the central challenges in genetics. They achieved the aim of reading the entire sequence of three billion DNA base-pairs that makes up the genetic blueprint from one person.

> *[The human genome] is a history book – a narrative of the journey of our species through time. It's a shop manual, with an incredibly detailed blueprint for building every human cell.*
>
> **Francis Collins**

The knowledge obtained by sequencing DNA and interpreting the genetic blueprint from plants, animals and humans is now a source of remarkable new insights into the structure of living cells, how these function in health and what goes wrong in disease. We now know the chemical pathways by which the genetic blueprint of an organism, encoded in the sequence of DNA molecules, is translated into proteins, which in turn direct the growth and fate of all the cells in an organism. Mutations and other subtle variations in DNA sequence take place with apparent randomness to alter the genetic code of each individual – a process that ensures genetic diversity in the population.



Decoding the Book of Life: Francis Collins, project director, with President Clinton celebrate the completion of the first part of the Human Genome Project in 2001.

Variation in the sequence of an individual's DNA are sometimes beneficial, as when a mutation leads to a change in the immune system conferring improved immunity to infections. However, more often, mutations are harmful and contribute to disease. Crucially, though, the mutations and other variations that occur in DNA allow living creatures to adapt and survive changes in their environments. The union of Darwin's early insights with modern molecular genetics – termed 'neo-darwinism' – is a cornerstone of modern biology.

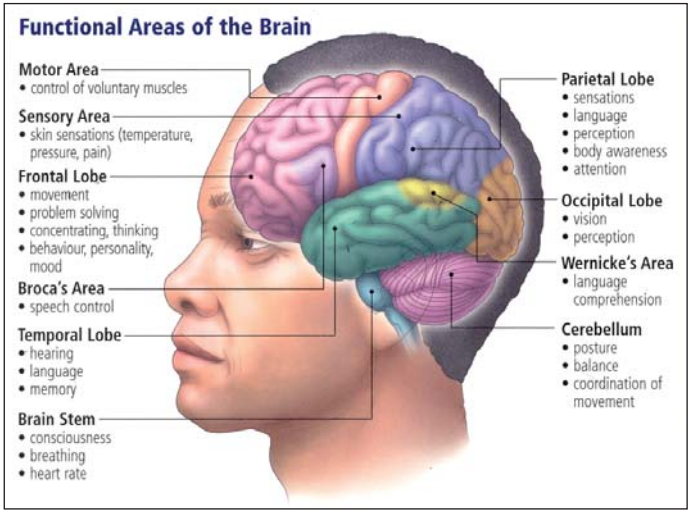
Evolution of the brain

The human brain is possibly the most complex biological system ever to have evolved, and its origins can be traced back at least to simple marine worms that burrow into sand on the sea floor.

Proteins that evolved half a billion years ago, enabling acorn worms to sense their surroundings on the sea shore, are remarkably similar to the proteins that direct the development of the human brain

About 200 million years ago, early mammals living on land and contending with dinosaurs, achieved a rapid increase in brain size. This was the first appearance of the brain cortex, allowing greater complexity of behaviours and refinement of the sense of smell and touch. Later, visual areas of the cortex increased in tree-dwelling primates, but a much greater driving force for enlargement of the cortex is thought to have been the change in behaviour that led primates to live in large family groups.

With a larger brain humans could find new ways to live cooperatively in complex social groups. This requires handling many different relationships – competing with rivals, being

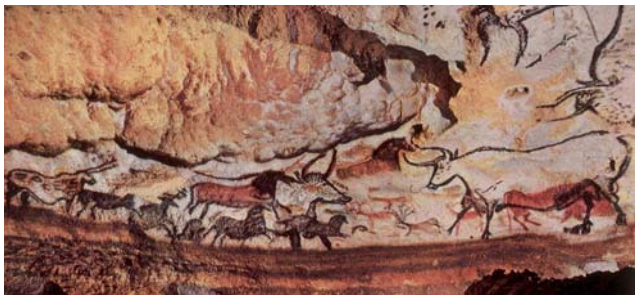


About 2 million years ago, in the group of apes that led to modern humans, there was a period of runaway evolution of brain size and complexity. This led to the emergence of language skills and the higher mental functions associated with human consciousness.
The modern human brain came into existence in Africa about 200,000 years ago.

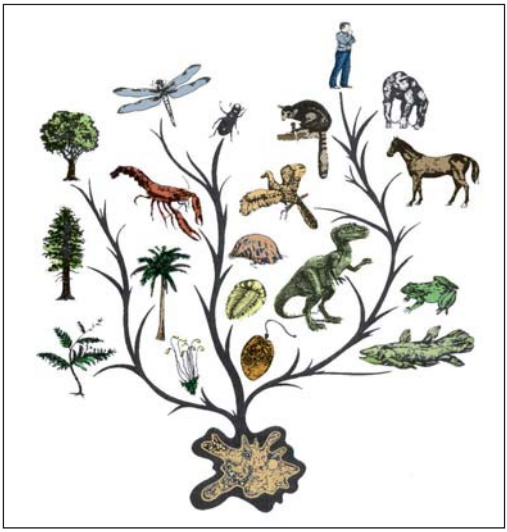
altruistic with kin and bonding with a partner. It has been suggested that the practice of rituals and emergence of organised religions might owe their origins partly to the improved chances of survival of members of cohesive groups able to support one another in challenging environments.

Homo sapiens had evolved to use language, master fire and use tools for clothing, shelter and hunting. They shared the planet for a time with other closely related groups of ancient humans, but these cousins are now extinct.

The path of evolution from ancient ape to modern humans had several blind alleys and even *homo sapiens* at one stage came close to extinction. Neanderthals lived for a while side by side as traces of their DNA are found in most people today. They buried their dead, decorated their bodies and made cave paintings similar to *homo sapiens*.

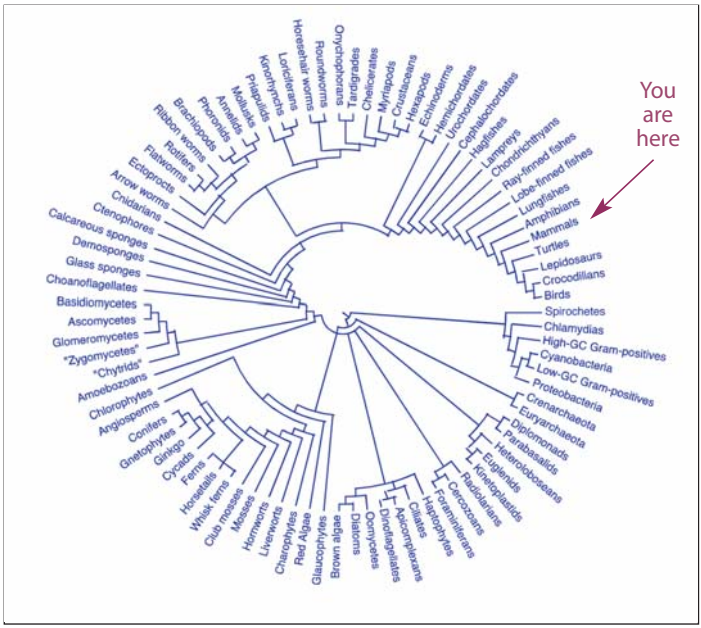


Cave paintings from Lascaux by Neolithic homo sapiens. Paintings have also been found at sites where Neanderthals lived. Did these early relatives of homo sapiens *take part in religious rituals long before modern humans evolved?*



Fossil and DNA findings suggest the evolution of *homo sapiens* was a much more complex process than the traditional notion that human beings were set apart from the rest of life and destined from the start to dominate the world. Instead, the story of evolution highlights human vulnerability in the face of many contemporary challenges such as climate change.

A traditional view of the tree of life – with homo sapiens *placed at the top*



All forms of life, bacteria, viruses, moulds, fungi, plants and animals share common origins. Homo sapiens *is a latecomer distinguished by having the most complex nervous system, but in many respects not very different from other creatures. So what is special about humans? What is meant by the verse in Genesis: 'So God created humankind in his image, in the image of God he created them'?*

Further questions in science

Every time science answers one question new ones arise. We know a lot about the origins of the stars that cluster in billions of galaxies but know little, for instance, about the dark matter that holds them together. Neuroscientists investigating human thinking and consciousness are fully aware of the limitations of the tools available to explore these extraordinary complexities. A sense of humility in science is expressed by the physicist Carlo Rovelli, in *Seven Brief Lessons on Physics* and captured in the poem by Angus Campbell, 'Fishing the Imagination'.

> *It is part of our nature to long to know more, and to continue to learn. Our knowledge of the world continues to grow. There are frontiers where we are learning, and our desire for knowledge burns. They are in the most minute reaches of the fabric of space, at the origins of the cosmos, in the nature of time, in the phenomenon of black holes, and in the workings of our own thought processes. Here, on the edge of what we know, in contact with the ocean of the unknown, shines the mystery and the beauty of the world. And it's breathtaking.*
>
> **Carlo Rovelli**

Fishing the Imagination

by Angus Peter Campbell

On a November morning,
coming over Upper Teangue,
I saw a trawler out in the Minch.

The ring-netters of my mind,
the glittering herring of my memory,
and the ocean so big, and so beautiful, and so wide.

I stopped for a moment
at the Brae of Humility
flinging a net over my thoughts.

The people on their knees,
the Church,
and the deep sea surrounding us.

Frequently Asked Questions

QUESTION 1

Interpreting the Bible: how might the language and imagery of faith evolve and remain at the heart of a contemporary scientific world view?

> *If you understand it, then it is not God.* **Augustine of Hippo**

The New Testament, including the Gospels, is a record of the early Christian community's reflection on its encounter with God. The Old Testament is a record of the Jewish people's reflection on their encounter with God. Within the Bible, there are many different perspectives on God and, over the course of biblical history, human understanding of God has evolved.

The Bible is a literary work: it is theology through story. The writings of the Old and New Testaments are not 'history', as we would usually understand the word. The discipline of historical accuracy did not occur to the writers. The Bible is a set of stories written, collected, revised and developed by human beings to express theological truth about God and our relationship to God.

Biblical scholarship is vital to fully appreciate the richness and complexity of sacred Scripture. In the words of the noted scholar and priest, Roland E Murphy:

> *The equation of biblical truth with historical truth is a form of reductionism.*

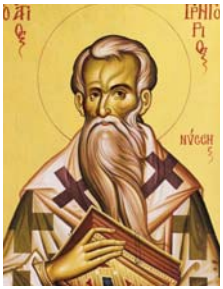
A fragment of one of the Dead Sea Scrolls, containing parts of the book of Isaiah

Metaphor, Allegory and Myth

Metaphor is central to interpreting Scripture. No human words can capture the essence of God and, therefore, every word and image which we use of God is a metaphor.

> *Myth is a story about the way things never were, but always are.*
>
> **Thomas Mann, Nobel Prize-winner for Literature 1929**

Within Scripture itself there is an acknowledgement that the stories of the Book of Genesis are to be read for their symbolic meaning. The apostle Paul describes the story of Abraham and his two sons, Ishmael and Isaac, as 'an allegory' (Galations 4: 24).



Gregory of Nyssa

In the Early Church, in his commentary on the life of Moses, Gregory of Nyssa (335–395 CE) drew together the biblical material to write an extended meditation which is allegorical in nature. It is a spiritual 'wandering' or exploration of the life of Moses, which is intended as an aid to bring us into immediate, intimate contact with the Holy.

Augustine (354–430 CE), the most influential of the early Fathers, interpreted the Old Testament story of Jonah living in the belly of a great fish for three days, as an allegory of the life of Christ. The three days in the belly of the great fish was suggestive of the three days Christ would spend 'in the heart of the earth'.

For Augustine, the meaning of the story of Jonah did not lie on the surface – a literal interpretation would just miss the point.

Image of Jonah in a 14th-century Persian manuscript (folio from a Jami al-Tavarikh – Compendium of Chronicles)

Many stories in Scripture are best understood symbolically, as myth. The legendary character of some of the stories of Moses and Elijah is suggested by a number of similarities they share. The place of Elijah's mystical encounter with God was on Mount Horeb, which is Mount Sinai, the place of Moses' mystical encounter. Like Elijah, Moses encounters the Holy after 40 days and 40 nights (Exodus 24: 18). Like Elijah (1 Kings 19: 4), there is a dark moment in the life of Moses when he pleads with God for death (Numbers 11: 15). One possible progression or theological step forward in the Elijah legend over that of Moses is that in the later Elijah legend God is no longer revealed in words, in the Commandments or the pages of commentary that follow, but now in the mystical, subtle sound of sheer silence (1 Kings 19: 12).

Numerous Gospel stories have their roots in the stories of the Old Testament. For example, in the inter-testamental book of Sirach (24: 5 – 6), Wisdom walks on water. In the Gospels, the writers portray Jesus, the Word or Wisdom of God, walking on water.

The story of the ascension of Jesus (Luke 24: 51 and Acts 1: 2, 9ff) is a re-imagining of the ascension of Elijah (2 Kings 2: 11), so portraying Jesus as being like the great prophet. The myth of the ascension is found in Judaism, Christianity and Islam. The Prophet Muhammad, ascends into heaven in a dream not dissimilar to that of Jacob's Ladder. Ascension is also found in The Egyptian Book of the Dead and in the mysteries of Mithras.

Jesus walking on the water, from a window in St Giles' Cathedral, Edinburgh

In the Bible, through storytelling, we are brought closer to the Sacred, to Christ in God, the foundation of the Church.

The Resurrection

The concept of 'resurrection' is not unique to the New Testament. Within Judaism, the concept of resurrection – that is, life beyond this life or entering into new life with God – can be found in the Old Testament and in rabbinical literature. For example, Enoch was taken by God (Genesis 5: 23f and Hebrews 11: 5). In rabbinical literature, it is said that Moses ascended Mount Abarim accompanied by Joshua, Eleazar and the elders of the people, and that while he was talking with them a cloud suddenly surrounded him and he disappeared from their sight. The prophet Elijah entered new life with God: he ascended in a whirlwind into heaven (2 Kings 2: 11).

Icon depicting the Ascension of Elijah

In the story of the Transfiguration, which is told in Matthew, Mark and Luke, we see Jesus stand alongside Moses and Elijah; in other words, the Lawgiver and the Prophet are already raised from the dead, already alive in God before Jesus died (Matthew 17, Mark 9 and Luke 9).

In the Gospels, the Sadducees question Jesus about the resurrection (Mark 12:26f). In reply, Jesus declares God to be the God of Abraham, Isaac and Jacob, that is, the God of the living, not of the dead. Jesus believes the patriarchs to be alive in God.

Through a mystical encounter, the apostle Paul 'saw' Jesus, risen from the dead. This experience turned his life around. At the time he wrote about Jesus being raised from the dead, the Gospels had not been written. He was not referring to the resurrection appearances that we know so well. Almost certainly, Paul believed that, like Enoch, Abraham, Isaac, Jacob, Moses and Elijah, Jesus had been raised from the dead, alive in God.

Following in the footsteps of the Early Church Fathers and many others, each biblical narrative may be approached through meditation and imaginative reflection. For example, while Scripture often uses 'light' to describe God, in the Gospel of John, we read that when the Beloved Disciple entered the darkness of the empty tomb, 'he saw and believed.' (John 20: 8). If we too sit in the tomb we can sense the presence of the living Christ. In the life of Jesus on the Mount of Transfiguration God speaks from the cloud, the only part of the hillside in darkness. In the poem, 'You Darkness of whom I am Born', Rainer Maria Rilke imagines encountering God in darkness.

Du Dunkelheit, aus der ich stamme

by Rainer Maria Rilke

You, darkness, of whom I am born –

I love you more than the flame
that limits the world
to the circle it illumines
and excludes the rest.

But the dark embraces everything:
shapes and shadows, creatures and me,
people, nations – just as they are.

It lets me imagine
a great presence stirring beside me.

I believe in the night.

Stilling ourselves, the ancient monastic practice of silence, is sometimes the best preparation for hearing what Scripture has to say to us. There is never a single definitive interpretation of any given story: Scripture is a doorway through which an individual may encounter the Holy.

Of Easter, Pope Francis said:

> *To enter into the mystery means the ability to wonder, to contemplate, the ability to listen to the silence and hear the tiny whisper amid great silence by which God speaks to us.*

Post-Resurrection stories

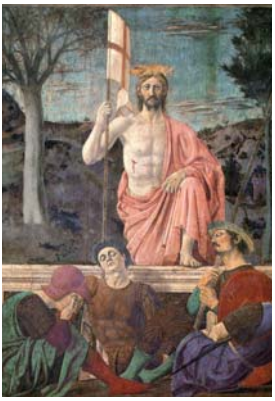
In the stories of Philip and the Ethiopian eunuch (Acts 8: 26–40) there are strong parallels with the story of the eunuch in the Book of Jeremiah (Jeremiah 38) and the appearance of Jesus on the Road to Emmaus in the Gospel of Luke (Luke 24: 13–53). In Jeremiah and the Book of Acts, the faith of the eunuch is held up as a beacon, a source of immense strength for those with open hearts.

Philip meeting the Ethiopian Court Official on the road from Jerusalem to Gaza

In the Resurrection appearance of Jesus with Cleopas and his friend and that of Philip and the eunuch, the Scriptures are opened. Those who hear the Scriptures opened are spiritually brought alive by what they hear.

On the Road to Emmaus, Christ is known in the breaking of bread, while on the road from Jerusalem to Ethiopia, Christ is known in the sacrament of water. At the close of each story, the one who opens the Scriptures, the one who celebrates the sacrament, Jesus/Philip, is snatched away and vanishes out of sight.

The road to Emmaus from Jerusalem



The Resurrection, *a fresco by Piero della Francesca (1415–92)*

The physicality of some of the resurrection appearances has the effect of making Christ utterly real to us. The resurrection stories affirm the goodness of creation and point to its renewal and if we allow God's Spirit to speak to us through Scripture, we will be changed, as were the followers of Jesus when, after His crucifixion, they felt sure He was alive.

We are called to feed on Jesus (John 6: 35 and 68). The Bible is spiritual nourishment; it is not 'history' or 'science'. C S Lewis wrote:

> *There is no need to be worried by facetious people who try to make the Christian hope of 'Heaven' ridiculous by saying they do not want to 'spend eternity playing harps'. The answer to such people is that if they cannot understand books written for grown-ups, they should not talk about them.*

QUESTION 2

The logic of mathematics and the laws of physics appear to provide an almost complete description of the external world, from the movement of sub-atomic particles to chemistry, biology and the existence of human beings. So where is the need for God, to explain the Universe or to account for the appearance of humans on Earth?

For some people science leads to atheism. The physicist Stephen Hawking declared:

> *I believe the simplest explanation is, there is no God. No one created the universe and no one directs our fate .*

The geneticist and writer Richard Dawkins wrote:

> *One of the greatest challenges ... has been to explain how the complex improbable appearance of design in the universe arises. Darwin has shown how living creatures with their spectacular statistical improbability and appearance of design have evolved by slow gradual degrees from simple beginnings. We can now safely say that the illusion of design in living creatures is just that – an illusion.*

The argument that science eliminates the need for God seems to be based on the assumption of a God standing separate from the machinery of the universe, a God who interacts with physical things from the outside to cause them to behave as they do. We do not need 'God the Engineer' to make one atom stick to another – we need only the laws of physics.

Scientists accept a picture of the physical universe when their observations are explained by mathematical reasoning and confirmed by the practical test: 'Does the model work?' A scientific understanding allows us to build cities, explore space and find cures for diseases. We accept the findings of science as an act of faith in the full knowledge that the picture may change if new discoveries falsify old theories.

What science does not explain is itself: *why is the picture so?* Some scientists would like to extend the picture to show that it could not logically be otherwise – but they have not yet done so, and even if they did, they would not be able to explain why the universe is there in the first place. Nor does science account for a central aspect of human experience, our self-awareness or consciousness.

Michaelangelo's 'Creation of Adam' reinterpreted

> *Science takes things apart to see how they work. Religion puts things together to see what they mean.*
>
> **Jonathan Sacks, Emeritus Chief Rabbi**

We may understand the science of sunsets and human visual perception, but how do we explain our subjective aesthetic experience of watching a beautiful sunset?

The philosopher Thomas Nagel has pointed out that a reductive materialist explanation of life is unsatisfactory because it takes no account of our subjective consciousness – we are aware of ourselves, hold values, make plans and invest the world around us with personal meaning. His scepticism is not based on religious belief nor on a belief in any alternative and it invites the question: are there underlying principles of nature organising the aggregation of lifeless matter into living organisms, making life in the universe inevitable?

> *The appearance of animal consciousness is evidently the result of biological evolution, but this well-supported empirical fact is not yet an explanation – it does not enable us to see how it came about. ... Selection for physical reproductive fitness may have resulted in the appearance of organisms that are in fact conscious, but there is no physical explanation of why this is so – nor any other kind of explanation that we know of. And once there are beings who can respond to value … the universe has become not only conscious and aware of itself but capable in some respects of choosing its path into the future.*

Thomas Nagel, *Mind and Cosmos*

For many, the unifying principle that simplifies this world of experience is the existence of a caring God. For Christians, this is God glimpsed in the person of Jesus Christ (1 Corinthians 13). Perhaps there is a parallel between the scientific and religious ways of looking at creation. When physicists, chemists and biologists say a theory is true, theirs is *an act of faith* tested by experiment. For the believer in God, the unifying principle that God is present is also *an act of faith* tested not by experiment but by personal experience.

> *Let no one enter here who does not have faith.*
>
> Inscription over the door of the laboratory of the theoretical physicist, **Max Planck**

For the believer, the presence of God springs forth in two places. One is in the very existence of the Universe with laws describing its behaviour, and the other is in moral awareness: in acts of selfless love, moments of wonder and the joy of community. These experiences, while they may be caused in a physical sense by chemical actions in our brains, achieve a coherent context in our world if we are open to the presence of a loving God.

Hans Küng, a leading Catholic theologian, is critical both of scientists who adopt a materialist view, and theologians who attempt to tell scientists how creation came about.

In the view of biologists a direct supernatural intervention of God in the rise and ongoing development of life seems more than ever unnecessary. But at the same time the existential question of the origin and meaning of the whole process also arises for scientists as human beings; they may not evade this question even if they cannot answer it as scientists.

Küng calls for an enlightened attitude to God.

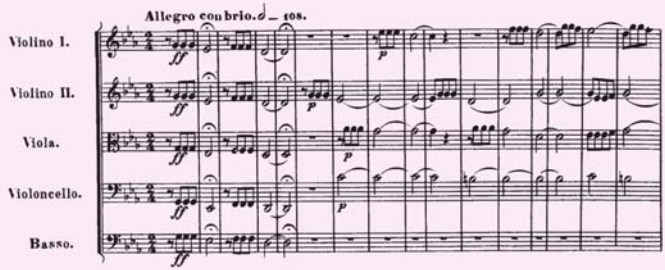
God's spirit does not work on the world from above or outside as unmoved mover. Rather, it works ... in the passionate process of the world: in, with and among human beings and things. It itself is the origin, centre and goal of the world process.

Francis Collins, Director of the Human Genome Project and author of *The Language of God* also challenges scientific materialism:

The God of the Bible is also the God of the Genome. He can be worshipped in the cathedral or the laboratory. His creation is majestic, awesome, intricate and beautiful – and it cannot be at war with itself ... It is time to call a truce between the escalating war between science and spirit – a war initiated by extremists on both sides ... science is not threatened by God and God is most certainly not threatened by science; He made it possible.

It would be possible to describe everything scientifically, but it would make no sense; it would be without meaning, as if you described a Beethoven symphony as a variation of wave pressure.

Albert Einstein



Praise

by R S Thomas

I praise you because
you are artist and scientist
in one. When I am somewhat
fearful of your power,
your ability to work miracles
with a set-square, I hear
you murmuring to yourself
in a notation Beethoven
dreamed of but never achieved.
You run off your scales of
rain water and sea water, play
the chords of the morning
and evening light, sculpture
with shadow, join together leaf
by leaf, when spring
comes, the stanzas of
an immense poem. You speak
all languages and none,
answering our most complex
prayers with the simplicity
of a flower, confronting
us, when we would domesticate you
to our uses, with the rioting
viruses under our lens.

Pied Beauty

by Gerard Manley Hopkins

Glory be to God for dappled things –
For skies of couple-colour as a brinded cow;
For rose-moles all in stipple upon trout that swim;
Fresh-firecoal chestnut-falls; finches' wings;
Landscape plotted and pieced –
fold, fallow, and plough;

And all trades, their gear and tackle and trim.
All things counter, original, spare, strange;
Whatever is fickle, freckled (who knows how?)
With swift, slow; sweet, sour; adazzle, dim;
He fathers-forth whose beauty is past change:
Praise him.

QUESTION 3

A capacity for moral reasoning, and religious belief, appear to have emerged in stages during the long course of human evolution.

So does evolution explain our sense of right and wrong and explain away our religious faith and awareness of God?

Evolutionary psychologists have said that religious beliefs and practices are natural phenomena surviving to modern times as random quirks of evolution. Some say these attributes have no survival value and are random 'spin offs' from the growth of human higher mental processing rather like our enjoyment of games or appreciation of music. Another view is that religious rituals and a sense of moral awareness, present in most people in most societies, provide an evolutionary advantage by encouraging cooperation and altruism among people living in hostile environments where group activities are crucial to survival.

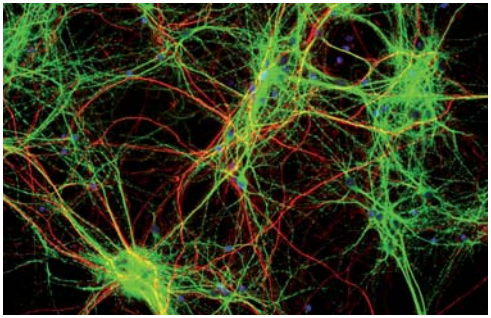
For some, including James Watson, a winner of the Nobel Prize in Medicine in 1962 as one of the discoverers of the structure of DNA, and the writer and philosopher Daniel Dennett, evolutionary explanations of the origins of religious beliefs leave no place for divine revelation as an influence on how we live in communities or make moral choices.

> *Every time you understand something, religion becomes less likely. Only with the discovery of the double helix and the ensuing genetic revolution have we had grounds for thinking that the powers held traditionally to be the exclusive property of the gods might one day be ours.*

Watson in an interview with the *Daily Telegraph*, 20 March 2003

> *Like all animal brains, human brains have evolved to deal with the specific problems of the environments in which they must operate. The social and linguistic environment that coevolved with human brains gives human beings powers that no other species enjoys, but also created problems that folk religions apparently evolved to handle. The apparent extravagance of religious practices can be accounted for in the austere terms of evolutionary biology.*

Daniel Dennett: *Breaking the Spell*



It is estimated that the brain contains some 100 billion nerve cells. Each nerve cell connects with up to 1000 other cells to form an astonishing network that handles the information coming from all the senses to create in our minds a mental picture of the world.

Neuroscience is gradually discovering the nuts and bolts of how the brain works. An example is the study of vision. A lot has been learned about how the stimulation to cells in the retinas of both eyes can rapidly create in our consciousness a three dimensional coloured picture of the world around us. Not only that but we can interpret what we see using memory, respond to it emotionally and prepare to react physically in an appropriate manner. All of these steps in the process of 'seeing' an object have been examined, measured and mapped. Hearing, touch and smell have been analysed in a similar way and comparisons made with other animals reveal how our senses have evolved from much simpler sense organs.

But can the same lines of scientific investigation that describe our senses of seeing, hearing, touching and smelling find a physical explanation for the subjective aspects of our conscious selves that some call mind – the 'you' that thinks your thoughts, is aware of being alive, holds beliefs and has a sense of a place in the world alongside others?

This personal awareness, because it is truly subjective and unique to each person, is inaccessible to scientific classification and measurement and can be viewed as an 'emergent' property, arising from the firing of countless individual neurons, yet not fully explained in these physical terms. Mind emerges as a new phenomenon that resists reduction and is more majestic than the sum of the activities of the brain cells that make thinking possible.

This argument has been made by the philosopher Thomas Nagel in *Mind and Consciousness*:

> *I take it for granted that knowing the immediate cause of an event does not always make it intelligible – the causation of consciousness by brain activity being a prime example.*

The theologian Keith Ward, responding to the claim that religion will one day be explained away by brain science writes in *God, Chance and Necessity*:

> *The ultimate constituents of the universe, out of which the whole complex universe is made, cannot just be lumps of matter or fields of force. They must include conscious states. Though animal conscious states – including the human – emerge from complex brains, they are truly emergent, new sorts of reality and they stand in need of an explanation that cannot be reduced to physical terms alone.*

As archaeologists find indications that religious practices may have taken place far back in human evolution, we can speculate on whether or not these rituals, and an awareness of moral values, provided an evolutionary advantage which helped early humans in their struggles to survive.

But can this account of the evolutionary origins of religious thought explain away the reality and meaning of particular experiences for the individuals belonging to these groups at those times? The theologian David Fergusson has written in *Faith and Its Critics*:

> *In the case of evolutionary origins, to explain how something emerges in the past is not in itself to pronounce on its truth or its usefulness. … Why did Homo Sapiens bury the dead and paint on the cave walls of Lascaux? Answers to these questions will surely have important Darwinian elements. Yet an account of an origin of an idea does not in itself tell us whether that idea is true or that practice good, let alone explain why they are so.*

QUESTION 4

If we believe in a God who is all powerful and loving, how can small children die? How can there be undeserved suffering?

In his novel, *The Brothers Karamazov*, the Russian writer and philosopher, Fyodor Dostoevsky, wrote:

> *If the sufferings of children go to make up the sum of sufferings which is necessary for the purchase of truth, then I say beforehand that the entire truth is not worth such a price … we cannot afford to pay so much for admission … it is not God that I do not accept … I merely most respectfully return him the ticket.*

For most people, the suffering of children is unbearable. How do we reconcile a world of cruelty, even horror, with a God of love? In the creation narrative (Genesis 1: 31), we read:

> *God saw everything that He had made, and indeed, it was very good.*

There is no simple answer, no knockdown argument, to the question of why there is suffering in the world. From around the world, on television and through social media, we learn stories of women, children and men suffering because of disease or a natural disaster; a village or town has been bombed, gunmen have killed innocent civilians, or a mother has drowned her child.

Natural events such as earthquakes, erupting volcanos, droughts and floods are an integral part of the Earth's survival and development, though they can be very destructive to life. When these events lead to changes in the Earth's environment, all forms of life must adapt or become extinct. The random genetic mutations on which the evolutionary process depends sometimes lead to an improvement in the individual's health and survival, but, more often, mutations are harmful and will cause disease.

It is clear that the process of evolution, while giving rise to splendid forms of life, exacts a terrible price, as expressed by Charles Darwin in a letter to a friend in 1856:

> *What a book a Devil's chaplain might write on the clumsy, wasteful, blundering low and horridly cruel works of nature.*

Pain, affliction and death are part of the fabric of evolution and indeed a necessary part of the intricate balances that exist, for example, between predators and prey or parasites and hosts. The poem 'Hawk' by Sheila Bryer (see page 36), vividly describes an experience of 'beauty dancing in the arms of death'.

More than suffering due to natural events, perhaps our greatest moral revulsion comes from suffering and death deliberately caused by another human being. The Christian concept of sin means that we 'miss the mark'; in other words, because of the decisions we make, we are less than we could be. It is a sin when one human being decides to murder another. It is also a sin that, through our political and economic structures, people die of starvation despite the fact we have the means to feed everyone.

Why does God allow human beings to make decisions which will hurt others? In part, the answer lies in the nature of love itself. If we are to be creatures that enjoy freedom, including the freedom to love, we are therefore not creatures pre-programmed by God. If we value making up our own minds, if we find our fulfilment in deciding upon our own path, then we must live with the consequences of our decisions. A world in which we could not choose or in which the outcomes of our decisions had no consequences, would not be a world of love. Love needs freedom; sometimes, it comes at a terrible price.

In the Gospels, the Book of Psalms, the Book of Job and in the lives of countless men and women over the generations, many have felt God with them and they tell of encountering the Sacred in the midst of suffering. God is there in solidarity with people in pain and death. In the words of Psalm 23:

> *Even though I walk through the darkest valley, I fear no evil; for you are with me; your rod and staff – they comfort me.*

Paradoxically, while we would never desire suffering, some people, on reflection, speak of their growth and change through the experience of suffering, either that of others or their own. It is through our unconditional caring and compassion for those who suffer that we experience our fuller humanity. Do our darkest moments sometimes make us stronger human beings? In the history of the Church, many of the saints speak of their suffering, or a sense of abandonment by God.

Hawk

by Sheila Bryer

It was a chance to sit – take time.
Maybe I was ready for her
blown into view above the railing,
riding the current like a child's kite.
And I began to hold still too,
caught in the updraft of her silence.
There we hovered, she and I, over
plunging limestone – stunted, clinging trees,
until, like a tightening thread,
rose an ancient struggle to make sense
of beauty dancing in the arms of death.
For I shivered as she stowed her wings;
shrank from the grave splendour of her dive.
I think it was my own fastness
she had entered, and as quickly left behind.

Mother Teresa of Calcutta came to understand her spiritual darkness as a sign of the mysterious presence of God.

How then, are we to think of God's activity in the world? To say that God directs and controls everything like an omnipotent, all-powerful lord and ruler, not only portrays the Divine as tyrannical, but it is unchristian. God is not to be thought of as a Being somehow separate from the universe, in the way one person is distinct and separate from another. God is spirit: at all times at one with all things, intangibly present, mysterious and animating life.

In his book, *God Outside the Box*, Richard Harries, writes:

> *God himself feels the anguish of the universe. It is of the very nature of love to enter imaginatively into the situation of others and, to some extent, feel what they feel. God who is perfect love knows every point of the universe from the inside and bears it within his heart. The word 'sympathy' comes from two Greek words meaning 'to suffer with'. God suffers with his creation. When Jesus was tortured to death this was an expression, in human terms, of the pain God bears eternally.*

God is the Creator and Sustainer of all, but the Christian understanding of God is shaped by the story of Jesus. In Jesus, we do not see an all-powerful God who intervenes dramatically and widely in human life and suffering, but a man who is impelled by love to alleviate suffering when he encounters it in those around him. Jesus is captured, questioned, tortured and killed by the Roman authorities. The revelation we see in Jesus' death is that throughout the physical, emotional and spiritual suffering of Jesus, God is present. However it is interpreted, the story of the resurrection is one of the creative power of divine love bringing hope of deliverance and new life, light in human darkness.

In her book, *Ask the Beasts – Darwin and the God of Love*, Elizabeth Johnson writes:

> *Biologically speaking, new life continually comes from death, over time. Theologically speaking, the Cross gives grounds to hope that the presence of the living God in the midst of pain bears creation forward with an unimaginable promise. This does not solve the problem of suffering in a neat systematic way. It does make a supreme difference to what might come next.*

QUESTION 5

What can we make of the Garden of Eden? Do the doctrines of the 'Fall of Man' and 'Original Sin' have meaning in an evolutionary universe?

The doctrine of the 'Fall of Man', of humanity, is central to Western Protestant theology. Its bedfellow is the doctrine of original sin. In short, these traditional doctrines mean that humanity is fallen: humanity lost its innocence and perfection through the actions of one man, Adam (Genesis 2:4 – 3: 24). Sin and death entered the world when Adam, with Eve, chose to eat from the tree of knowledge of good and evil. According to St Paul, the punishment, which fell on the historical character, Adam, extends to every human being for every generation (Romans 5).

The problem is that these doctrines assume that, in the Garden of Eden, humanity was once innocent, perfect and immortal, humanity's 'fall' was the fault of one man and God punishes the whole of humanity for all time because of the mistake of one man.

Another view of the second creation story is that there is no 'fall'. Adam and Eve are not banished from the Garden for having eaten from the tree of knowledge of good and evil, and neither do they die. They depart the Garden because, if they stayed, they would eat from the other tree, the tree of life, and live for ever. This ancient story is not about sin entering the world, or death through sin, but the fact that we are mortal.

In eating from the tree of knowledge of good and evil, Adam and Eve tasted eternity (Genesis 3: 22). Their sense of 'nakedness' represents

Depiction of the Fall, from the Nuremburg Chronicles (1493)

their awareness that they are not like the animals. Adam's repeated use of 'I' indicates the emergence of human self-consciousness (Genesis 3: 9 – 13). The image of God, breathed into us, is never obliterated, not even in the creation story of Noah (Genesis 6 – 8).

Taken together, these creation stories underline that we are made in the image of the Holy, able to differentiate ourselves morally from the animals and discriminate between good and evil. We know also that, though God dwells in us, we are not immortal. The promise of Jesus is that, though we die, we are held by the Eternal for ever (Luke 23: 43).

The story of the 'fall' reminds us, in a post-Darwinian world, that we must constantly wrestle with aspects of our own nature like selfishness, violence and indifference to the suffering of others, in a world shot through with pain and trouble. The good we would do, we do not (Romans 7: 19). Through worship and meditation, in allowing ourselves to unite with the Spirit of Jesus, become one with the Sacred, we can say with St Paul, 'It is no longer I who live, but Christ who lives in me' (Galatians 2: 20).

QUESTION 6

How do we respond to Creationism and Intelligent Design?

Creationism holds that God created all things as they now exist and the standard account of evolution is not to be believed because it is at odds with accounts of creation in the Bible. It has come to refer to the belief that the beginnings of life on Earth, the creation of the different species and humanity, were exactly as described in Genesis chapters 1–3, taking place over six days.

The writers of the biblical text would never have imagined that what they set down should be taken as a permanent and exact scientific explanation of creation. The text is a poetic statement about the relationship between humanity and God set against the background of a three-tiered universe, as understood by the early biblical writers.

While creationists may be well-meaning in their desire to be faithful to God and Scripture, their claims are a misinterpretation of Scripture, the consequences of which go far beyond a simple rejection of evolution. If their claims for the historicity of Genesis 1–3 are considered to be true, there would be, in the words of Francis Collins:

> *a complete and irreversible collapse of the sciences of physics, chemistry, cosmology, geology, and biology.*

Supporters of **Intelligent Design** accept that the first chapters of the Book of Genesis are not to be read literally and believe that evolution takes place. However, they insist that evolution alone could not achieve the extraordinary and irreducible complexity found in nature without a direct intervention by God at some critical stages.

For example, it is claimed that eyes are too complex to have evolved step by step. However, we now know that the development of eyes *can* be explained in evolutionary terms. Indeed, eyes with lenses, so called 'camera eyes', have proved so successful as a means of seeing that they have evolved not once but independently in several different species as far apart as humans and the octopus – an example of convergent evolution where similar adaptive solutions have repeatedly evolved from unrelated starting points on the tree of life (www.mapoflife.org).

Scientists are unconvinced by the arguments of Intelligent Design as various claims of irreducible complexity have become steadily eroded by advances in biology. Supporters of Intelligent Design had claimed that whales could not have evolved from small land animals. However, DNA analysis and fossil discoveries have now filled in the gaps and provided a reasonable picture of how a group of small land animals became adapted to aquatic life to become the forerunners of present-day whales.

Supporters of Intelligent Design claim that eyes could not have evolved step by step as these are complex structures made up of several different parts all of which are essential for the eye to function. Therefore, they say, eyes must have been created, fully formed in one fell swoop.



Darwin's suggestion that whales have evolved from small land animals has been challenged by supporters of Intelligent Design on the grounds that whales have a long generation time and small population size, so the process of evolution is too slow, it is claimed, to explain how a land mammal converts into a whale in a few million years.

There are plenty of gaps in our understanding of how life on Earth began and still much to discover about the way living organisms adapt to environmental change during evolution. Indeed, the notion that the origin of life is the outcome of a completely random process without design or direction has been questioned, based on the so called 'anthropic principle'. This is the claim that the laws of physics appear to be very finely tuned, and create precisely the right conditions for life to exist, making the universe a place that, in some way, is fruitful for life.

The supporters of Intelligent Design have a sincere desire to counter claims that evolution promotes a materialist view of nature. However, as Francis Collins has written in *The Language of God*:

> *Intelligent Design portrays the Almighty as a clumsy Creator, having to intervene at regular intervals to fix the inadequacies of His own initial plan for generating the complexity of life. For a believer who stands in awe of the almost unimaginable intelligence and creative genius of God, this is a very unsatisfactory image.*

21st Century Challenges

Tom McLeish in *Faith and Wisdom in Science* noted that public debate around new science, including climate change and genetic modification of crops, is considerably influenced by a strong underlying narrative of suspicion: the fear that scientists tend to make exaggerated claims about new discoveries, are unwilling to think through possible unforeseen risks and are prepared to keep people in the dark when new evidence emerges to question their claims. Even in a largely secular society there is a deeply held belief not to 'play God' with nature. Another narrative is exploitation – the rich get richer while the poor get poorer. As Tom McLeish expresses it:

> *For Christians our challenge is to create a proper balance between the technological and cautionary tendencies in public debate.*

We discuss three topics: climate change, DNA editing in plants and in humans, and organ transplantation, offering a perspective on how Christian belief may inform these pressing and difficult public discussions.

Environment and Climate Change

We have amazing control over much of our environment. We readily clear, fell, excavate, drill, mine, frack, dam and burn to provide the resources and energy we need for our homes and industry. However, we exploit Earth's resources more than we look after its ecosystem.

Burning coal and oil generates greenhouse gases which cause global warming.

Scientists show that global warming is increasing, due to burning of coal and oil. This is causing climate change, which may well have destructive effects on our way of life and last for centuries. Can a combination of science and religion meet this environmental challenge?

Global warming and climate change

Humans cause warming of the oceans and atmosphere by increasing the concentration of 'greenhouse gases' such as carbon dioxide (CO_2). We do this through burning fossil fuels such as coal and oil, and activities such as deforestation. Climate change due to this 'global warming' will increasingly cause crops to fail, water

Climate change makes extreme weather events more likely. Flooding in Bucklebury, Berkshire.

shortages, and more extreme weather events such as hurricanes, floods and droughts. Earth's weather over the past few decades indicates that this may already be happening!

All major climate changes, including natural ones, are disruptive. Some have led to the extinction of species, population migration, and changes to vegetation cover and ocean circulation. The present level of CO_2 in our atmosphere is greater than it has ever been in the last million years, during which we humans have evolved. Also, the speed of the current climate change is faster than most of the previous changes. This is likely to make it harder for the natural world, including ourselves, to adapt. If we don't act, disruption is certain.

How to limit climate change?

Do we change energy production and usage to limit the emission of greenhouse gases, and so try to limit climate change? Or, do we wait for the changes to occur and take the consequences in terms of losses, damage to the environment and suffering? Perhaps we should aim to adapt as best as possible to both actual and expected changes? Could we devise advanced geoengineering solutions to counter the changes? All are possible – but they have risks as well as attractions, and substantial costs. The most likely outcome is some combination of these alternatives.

Action on climate change

Action must focus initially on the two most important areas:

- reduction of CO_2 emissions from burning fossil fuels
- limiting deforestation.

Nations must arrange to share the burden of achieving the required target. Negotiations will be complicated, difficult and liable to delay. Governments are likely to argue why they cannot make cuts, instead of looking for opportunities to do so.

Nations have very different capacities to adapt, and also vary in their vulnerability. The developed world must admit that the most vulnerable communities are generally the least responsible for causing the problem. Unprecedented individual cooperation, strong morality, and true selflessness – as promoted by the world's major religions – will be essential for success.
Most campaigners on global poverty and equality see climate change as a major threat.

Is climate change an 'Act of God', like floods and earthquakes?

During earthquakes and tsunamis, vulnerable environments suffer most. Tsunami damage in Tagajo, 2011.

Natural hazards are often called 'Acts of God', and some people attribute them to God punishing humankind for perceived crimes. But volcanic eruptions, earthquakes, storms and floods are a necessary part of creation!

People suffer in natural disasters not because they provoked God's wrath, but because they were in the wrong place – in a vulnerable environment – at the wrong time, when the flood, storm or earthquake struck. We create our own vulnerability to natural hazards. This is done, for example, by building poorly engineered structures on unsafe sites, increasing the probability of flooding by deforestation – and increasing global warming by burning fossil fuels.

The Whole Earth

Forty years ago, James Lovelock proposed the 'Gaia hypothesis'. He suggested that the Earth is a self-regulating system, which evolves to maintain conditions just right for life, and it works to maintain this environment even when events such as droughts and diseases threaten it.

It is comforting to think that we live in an ecosystem that looks after us, but as any parent knows, it doesn't stop bad behaviour. This can become destructive! Tests of the hypothesis suggest that Gaia is not an accurate picture of how our world works. However, it has reminded us that we are all part of one creation and must relearn a sense of reverence for the Earth itself. The idea has stimulated research on environmental science, and gives us a useful concept of the 'Whole Earth' as vital for sustaining life.

Reflection

Christianity teaches that as part of God's creation, the Whole Earth needs to be valued and respected. Most world religions take a similar position. To care properly for our Earth, we need both science and religion. We cannot ignore the problems of climate change and human population size that have emerged as we increasingly exploit natural resources to sustain industrial societies supporting modern health care systems. As the most intelligent lifeform on the planet, it's up to us to maintain our environment – and ourselves – in a healthy condition, intellectually, physically and spiritually.

> *Happiness is not the absence of problems; it's the abllity to deal with them.*
>
> **Steve Maraboli**

Tigerless

by Rachel Lewis

In between hunts, when I lie in the grasses
And practise the stillness of death,
I have been thinking hard.
And I believe, Father, that what is gone is certitude.
We learnt the loss of you in between licks,
When we asked where our bull elephant,
Our antlered stag, our spring-spout was.
Mother said you were a wanderer, that all men are,
You were never going to be around for long.
I do my best without you. I rise
As I believe you rose, as I saw Mother
Surge, all dappled haunches, in the den.
Like her, only heavier. For I think you would stand
With all the thunder-strength of muscled cloud.
Now I am big as she said you were and I would be,
Eye-level with the lightning-riven tree.
But she was wrong as well, said you were wandering
Through forests longer than the sky is high,
Forests full of other fathers. I have looked for you.
I have walked the orange day and the black night.
But I could not even find the forests, could not
Even find the way to you. All I found was men
And the carcasses of lands they leave behind.
Father I am afraid for you, lost somewhere
I cannot help, somewhere I cannot even see.
But Father, I am still more afraid for me.

Rachel Lewis (age 18) was a 2014 winner of the Cape Farewell Young Poets Network Competition for poems exploring climate change. http://poetrysociety.org.uk/education/cape-farewell/capefarewell2014

Genetic Modification of Plants, Animals and People

Scientific Background

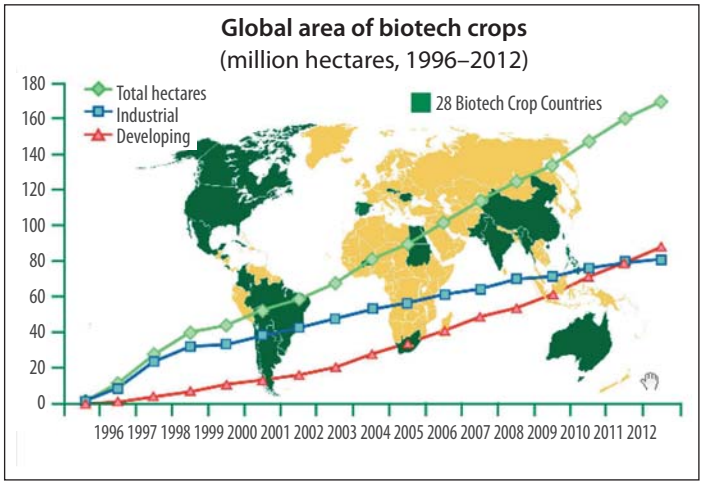
All the information needed to 'build' an organism is encoded by its genes. Almost all living organisms – from bacteria to plants, and including human beings – have their genes written in the same code made of only 4 DNA bases or 'letters' (G, C, T and A). This means that, with only a few minor changes, the gene of an organism is compatible with the same gene of another, totally different organism.

In a process equivalent to 'cut and paste', scientists can take a gene of interest from one organism and introduce it into another organism. This is known as genetic modification. It is an essential tool in biological research and is regularly used in the manufacture of medicines such as insulin, which is harvested from bacteria engineered to produce the human insulin protein.

Genetic modification means altering the DNA code of an organism. It is sometimes possible to remove genes or parts of genes that cause harm or to insert new beneficial genes.

Why would we want to produce GM plants?

We live in an extremely unequal world, where people starve to death because resources are not correctly distributed. Either we learn how to distribute our food more equally, or we learn how to increase the yield using crops modified to grow better.



In 2012 a record 17.3 million farmers, in 28 countries, planted 170.3 million hectares (420 million acres) and for the first time, over 50% of the world's GM crops were grown in developing countries.

In fact, over 90% of the farmers using GM crops live in developing countries. The use of GM crops in Burkina Faso has led to a 30% increase in yield.

In addition to growing GM crops resistant to drought or parasites we can also design crops to produce special nutrients or even medicines. One notable example is a type of GM rice that produces Vitamin A. Deficiency of this vitamin is a leading cause of blindness in some parts of Africa and SE Asia. Natural rice does not produce vitamin A. However, by adding two extra genes to natural rice, a GM variety called 'Golden Rice' is produced which contains the vitamin and, if part of the regular diet, will help prevent childhood blindness. Golden Rice was blessed by Pope Francis as a source of vitamin A for children.

Rice can also be modified to yield vaccines that are safer, cheaper and easier to store than current vaccines. A promising vaccine against cholera is being tested.

'Golden Rice' (right) and ordinary rice, in the hands of a scientist at the International Rice Research Institute in The Philippines.

Concerns about GM crops

Many people hold strong views for and against genetically modified organisms, and both sides have sometimes used misleading information to win public support.

One contentious use of GM crops is the creation of soya beans and maize resistant to weed killers or herbicides. The general principle is that a gene from a bacterium is introduced into the

Activists uproot a genetically modified crop in a protest against bio-engineered food.

plant, which thus becomes resistant to a particular herbicide. This herbicide can then be used to spray the GM crop, leaving the crop plants intact but killing the weeds that grow around it. Farmers planting the GM crop will use less pesticide and obtain higher yields of product.

The main downside is that these GM crops are resistant to only one type of herbicide and that can only be bought from the company that provides the GM seeds. This means that farmers are very dependent on that one company and are open to exploitation. However, there are also advantages because these GM plants have resistance to only one very specific weed killer and there is no risk of a general herbicide resistance spreading to other wild plants. There is a trade-off of benefits.

'Terminator' seeds are another focus of debate. These describe the seeds of GM plants that have been designed to be unable to produce fertile seeds necessary to grow the next year's crop. Farmers who plant crops using 'terminator seeds' must buy new seed from the GM companies each year, thus becoming dependent on these big corporations.

Terminator seeds could be the answer to one of the major concerns about the environmental safety of GM crops. This is because the gene that confers herbicide resistance cannot be transmitted from GM plants to weeds as these GM crops are not able to pollinate wild plants thereby transmitting the resistance gene.

Overall, the unintended effects of genetically modified organisms on the environment appear to be similar to those of traditional organisms. GM crops engineered to express a toxin that kills insects have been used for 15 years with no record of negative impact on insect populations. They could even be more environmentally friendly than the spectrum of broad insecticides normally used by farmers, which do have a negative impact on insect populations.

Some sectors of the public are unsure about the safety of products derived from GM crops. GM crops can be used to produce cotton clothes or to feed cattle, but what worries most people is what happens when we eat GM plants. Such fears appear to be unjustified because DNA in food is digested by our bodies in the same way whether it is modified or unmodified. GM foods are probably the products under the strongest supervision both by the industries producing them and by

Cultivation of GM probe

external health agencies. Some GM foods are already extremely common in the US and are considered safe to eat.

Christian support for GM crops?

Some general principles apply:

- Do GM crops have good consequences?
- Do the gains outweigh the risks?
- Is there anything about GM crops that goes against Jesus' teachings?

Most of the farmers using GM crops live in developing countries where the effects have been remarkable. In general, GM crops have been shown to be as safe, if not better, than the non-GM counterparts. We are called to feed the hungry, clothe the naked and take care of the sick (Matthew 25:35–36). However, we must also be responsible and take care of nature (Genesis 2:15).

An important concern is that an acceptance of GM crops will be a first step towards a wider use of DNA modifications, not only in plants but also in animals including humans – modifying the human genome, first for therapy but later for accessory reasons. This area is strongly regulated and open to public debate, and indeed some specific interventions have been approved to avoid some serious, rare childhood disorders. However, the ethical use of increasingly sophisticated techniques for DNA manipulation will depend also on the vigilance by the scientific community who are responsible for the long-term direction of this research.

When Jesus was criticised for healing on the Sabbath, he replied:

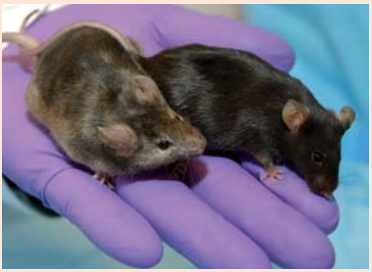
> *Have you never read what David did when he and his companions were hungry and in need? In the days of Abiathar the high priest, he entered the house of God and ate the consecrated bread, which is lawful only for priests to eat. And he also gave some to his companions […] The Sabbath was made for man, not man for the Sabbath.*
>
> **Mark 2: 23–28**

If GM crops could save human lives and make this world a better place, is there anything more important?

GM in Medicine

The human genome can be thought of as a detailed blueprint for building every cell in the body. However, this is not a permanently fixed blueprint because DNA mutations and rearrangements occur in every child in every generation. These rearrangements alter the instruction manual in many small ways, introducing misspellings and distorted sentences. These are often inconsequential but may sometimes give rise to devastating disease.

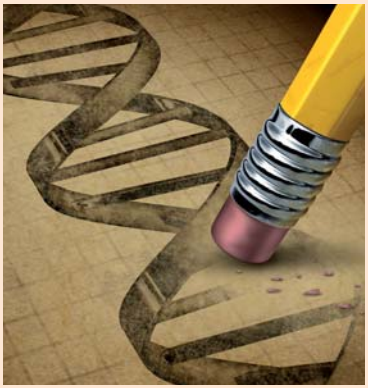
Genome editing can be accurately performed in both plants and animals.
One well-established approach creates so called 'modified mice', whereby, in embryonic cells, a single selected gene is disabled or altered in some way to model a particular disease. Genetically modified mice are extremely valuable to medical researchers studying human genetic diseases.



A genetically modified mouse in which a gene affecting hair growth has been knocked out (left), shown next to a normal lab mouse.

Newer techniques now allow researchers to 'edit', very precisely, the DNA from almost any type of cell. Where a disease is caused by a mutation in a single gene, the defective gene can be 'repaired'. The damaging mutation can be cut out and replaced – it is possible to replace single letters of the DNA code. If the repair is carried out in embryonic cells in mice, healthy offspring will be born with no risk of the disease they would otherwise have inherited from a parent.

It now seems possible that DNA editing – the replacement of faulty genes in body cells – will become a useful part of the treatment of some human inherited diseases. UK law prohibits genetically modified embryos from being implanted into women, and laboratory research is strictly controlled, while the far-reaching ethical and social implications of such interventions are being examined and are open to public debate. The extent to which DNA editing is permitted in future will depend on what society finds acceptable and whether or not these procedures can be shown to be safe.



The Gift – Reflections on Transplant Surgery

The first living donor kidney transplant in the UK was performed between identical twins in the Royal Infirmary of Edinburgh in 1960. In its report of the event, *The Scotsman* stated that 'the recipient has a sporting chance of getting away with it'!

It then took more than a decade to develop drugs able to dampen down the rejection response, allowing transplantation between people who were not genetically identical. Now transplantation is a life-saving treatment for many patients with failure of organs such as the kidney, liver, pancreas, heart and lungs.

In 2014, about 3500 transplants were performed in the United Kingdom, but twice that number of patients remained on the waiting list. Worldwide there is a shortage of donors, and this leads to some challenging ethical and moral decisions as we aim to increase the numbers of deceased and living donors.

Fairness using scarce resources

Transplant is unique in medicine in that the treatment of one individual is dependent on the gift of another, be they dead or alive. The responsibility of transplant clinicians is to ensure that the gift of each and every donated organ is used in a thoughtful and fair way, balancing the good of each individual requiring the organ with the overall good of the community.

Most patients on kidney dialysis would love the opportunity to have a transplant, but is that the best use of the scarce resource if their life expectancy is less than five years, with or without a transplant? Tough conversations about equity and justice take place in the transplant clinic on a weekly basis balancing the needs of the individual with the best use of a scarce resource.

Organ donation, families and the community

Imagine that your loved one has died in unexpected and sudden circumstances, and you are approached as the closest relative to authorise organ donation. How can any of us gauge how we would react? If that person was on the organ donor register, or had had the 'wee chat' about organ donation, the response is not difficult. In the majority of cases the wish of the loved one can be honoured. Working as a community, we can promote

organ donation as a positive decision that individuals make to do something good in the face of tragedy, knowing that their families may receive some solace in the gift of life offered in the face of death.

Questions about living kidney donation

Few of us would argue about the appropriateness of a father donating a kidney to one of his children; there is hardly a parent among us who wouldn't do the same if we needed to. But what if the parent has a medical condition that adds to the risk of donation but wishes to disregard that in order to save their child? Or we may have the situation where an adult son or daughter wishes to donate to their ageing father, to 'give him a few more years of good-quality life', not concerned that those years are likely to be few in number? Where does responsibility lie in those circumstances?

Altruistic organ donation

In 2006, a change in UK legislation led to an expansion in the opportunities for living kidney donation. If a living donor was not able to donate to his or her own recipient because of blood group or immunological incompatibility, the kidney could be matched to a patient elsewhere in the country expanding the opportunities to give more patients the chance of having this life-giving transplant.

This also opened the door to non-directed altruistic donation, in which an individual can donate a kidney to someone on the waiting list, on the understanding that they will not find out to whom their kidney goes and what happens to it thereafter. Transplant doctors were humbled by the number of people who came forward; in 2013 more than 100 individuals donated a kidney, and many more came forward but had to be excluded for medical reasons. This is challenging to doctors who have a responsibility to 'first do no harm'. A balance must be found between the donor's autonomy and giving advice about what to do. This is particularly challenging with the increasing number of young people in their early twenties, often women who have not yet had children, who come forward wishing to donate a kidney altruistically. How can we counsel them?

To address these challenging questions requires transplant doctors to bring their own humanity to every one of the people who come forward offering to be a donor. They are owed no less.

Prayers and Reflections

The four prayers on the following pages were published in *Life and Work* in 2015.

Be still.
God breathes in your breathing.
Breathing is prayer.

'God',
a one word poem,
a lamp of living light,
impenetrably dark,
dwelling in your soul.
You changed forever,
touched, transfigured,
by Transcendence,
warmed by the smiles of silent
prayer.

The Sacred is the Most Real,
seen, heard and sensed
in Yeshuah, son of Miriam –
rabbi, Pharisee, mystic –
present with you now,
weeping, broken, suffering,
leading you,
like modern-day magi,
pilgrims in time and space,
into a Mystery, an Abyss,
an Emptiness that is all-consuming.

In silence,
God speaks truth, which words
cannot contain.
He is the Father
giving birth eternally,
your Companion, Friend and Lover,
the Transcendent in your midst,
creating through randomness,
chance and necessity,
with spaces for art, ethics, poetry
and myth.

'Be still, and know that I am God.'

With the gift of inner sight,
with spiritual imagination and
captivated by wonder,
see the star before you,
His star,
guiding you,
a benign providence,
each day, each night,
in joy, in pain,
in light, in darkness.

Be still.

Silence.
Smiles at paradox,
holds together contradictions
and tensions,
more adequate than words,
the climax in which all music ends,
in the beginning
before creation began.

In the still centre of the soul,
in the inner self,
Christ makes His home.
In your inner self,
you are renewed in God's image.

Let go
of fear, anger and shallow judgements.
Like drops of water,
let God's love and compassion
fill the vessel of your soul to
overflowing,
washing away all that diminishes you,
all that leads to hatefulness and
cynicism.
Let the Trinity,
the divine dance of the Sacred,
encircle others, the earth, creation and
you
in self-giving love.
There is nothing God's love cannot
face.
In our deepest wound, we find the
Lord.

Too eager to prove our worth,
too worldly in our theology,
too wrapped up in self-interest,
call us back, O Christ,
to the mystical presence at the heart of
the Church,
to the honouring and nurturing of
community,
to become once again sojourners,
spiritual travellers,
exploring the Mystery,
finding our fulfilment in the emptiness
of the tomb,
our meaning in meditation,
saturating ourselves
in the inner life,
where Christ desires to be conceived
anew.

Call us to holiness, O Christ,
to all that is beautiful, sublime
and good:
sanctify us with Your tender
Transcendence.
The Eternal Essence is our Lover:
inwardly enlightened by inexpressible
Truth,
dwelling in the timeless moment,
awaken us to a God-seeing life.

In faith,
may we enter the walled garden of
Scripture,
feel the breeze upon our face,
see, touch and smell all it has to offer,
and let its word-pictures infuse and
transform us.

God-soaked silence
is the treasure that the Church has
to offer the world.

Where is God?

God is everywhere.
There is no place, not among the stars,
the depths of ocean nor the secret corners of the mind
where God is not.
As creatures of integrity and double standards,
of love and selfishness,
we approach the sanctuary of grace.
In prayer, momentarily,
we enter heaven.

Holy God,
Luminous Darkness,
invisible, unseen reality,
permeating all that is,
present in matter, reason and imagination;
present too in the mystic rabbi from Nazareth,
in His life, suffering and death,
in Mary,
the mother who loved, embraced and cherished Him
and in us, bearers of the Divine,
the Resurrection flame burning within.
There is a knowledge deeper than that of the head,
a consciousness of calm,
a peace that only the presence of Love can give.
May we be present to the Presence.

The first outburst of God is always compassion.
Touch us, Holy God, with Your tenderness.
We hold up before You our narrowness,
the pride, prejudices and insecurity of the ego we fail to overthrow.
Come, cleanse us;
heal every self-inflicted wound;
anoint us with the oil of forgiveness;
grant us the courage to forgive and be forgiven.

May the mind of Christ be in us,
seeing You in all things and all things in You,
each day a sacrament,
each rainfall a baptism,
each meal a Eucharist
and the air we breathe the very breath of God.

Soaked in the Sacred,
may we live a life shaped by Your Spirit
and inspired by Your saints.
Embraced by Christ, may we embrace Him;
reflecting His radiance,
may we spend ourselves in His service,
sharing His love abundantly,
generously, extravagantly.

Star-gazers,
pilgrim magi,
setting out for home, hearts warmed,
for ever changed.
In the heavens, in the death and life
of the stars,
they had sought meaning,
and craved, yearned for the Mystery,
for peace, wholeness and intimacy,
for the inner touch of the Sacred.

In the cave's emptiness,
in stillness and darkness,
they encountered Eternity's silence:
a Child is held, tenderly embraced
by love;
a Mother rests, delicately wrapped
in a veil of Divine Love.
The night sky with its trillion trillion
stars cannot compare
to the timeless beauty dwelling
in the human soul,
within each of us:
God-bearers.

Looking inwardly,
she sees the suffering, hurt and loss
which is to come;
the sadness on her face reveals
her broken heart.
Swaddled in a shroud of gold,
the Child, the Sun of Righteousness,
comforts His Mother.

Here,
in the tragedy of human suffering,
in life's bitterness, loneliness and
brokenness,
in our failures, shame and
shortcomings,
like the star-gazers, we may sense
the Mystery:
in death, there is Life.

Hidden in the darkness of the
universe,
present in the fluctuating phases
of matter,
Companion in our consciousness,
saturating the mind and every
moment,
Heart at the heart of all things,
may we be present to Your Presence.

Amid the complexity and struggles
of life,
in the muck and mess,
help us face down the demons
of hypocrisy,
the destructive selfishness of
the ego.
Lead us on pilgrimage to our truer
self,
to the virtues of humility, love and
peace,
to our home in You.

Reflection on God within Us

According to the Christian tradition, the entire universe, in all its evolutionary complexity, emerges from the Father. Matter is alive with the essence of God. The palaeontologist and Jesuit priest, Teilhard de Chardin, said that, *'At the heart of matter is the heart of God.'*

> *God awaits us every instant in our action, in the work of the moment … He is at the tip of my pen, my brush, my needle – of my heart and of my thought.*

George MacLeod echoed this:

> *Matter matters, because at the heart of the material is the spiritual.*

Let the moon, seas, stars and sky, become a doorway into the Divine.

St Ignatius said:

> *God dwells in creatures, in the elements giving them existence, in the plants giving them life, in the animals conferring upon them sensation, in [humanity] bestowing understanding. He dwells in me and gives me being, life, sensation, intelligence; and makes a temple of me.*

The founder of L'Arche, Jean Vanier, writes, *'Jesus in us and us in Jesus.'* Through accident, sickness, failure and loss, there can be hurt, grief and desolation. Through our emptiness, we can suffer anxiety, fear and loss of self-worth. Jesus says, *'Abide in My love.'* He says, *'Let Me be at home within you.'* The journey of the inner life is a process of growing towards greater oneness with Jesus and the Father (John 10: 30). Vanier writes:

> *When Jesus and the Father come and love or make their dwelling place within us, that is not something static. They are living and active within us.*

The Celtic writer, David Adam expresses this process in his prayer:

I weave a silence on to my lips
I weave a silence into my mind
I weave a silence within my heart
I close my ears to distractions
I close my eyes to attractions
I close my heart to temptations.

Calm me, O Lord, as you stilled the storm
Still me, O Lord, keep me from harm
Let all the tumult within me cease
Enfold me Lord in your peace.

Creator God

by Diane Coleman

Creator God, beyond space and time,
as science stretches our understanding
and ponders universal mysteries,
we ask that you guide our actions and increase our vision,
so that we may choose to use our knowledge and skill
for the good of the earth
and the coming of your kingdom.

Psalm 139

Where can I go from your spirit?
Or where can I flee from your presence?
If I ascend to heaven, you are there;
if I make my bed in Sheol, you are there.
If I take the wings of the morning
and settle at the farthest limits of the sea,
even there your hand shall lead me,
and your right hand shall hold me fast.
If I say, 'Surely the darkness shall cover me,
and the light around me become night',
even the darkness is not dark to you;
the night is as bright as the day, for darkness is as light to you.

For it was you who formed my inward parts;
you knit me together in my mother's womb.
I praise you, for I am fearfully and wonderfully made.
Wonderful are your works; that I know very well.
My frame was not hidden from you, when I was being made in secret,
intricately woven in the depths of the earth.
Your eyes beheld my unformed substance.
In your book were written all the days that were formed for me,
when none of them as yet existed.
How weighty to me are your thoughts, O God!
How vast is the sum of them!
I try to count them—they are more than the sand;
I come to the end—I am still with you.

Psalm 139, vv. 7-18 NRSV

Prayer on the goodness of creation

by Pelagius (fl. c. 390 – 418),
Celtic Theologian writing to a friend

Look at the animals roaming the forest:
God's spirit dwells within them.
Look at the birds flying across the sky:
God's spirit dwells in them.
Look at the tiny insects crawling in the grass:
God's spirit dwells within them.
Look at the fish in the river and sea:
God's spirit dwells within them.
There is no creature on earth in whom God is absent ...

When God pronounced that his creation was good,
it was not only that his hand had fashioned every creature;
it was that his breath had brought every creature to life.
Look too at the great trees of the forest;
look at the wild flowers and the grass in the fields;
look even at your crops.
God's spirit is present within all plants as well.
The presence of God's spirit in all living things
is what makes them beautiful;
and if we look with God's eyes,
nothing on earth is ugly.

Further reading

Useful links:

The Faraday Institute, St Edmunds College Cambridge. A range of lectures and other resources including the Faraday Papers are available from their website (www.faraday.st-edmonds.cam.ac.uk/ papers).

Faraday Papers:

- John Polkinghorne, 'The Science and Religion Debate – an Introduction' and 'The Anthropic Principle and the Science and Religion Debate'
- Denis Alexander, 'Models for Relating Science and Religion'
- Alister McGrath, 'Has Science Killed God?'
- J. Bryan, 'Ethical Issues in Genetic Modification'.

Christians in Science (www.cis.org.uk) CiS is a member of the Evangelical Alliance and is an international network of those concerned with the relationship between science and Christian faith, open to scientists, teachers, students and all those with an interest in this dialogue.

The BioLogos forum (BioLogos.org) is an American organisation founded by Francis Collins to distribute resources on science and faith. Their mission is: 'BioLogos invites the church and the world to see the harmony between science and biblical faith as we present an evolutionary understanding of God's creation'.

Science and Religion Forum (www.srforum.org). publishes reviews in 'Science and Religion' a journal that commissions reviews of the latest work in the field.

Journals

New Scientist: The Collection, Volume 1, Issue 4: 'The Human Story'. Reed Business International 2014.

New Scientist: The Collection, Volume 2, Issue 1: 'The Human Brain'. Reed Business International, 2015

Scientific American, Volume 311, Number 3: 'Evolution – The Human Saga', September 2014

Books

James Barr, *The Garden of Eden and the Hope of Immortality*, SCM Press, 1992

Expanding on a series of five lectures, the author, professor of Hebrew Bible at Vanderbilt Divinity School, examines the story of the Garden of Eden. His central theme, challenging some conventional views, is that the Hebrew text reveals a story, not about the origin of sin and death, but about immortality. The lectures discuss ideas about death in the Hebrew Bible and reflect on the Garden of Eden story found in the New Testament.

Francis Collins, *The Language of God. A Scientist Presents Evidence for Belief,* London: Pocket Books, 2007.

A leading US geneticist who was head of the Human Genome Project has written this powerful account of his personal faith explaining why he views modern discoveries in science as being in complete harmony with Christian belief.

Richard Dawkins, *The God Delusion*, Bantam Press, 2006.

In this well-known title the author, broadcaster and geneticist puts the case for a purely materialistic approach to life and a head on collision between religion and science.

Daniel Dennett, *Breaking the Spell; Religion as a Natural Phenomenon,* Penguin Books, 2006.

A recommended read giving intriguing insights and speculations on the cultural origins of religious beliefs and practices from the perspectives of evolutionary psychology.

Elaine Howard Ecklund, David R. Johnson, Sarah Hamshari, Kirstin R W Matthews, and Steven W Lewis, *A Global Lab: Religion among Scientists in International Context – a conference report*, 2015.

A report on a large survey, funded by the Templeton Foundation, on how scientists around the world view religion. In all eight countries, France, Hong Kong, India, Italy, Taiwan, Turkey, UK and US, representing quite different religious contexts, scientists were substantially more secular than the general population and most thought religion and science operate in separate spheres.

David Fergusson, *Faith and its Critics – a Conversation*, Oxford University Press, 2009.

This highly readable book by the Professor of Divinity at Edinburgh University, contains the six Gifford Lectures given at the University of Glasgow in 2008. Topics cover the central themes of current science & religion debates including 'Sacred texts: How Should We Read Them?'. The book is recommended by Keith Ward as follows 'If you want a calm,

reasoned, dispassionate discussion of some of the more evangelical atheists of recent times, this is it'

Richard Harries, *God outside the Box*, SPCK 2003

Mark Harris, *The Nature of Creation: Examining the Bible and Science*, Acumen Press, 2013.

The author is Lecturer in Science and Religion at the University of Edinburgh and the book is a scientific and theological exploration of what the Bible says about creation. 'For anyone interested in what the Bible can bring to the sometimes bewildering dialogue between science and theology, Harris's study is a must.'

Elizabeth Johnston, *Ask the Beasts: Darwin and the God of Love*, Bloomsbury, 2014.

The title of this highly readable book is taken from the Biblical book of Job 'Ask the beasts and they will teach you' says Job. In her own words the author 'conducts a dialogue between Charles Darwins's account of the origin of species and the Christian story of the ineffable God of mercy and love recounted in the Nicene creed'.

Hans Küng, *The Beginning of All Things: Science and Religion*, Cambridge: William B. Eerdmans, 2007.

A lucid account of current dialogues between science and religion by a distinguished theologian. Küng writes 'From the time of Galileo it was in principle unnecessary for christian theology and the church a priori to put themselves in opposition to the insights of the rising natural sciences. At an early stage a distinction could have been made between the biblical view of the world and the meaning of the Bible.'

In a wide ranging discussion of cosmology, evolution and brain science, Küng finds an inspiring accommodation between science and religion.

Tom McLeish, *Faith and Wisdom in Science,* Oxford University Press, 2014.

A book by a physicist at Durham University, with a reflection on the book of Job at its centre. The book takes quite a different stance from a binary science vs religion point of view. Instead it succeeds in showing how science, 'the love of wisdom of natural things that can draw on theological and cultural roots', is part of an ancient tradition so that 'surprisingly science becomes a deeply religious activity'.

Roland E Murphy, 'Introduction to the Pentateuch', in R. Brown, J Fitzmyer & R Murphy, *The New Jerome Biblical Commentary*, 5, pp.1151–52, Englewood Cliffs, NJ: Prentice-Hall, 1990.

Thomas Nagel, *Mind and Cosmos – Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly Wrong,* Oxford University Press, 2012.

A critique of reductive materialism, not based on religious belief, by a philosopher who writes: 'The modern materialist approach to life has conspicuously failed to explain such central features of our world as consciousness, intentionality, meaning and value'.

Carlo Rovelli, *Seven Brief Lessons in Physics,* Allen Lane 2015.

A theoretical physicist who wrote this popular, readable book, which has been translated into 24 languages.

Keith Ward, *God, Chance & Necessity,* Oxford: One World Press, 1996.

A highly readable response to scientific atheism by the Regius Professor of Divinity at the University of Oxford. Using arguments from cosmology, biology and psychology the book 'points to the existence of God as the best explanation of how things are as they are'.

Other resources

Exploring The God Question: Science, God and the Search for Truth. Based on the international TV series (www.thegodquestion.tv/explore).

A series of three DVDs: The Cosmos, Life and Evolution, Mind and Consciousness with a Study Guide. Published by Search for Truth Enterprises Ltd.

Climate Change

Intergovernmental Panel on Climate Change, *IPCC 2013: The Physical Science Basis, Assessment Report*, www.ipcc.ch/report/ar5/wg1/

Climate Change: Evidence and Causes, Report of The National Academy of Sciences and The Royal Society, February 2014 https://royalsociety.org/policy/projects/climate-evidence-causes/

Robert Adler & Fred Pearce, 'Happy Planet', *New Scientist*, 2976, 2 July 2014

Nicholas Stern, 'The Economics of Climate Change', HM Treasury, 2006 http://webarchive.nationalarchives.gov.uk/+/http:/www.hm-treasury.gov.uk/media/4/3/executive_summary.pdf

George Marshall, 'Understanding faulty thinking to tackle climate change', *New Scientist*, 2982, 18 August 2014.

'The Gaia Hypothesis' *New Scientist Special Report* [2015] www.newscientist.com/special/gaia

'Living Lightly, Living Faithfully' (eds C Bell, J Chaplin, R White), Published by the Faraday Institute 2013.

A multi author book of a conference held in 2011 funded by the Templeton Foundation addressing the question 'Can the religions of the world offer anything worthwhile towards the goal of a truly sustainable way of living in the 21st century'. Contributions from Buddhism and Islam and a chapter on 'What action should the Christian church in UK be taking right now'.

A series of links to statements about climate change: http://fore.yale.edu/climate-change/

Vatican encyclical on global warming. Encyclical Letter, *Laudato Si',* of The Holy Father Francis on Care for Our Common Home: http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Natural Disasters

Robert White, *Who is to Blame?*, Monarch Books, Oxford, 2014.

A geophysicist writing on the Christian response to natural disasters.

Harold Kushner, *The Book of Job, When Bad Things Happened to a Good Person,* Schocken Books, 2012.

GM crops

P Moore, 'Thinking about Bioethics: How do we as Christians answer controversial questions in Science?', Christians in Science.

J Bryan, 'Thinking about Genetic Modification: Why is Genetic Modification such a controversial topic?' Christians in Science.

Derek Burke, 'Why is there a fuss about the genetic engineering of crops?' Christians in Science.

An article about the position of Vatican scientists on GM crops: www.newscientist.com/article/dn19787-vatican-scientists-urge-support-for-engineered-crops.html?full=true#bxdn19787B1.

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