

Beginnings

Rob Yule 2020

THE DISCOVERY OF THE BEGINNING

Science Catches Up with Scripture. (Genesis 1:1)

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FORMING THE UNIVERSE

'Big Bang' Cosmology and the Bible (Genesis 1:2)

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LIGHTEN OUR DARKNESS

The Origin of the Very First Light (Genesis 1:3-5)

The biblical account of the creation of light is remarkable for the way it undercuts ancient religious worship of the celestial bodies and anticipates some of the most remarkable findings of modern science.

THE ORIGIN OF LIFE

Did Life Arise in a Primordial Soup? (Genesis 1:9-13)

For fifty years pop science has trumpeted that life arose by entirely natural processes through the spontaneous synthesis of chemicals in a primordial soup. The implausibility of this scenario is much less widely known, but is far better established by the scientific evidence.

LIFE TO ORDER

The Sudden Emergence of Complex Life (Genesis 1:20-25)

The gradual emergence of complex life-forms, central to the theory of evolution by natural selection, is called in question by the discovery that complex organisms arose with un-Darwinian suddenness in the Cambrian era, and by the absence of transitional forms in the fossil record. This address presents the growing agreement between the scientific and biblical accounts of the development of complex life on Earth.

IN GOD'S IMAGE

The Importance of Being Human (Genesis 1: 26-31)

A seldom-noticed difficulty with the theory that humans evolved from animals is its inability to explain how human beings can do what animals cannot. The irreversible qualitative difference between humans and animals cannot be explained by naturalistic evolution, but is accounted for by divine creation. This presentation emphasises the capacity of humans for artistic creativity and abstract thought, and defends the value and responsibility of science.

IN GOD'S TIME

The Time-Scale of Creation (Genesis 2:1-4)

Both evolutionists and Young Earth Creationists have problems with a fifteen billion year age for the universe - the former because it is too short, the latter because it is too long. This address discusses the time-scale of origins, argues on biblical grounds that the days of Genesis are long time periods, and urges greater cooperation between scientists and biblical scholars.

EVIDENCE FOR DESIGN

The Complexity and Fine-Tuning of the Universe (Isaiah 40:12-15, 21-23, 25-26)

It is widely assumed that the origin of the universe and life can be explained by random natural processes. But randomness can only account for loss of order and information, not for the existence of order and information in the first place. This address argues that the high information content and fine-tunedness of the universe are inexplicable without a supremely intelligent Creator as their cause.

CHRIST AND CREATION

Science and the Bible on the Wonder of Life (John 1:1-14)

The last fifty years, since the description of the double-helical structure of DNA in 1953, have seen a revolution in understanding the living cell. Yet these discoveries, far from making the Bible seem dated, make its portrayal of the nature of life as an information system even more relevant to understanding why we are here.

FAITH AND SCIENCE

Their Complementariness and Partnership (Matthew 22:34-40)

During the last 150 years the relationship between science and Christianity has often been one of conflict and opposition; here is a compelling case for greater cooperation, and a critique of those tendencies in both science and Christianity that hinder the development of such a partnership.

The Discovery of the Beginning

Science Catches Up with Scripture

(Genesis 1:1)

Since the time of Aristotle in the 4th century BC, the universe has been regarded as infinite and eternal, having no beginning and therefore no Beginner. In one of the most dramatic intellectual developments in human history, twentieth century research in astrophysics and cosmology has discovered that the opening verse of the Bible is correct: the universe did in fact have a beginning. In this address, first in a series on 'Beginnings', preached at St Albans Presbyterian Church, Palmerston North, on 30 January 2000, Rob Yule tells the remarkable story of this development and outlines its implications.

The Bible begins with a majestic, Beethoven-like opening: 'In the beginning, God created the heavens and the earth.' This deceptively simple statement of the book of Genesis, unlike any other purported account of origins, says that the universe - everything that exists - had a beginning, and that God made it. The universe had a beginning, so its very nature points to the existence of a Creator.

Down the centuries there have been many attempts to deny this truth. Since the Greek philosopher Aristotle in the 4th century BC, people have put forward the view that the universe is eternal, in order to escape the implication that it had a beginning. If the universe had a beginning, it has a Beginner. And if it has a Beginner, then it is dependent, not self-sufficient; and that means we are accountable, not autonomous beings. The persistent attempt by thinkers, philosophers, and scientists down the ages to maintain the eternity of the universe comes from the desire to avoid attributing its origin to God - so that we do not need to acknowledge that God is the proprietor of the universe, or that we are dependent, accountable beings.

Science Discovers the Beginning

Throughout the 20th century scientific research about the origin of the universe has steadily accumulated evidence that our space-time universe did indeed have a beginning. This is one of the great stories of discovery in modern times. The following are the main episodes in this dramatic development:

1. Einstein's General Theory of Relativity (1915) suggested that the universe is simultaneously expanding and decelerating, as though from a giant explosion. His original equations of General Relativity point to an expanding universe and imply that all matter, energy, space and time has expanded outwards from a single point of origin or 'singularity'. Einstein's equations were elegant and convincing, but so deeply ingrained was his dislike of the theistic implications of a beginning point that he did a very unscientific thing: he introduced a 'fudge factor' into his equations (the so-called 'Cosmological Constant') to get them to yield a static, non-expanding, model of the universe.

2. In 1929 the American astronomer Edwin Hubble, working on the powerful 100 inch Hooker Telescope at the Mt. Wilson Observatory in California (then the largest in the world) discovered a phenomenon known as 'redshifts'. Certain stars and galaxies appeared redder or longer in wavelength than they should be, showing that they were moving away from the observer. The clear implication was that the universe is expanding. This was the first scientific evidence of creation or the 'Big Bang'; that universe is not eternal, but is expanding outwards and must originally have come from a finite point and had beginning. From this came the famous 'Hubble Constant', enabling scientists to calculate the age of the universe from the velocity of its recession (Hubble's calculation had a significant margin of error; current research has narrowed it to 15.3 +/- 1.6 billion years, but it is still being investigated and vigorously debated).

3. Only in 1931, after the publication of Hubble's law of redshifts and observations of the universe's expansion, did Einstein reluctantly accept the evidence for a beginning, acknowledging that by not trusting his original equations of relativity he had made the 'biggest blunder' of his career. It is astonishing to think that Einstein could have predicted this result, but fudged his sums and missed his moment of opportunity. Einstein visited Edwin Hubble at the Mount Wilson Observatory, to acknowledge his discovery. To the best of our knowledge Einstein never changed his beliefs, continuing to believe in an impersonal God identical with the laws of nature, but never

accepting the existence of personal God beyond nature, a God who brought the universe into existence (see Hugh Ross, *The Fingerprint of God*, [Orange, California, Promise, 2nd. ed., 1991], pp. 58-59).

4. In 1965 two Bell Telephone Labs scientists, Arno Penzias and Robert Wilson, measuring radio emissions from our galaxy, found a background noise that they could not eliminate. They tried everything they could think of to remove it, even cleaning pigeon droppings from their giant radio antenna. It took them some time to realise that they had accidentally discovered the residual energy of the 'Big Bang', the universal background microwave radiation remaining from the original 'explosion' which marked beginning of universe. What they discovered confirmed the origin and expansion of universe first observed by Hubble in 1929. Their measurements indicated a very low temperature for this microwave radiation - only about 3° above absolute zero.

5. In November 1989, just as the Berlin Wall was coming down, NASA launched the Cosmic Background Explorer (COBE) satellite, a project sixteen years in planning. Between January 1990 and April 1992 teams of scientists used its radiometers to measure more precisely the characteristics of this universal microwave radiation, now known as Cosmic Microwave Background (CMB). The COBE measurements showed a uniform background radiation with a temperature of 2.276° K, with minute ripples or fluctuations - in the order of one part in 100,000 - indicating where galaxies would have first begun to form by gravitational attraction as the universe expanded.

Responses to the Beginning

Many astronomers and physicists, faced with this evidence, have become believers in God. One is Alan Sandage, Edwin Hubble's successor, who for thirty years has been patiently refining the measurements for the expansion of the universe, who says, 'God to me is a mystery but is the explanation for the miracle of existence, why there is something instead of nothing.' According to science historian Frederic Burnham, the scientific community is prepared to consider the idea that God created the universe 'a more respectable hypothesis today than at any time in the last hundred years.' (See Hugh Ross, *The Creator and the Cosmos* [Colorado Springs, Colorado, NavPress, 1993], pp. 19-20, 116-17). The joke is that if you want to find an atheist these days to debate the existence of God, you have to go to the Social Sciences; you won't find any in the Physics Department - they've all joined the First Church of the Big Bang!

So overwhelming now is the astronomical evidence for a beginning and for the existence of a transcendent Creator that even an agnostic astrophysicist like Robert Jastrow acknowledges that it clearly points to the truth of the opening statement of the Bible. 'For the scientist who has lived by his faith in the power of reason,' he writes in his book *God and the Astronomers* (New York, Norton, 1978, p. 116), 'the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries.'

Not all scientists are this honest, or humble. Some, irritated by the evidence that there is a Creator, resort to irrational forms of denial. They react like the great English physicist Sir Arthur Eddington, who after the empirical evidence for the expansion of the universe was first published by Hubble in 1931, wrote in the prestigious science journal *Nature* (Vol. 127, 1931, p. 450): 'Philosophically, the notion of a beginning of the present order of Nature is repugnant to me. . . . I should like to find a genuine loophole.' Others say that in the first tiny milli-second of the Big Bang the physical laws of the universe are no longer operative so we cannot say what caused the universe. I find this implausible - rather like hoping that gravity will make an exception when I slip on a cliff, or that a knife blade won't cut when it is my finger that is in the way. The universe is not arbitrary like that.

Beneath such reactions lurk non-rational or moral factors for denying God's existence. Not many scientists and thinkers are honest enough to admit this. One who was was Aldous Huxley. In his book *Ends and Means*, Huxley candidly wrote: 'I had motives for not wanting the world to have a meaning. . . . For myself, the philosophy of meaninglessness was essentially an instrument of liberation, sexual and political.' In other words, he wanted sexual freedom and political influence, which believing in God would have interfered with. All too often people's denial of God is not based on evidence or rational grounds, but is a camouflage for moral disobedience.

Implications of the Beginning

The discovery of the beginning is the greatest turning-point in intellectual life and the history of ideas for two and a half millennia. It has profound implications not just for science but for all of culture - for education, the media, arts, philosophy, religion and human self-understanding. As Jewish physicist Gerald Schroeder remarks, 'This shift in scientific opinion, after millennia of opposition, represents the most significant change science can ever make toward biblical philosophy. Evolution, dinosaurs, cavemen are all trivial controversies when compared to the concept of a beginning.' (*The Science of God: The Convergence of Scientific and Biblical Wisdom* [New York, Free Press, 1997], p. 22). For if it is true that the universe had a beginning, then world-views that presuppose an infinite or eternal universe, or deny the existence of a Creator, are demonstrably false.

At a single stroke, like St. George slaying the multi-headed dragon, modern science's discovery that the universe had a beginning falsifies both ancient pantheism and modern atheism, the main rivals to the Judaeo-Christian worldview. If the universe is not infinite or eternal, monistic or pantheistic religions and philosophies which affirm that it is - including Hinduism and its New Age derivatives in the West - are shown to rest on a false premise. If the universe had a beginning, it is clearly implied that it has a transcendent Creator, which undercuts naturalism, dialectical materialism, secular humanism, existentialism, and other forms of atheism which deny the existence and activity of God and assert the autonomy and self-sufficiency of human beings. By testifying to a living, active and all-powerful God, the discovery of a beginning calls in question even those secularised forms of Christianity, from Ludwig Feuerbach to Lloyd Geering, which suggest that 'God' is nothing more than a human construct.

That secular science should provide such evidence for the biblical Creator is a surprising development, a plot-twist more unexpected than a detective thriller. We are witnessing a remarkable convergence of science and theology in our time. As Israeli solid-state physicist Nathan Aviezer says, 'hundreds of years of intense scientific effort by some of the finest minds that ever lived has finally produced a picture of the universe that is in striking agreement with the simple words that appear in the opening passages of the book of Genesis.' (*In the Beginning - Biblical Creation and Science* [Hoboken, New Jersey, Ktav, 1990], p. 17). The very nature of this rapprochement is biblical in its scope and irony, suggestive of the humour of God. Using even human wrath to praise him (Psalm 76:10), the Almighty is fetching glory from an unlikely source - from naturalistic science, the greatest project of human endeavour in modern times.

Secular science has come to this discovery through its own inner development. Focussing on the natural universe, repudiating supernatural revelation, often showing an anti-supernaturalist bias, and displaying at times an overconfidence in human ability, modern science has come to a point where it is arguably bearing better witness to the Creator than contemporary theology. At a time when many Christians have turned their backs on science, when most theologians have given up on natural theology, and when popular Christianity has emptied faith of reason and evidential support, it is surely a supreme irony, a truly master stroke, that God should pull creation from his left sleeve and use science to win himself applause.

Forming the Universe

'Big Bang' Cosmology and the Bible

(Genesis 1:2)

Genesis 1, which dates from a pre-scientific age, might be expected to parallel contemporary ancient Middle Eastern accounts of origins. In fact, it is strikingly different from alleged ancient parallels, but anticipates in a number of unexpected details the development of the universe as described by modern 'Big Bang' cosmology. This message, the second in a series on 'Beginnings', was preached by Rob Yule at St Albans Presbyterian Church, Palmerston North, on 6 February 2000.

When you study a document from ancient times, you would expect to find many parallels with other ancient literature from the same period; but you would also expect to find it very different from the ideas, technology and science of our own time. When we look at Genesis 1, we find exactly the opposite. It is strikingly different from the other 'creation' accounts from the ancient Near East. Yet it anticipates many of the most remarkable findings of modern science.

Ancient Contrasts

1. An Egyptian papyrus.

The Egyptian papyrus of *Apophis* was a document buried with nobles who had died to take with them into the after-world as a protection against the dragon Apophis. In it the 'lord of all', the sun god, boasts that he brought the 'numerous forms' into existence by his mouth. If you didn't read further you might think this was like the statement in Genesis 1 that God created the universe by his word or command. But in fact it refers to the casting of magic spells: 'I cast a spell in my heart; I created a new thing. I created all forms when I was alone . . . when no other had yet appeared who might have co-operated with me in creation.' What this Egyptian deity does with his mouth when he brings forth his children Shu and Tefene is not speak but spit: 'I spat out something as Shu; I spat out something as Tefene.' Then the papyrus tells us, as the deity wept for his children, 'people were formed from the tears which came from my eyes.'

This is a crudely primitive and materialistic account of origins, which characteristically has creatures emerging from body fluids.

2. A Babylonian epic

The Babylonian epic *Enuma Elish*, alleged to be an account of origins, also turns out on examination to have a polytheistic and magical background. The third and fourth tablets of this epic tell how, in the council of the gods, and after generous consumption of alcohol, Marduk is appointed warrior, creator and lord of heaven. But first he has to prove from his magical powers that he is qualified for this role. 'They brought into the circle a garment and said to Marduk their firstborn: "Your decree, O lord, transcends that of the gods; command to destroy and to make, and it shall be done. Open your mouth and the garment will perish; command again and the garment will be unharmed." Then he commanded with his mouth, and the garment was destroyed. Again he commanded, and the garment was created anew. When his fathers, the gods, saw what proceeded from his mouth, they rejoiced and paid homage, "Marduk is king."'

This, too, is so different from the biblical account of creation. There are many gods, not one supreme God, and the story describes witchcraft practices (similar to those encountered by Moses and Aaron among the magicians of Egypt, Exodus 7 & 8), rather than the origin of the universe.

People who claim that these ancient Near Eastern texts are parallels of the biblical creation account have probably never read or compared them.

Modern Parallels

The uniqueness of the Genesis account is even greater when we see how remarkably it anticipates the findings of modern science. The text of the first two verses of Genesis is very precise. Verse 1 declares that the space-time universe is not eternal but had a beginning, which twentieth century discoveries have so dramatically confirmed. Verse 2 speaks of God's action in forming the early universe, bringing progressive order from matter that was originally formless and lacking order. Moreover, there is no reference to light, only to darkness. This is very significant. It is exactly what one would expect if the 'Big Bang' theory of the origin of the universe is the correct one.

1. 'Big Bang' Theory

The theory of the 'Big Bang', or the inflationary universe, goes like this (see the graphic in *Time*, 29 March, 1999, p. 73):

1. The entire space-time universe begins from a 'singularity', a microscopic point before which nothing existed. Then it undergoes an enormously fast 'inflation', expanding from smaller than an atom to the size of a grapefruit in a tiny fraction of a second.
2. Following this inflation, the universe is a seething, searing hot mass of electrons, quarks and particles, with a temperature of 10^{27} °C.
3. Still within the first second of its existence, the rapid cooling of the universe permits quarks to clump into protons and neutrons.
4. By three minutes, the temperature of the exploding universe is still too hot to form atoms, the basic constituents of matter, and charged electrons and protons prevent light from shining. The universe is a scaldingly hot fog with a temperature of 10^8 °C.
5. It is not till 300,000 years from the beginning that the expanding universe cools sufficiently for electrons to combine with protons and neutrons to form atoms, mostly of hydrogen and helium, the lightest elements in the universe. Only at this stage are photons released and light able to shine.
6. By the time the universe is 1 billion years old, its temperature has cooled to -200°C, and it is no longer thermal energy but gravity that is the key factor at work in its formation. Gravity causes hydrogen and helium gas coalesce to form giant gas clouds that will gradually become galaxies, and smaller clumps of gas collapse under the influence of gravity to form the nuclear furnaces that comprise the first stars.
7. At the present age of the universe, some 13-15 billion years, the temperature has cooled to -270°C, the currently observed temperature of Cosmic Microwave Background radiation, around 2.7°C above absolute zero. The processes begin which are observed by modern astronomers currently: gravity causes galaxies to cluster together, the earliest stars die and spill heavy elements into space, and eventually these form into new stars and planets.

2. Biblical Cosmology

There are some remarkable parallels when we set this Big Bang model alongside the simple, brief statement of the origin and formation of the early universe as described in [Genesis 1:1-2](#):

1. [Genesis 1:1](#) says that God created the universe 'in the beginning'. Before this beginning, the space-time universe did not exist. God brought it into existence, as a 'singularity', not from any pre-existing matter, but out of nothing (*ex nihilo*).
2. [Genesis 1:2](#) says that the early universe was 'a formless void' (the words *tohu wa-bohu* mean 'unformed and empty'). It is described as a 'deep' (*t'hom*), suggesting something of immense density and pressure, like the depths of the oceans. The 'face' or surface of this deep was covered in 'darkness' - indicating that light was not yet present or shining. These descriptions, in pre-scientific language, exactly match the descriptions of the 'Big Bang' theory for the early universe at this stage of its formation. This is truly remarkable for a pre-scientific

document, and raises questions as to the source of this information. Such are the parallels I personally believe that the opening chapter of the Bible must have been directly revealed by God.

We are seeing in our day a remarkable convergence of scientific and biblical wisdom. Astrophysics and biblical scholarship appear to be on the same team, though not all scientists or biblical scholars are yet aware of this. This convergence is helping us to answer two great puzzles:

Perplexing Puzzles

1. Why is the Universe so Big?

The first is a puzzle for Christians: if God wanted to make a habitat for human beings, why did he create such a vast universe and take such a long time doing it?

An all-powerful God could have dropped human beings already formed into a world that was ready-made from the instant of creation. This is the fast-food theory of creation. But it does not appear to have been God's agenda. Both the Bible and modern science show that the Creator used a sequence of events, a development of the universe, with the ultimate intention of making a habitat for human beings. God is orderly. He chose to make the universe with orderly laws of physics and chemistry. God is truthful. He chose not to make a universe with false characteristics and a deceptive age, but with consistent properties and an age which can be calculated from the extrapolation of physical and chemical processes.

Hugh Ross, a Christian astrophysicist and apologist, explains: 'For many decades astronomers and others have wondered why, given God exists, he would wait so many billions of years to make life. Why did he not do it right away? The answer is that, given the laws and constants of physics God chose to create, it takes about twelve billion years just to fuse enough heavy elements in the nuclear furnaces of several generations of giant stars to make life chemistry possible. Life could not happen any earlier in the universe than it did on Earth.' (*The Creator and the Cosmos*, [Colorado Springs, Colorado, NavPress, 1993], p. 110).

The same point was made before the rise of modern science by church reformer Martin Luther in his Sermon on [Genesis 1:2](#) (1527): 'God has not created the world in a day but taken time for this purpose, as when he now creates a child. . . . Just as originally the infant, although it is not nothing in its mother's womb, is not yet formed as a perfect child is to be; and just as smoke is not nothing, but has neither light nor radiance, so the earth was as yet unfashioned and had no dimensions either of length or breadth.' That is a pretty good pre-scientific description of the origin and development of the universe.

2. How Did the Universe Expand?

The second puzzle is one for scientists: if the early universe was so dense, how did it ever expand? Modern physics tells of black holes - bodies that have such densely compressed matter and such overwhelming gravitational forces that they collapse in on themselves and not even light can escape from them. The density of matter in the universe in the first moments of its existence was like a giant black hole - the mother of all black-holes, so gigantic and with such enormous gravitational forces that no known physical force in the universe could have impelled it outwards. The early universe should have behaved like a gigantic collapsed star, and remained the blackest hole of all time. If it had, there would be no universe as we know it today. How it could have expanded has been a puzzle to physicists ever since Alan Guth of the Massachusetts Institute of Technology first analysed the forces of the universe's expansion in 1979 - and coined the term 'inflation' to describe it ('The Inflationary Universe', *Scientific American*, 250 [May 1984], p. 116).

How could such an immensely dense universe have inflated? The second verse of the Bible tells us. Here, when the conditions in the universe were those of a super black-hole, when 'darkness covered the face of the deep', there was a force from beyond the universe: 'the Spirit of God was hovering over the waters' ([Genesis 1:2b](#)). What no physical force in the universe could account for, the power of God's Spirit accomplished. Here is a one-time force mentioned only here in this account of the creation of the universe. The only other time this force is mentioned in the book of Genesis is the creation of man as a living being ([Genesis 2:7](#)): to explain the emergence of another unique and inexplicable development in the universe - the origin of free, intelligent,

spiritual beings. God's 'breath' or 'Spirit', the *ruach elohim*, is mentioned here as empowering the enormous inflation of the early universe, giving it just the right expansion rate to account for the properties of the universe as we now know it, so finely-tuned to support human life.

In describing the role of the Spirit of God in forming the universe, the Bible pictures the Spirit 'hovering' over it like a bird fluttering over its young in their nest ([Deuteronomy 32:11](#)) - a metaphor even more suggestive of care and provision than of raw power. It is God's Spirit who guides the formation of the universe from its inception towards its goal. The Spirit brings expansion where there is constriction, liberty where there is captivity, freedom where there is bondage, form and beauty where the world is 'without form and void'. The Spirit of God brings order out of disorder; makes a cosmos out of chaos.

What the Spirit does in the macrocosm - the universe at large - he can also accomplish in the microcosm - in our personal lives. The role of the Spirit is to lead us from our beginning to our goal, from chaos and confusion to order and peace.

Lighten our Darkness

The Origin of the Very First Light

(Genesis 1:3-5)

The biblical account of the creation of light is remarkable for the way it undercuts ancient religious worship of the celestial bodies and anticipates some of the most remarkable findings of modern science. This message, third in a series on 'Beginnings', was preached by Rob Yule, minister of St Albans Presbyterian Church, Palmerston North, New Zealand, on 13 February 2000.

Early in the twentieth century, a young man with a moustache, a mane of crispy, frizzled hair, and a preference for old worn-out jerseys, worked out a theory of matter that has become the most famous physics equation in the world. Albert Einstein's summary of the equivalence of mass and energy,

$$E=mc^2$$

was formulated when he was working as an examiner at the Swiss Patent Office in Berne. In 1905 he published a series of papers outlining what became known as the Special Theory of Relativity - to distinguish it from his later, more comprehensive theory of the universe, incorporating gravity, which physicists call the General Theory of Relativity.

Einstein would not have approved of the emphasis later given to the term 'relativity'. It implies that everything is relative, that there is no absolute truth, that he would have endorsed the Postmodern uncertainties of our day. Nothing was further from his mind. Einstein may have had shaggy hair, but he abhorred woolly thinking. He passionately believed in absolute truth, and that it was discoverable by human enquiry. In developing his theory he was much more impressed by the constancy of the speed of light (the *c* of his famous equation), which nothing in the universe can exceed.

Light without Luminaries

The biblical account of creation says that God created light before the sun, stars, and other celestial bodies, and that light-energy is the basic constituent of all reality. These observations, which used to be laughed at by sceptics, are a further indication what a remarkable document [Genesis 1](#) is.

1. Think what this meant, first of all, *for when the Bible was written*. At that time the worship of the sun, moon and stars was universal in the cultures of the Near East, throughout Mesopotamia and Egypt. People believed that their fates were sealed in the constellations. The Bible, at one stroke, negates worship of the sun and deifying of the stars. It emphasises that light was created before them and can exist without them. They are created entities, creatures like us, and therefore not to be worshipped. We are not beholden to them; they do not control our destiny. The writer could not have told us more clearly, 'Don't waste your money on astrology, horoscopes and so-called mystical pathways.'

2. Think what this means, secondly, *for our own time*. This pre-scientific book anticipates some of the major discoveries of modern physics:

- that the early universe was dark, and light could only emerge when it had cooled sufficiently, about 300,000 years after the beginning, for electrons to be bound in stable orbits, allowing photons to be emitted. Prior to this, in the enormous heat and density of the early universe, light was literally unable to shine.
- that the light which shone after proton release, the Cosmic Microwave Background radiation or 'very first light' (John Mather and John Boslough, *The Very First Light: The True Inside Story of the Journey Back to the Dawn of the Universe* [London, Penguin, 1998]), is our very

earliest indicator of the developing structure of the universe, and our basic measure of cosmic time.

- that light came into existence before the emergence of our sun and other burning stars. It was only as the universe cooled to about -200°C that gravitational forces began to attract gases and dust to form galaxies and burning stars, including our sun.
- that light or energy is a spectrum (the electro-magnetic spectrum, discovered by Scottish physicist James Clerk Maxwell, a devout Christian, in 1864), and that this light-energy is equivalent to matter and cannot be destroyed. Light-energy (as Einstein showed) can only be converted from one form to another, according to the conversion formula $E=mc^2$. We now know that light-energy is the very basis of matter and the material universe.

These discoveries demonstrate that the sequence of creative events and the understanding of the nature of reality as described in the opening verses of Genesis is correct, far in advance of the scientific thinking of its time. This information, I believe, could only have come from the Creator himself, in the form of a divine revelation.

The One Constant in the Universe?

Prior to the 17th century it was thought that light travels at an infinite speed. In 1676 the Danish astronomer, Olaf Rømer, first discovered that light travels at a finite speed. By an ingenious method, Rømer measured the time taken for light from eclipses of Jupiter's moon Io to reach Earth, and found that the times were shorter when Jupiter was closer to Earth and longer when it was further from Earth.

It is remarkable with such primitive measuring instruments that Rømer's measurements were of the correct order. The speed of light is around 300,000 kilometres (186,000 miles) per second, or about one foot per nanosecond (one thousand millionth of a second), the fastest speed possible for anything in the universe. At this speed light takes 1.3 seconds to reach the moon, 1,000 seconds to cross Earth's orbit, and 8 minutes for the light of the sun to reach us on Earth.

Einstein's famous formula, $E=mc^2$, is based on the premise that the speed of light - the c of this formula - is constant. But what if the speed of light is not a constant, c , but a variable, v ? Some twenty-four-hour-day creationists, such as Australian physicist Barry Setterfield and mathematician Trevor Norman, claim that the speed of light is slowing down since Rømer's first observations in the mid-17th century. On the basis of these diminishing figures, a sharply increasing exponential curve is produced which, it is claimed, would imply that the speed of light may have been 10-30% faster two thousand years ago in the time of Jesus, twice as fast three thousand years ago in the time of Solomon, four times as fast four thousand years ago in the time of Abraham, and more than 10 million times faster prior to 3000 BC!

If light is slowing down at this rate of decay, then projections of the age of the universe based on the recession of galaxies using the speed of light would give too great a value, and the universe would be much younger than the 15.3 ± 1.6 billion years which is the current best estimate. This would make the universe less than 10,000 years old, supporting the views of those who argue for a recent universe based on a claimed literal reading of [*Genesis 1*](#). (A popular presentation of this viewpoint is Chuck Missler's *Genesis and the Big Bang* tape series, Supplemental Study Notes [Koinonia House, 1991], p. 10).

These findings are highly controversial, especially to traditional physicists. Christian astrophysicist Hugh Ross has examined and critiqued them. Firstly, he points out that they are based on a selection of velocity of light measurements designed to give a progressive decrease in value. Ross produces a fuller table of measurements, containing standard error margins for each, which does not show a consistent decrease in velocity, only an increasing accuracy in the measurements. 'The

values and standard errors for all velocity of light measurements give no basis for concluding that the velocity is anything other than constant,' Ross concludes. 'The suggested exponential decrease is without factual foundation.' ('Making Light of Apologetics,' *Facts and Faith*, Vol. 1, No. 2 [Fall 1987]).

More serious still is the failure to consider the destructive physical implications of the hypothesis. Ross points out that any increase in the velocity of light would affect the luminosity of the sun. The sun's energy comes from nuclear fusion taking place in its core. Since, according to Einstein's formula, the energy release from nuclear fusion is proportional to the square of the velocity of light, even the slightest increase in its velocity would dramatically increase its temperature, so as to exterminate all life Earth. Even the 3% change represented by the difference between Rømer's original figure and currently accepted values would be problematic, Ross points out, 'let alone the factors of several million required by a creation time scale of only six thousand years.'

In short, I am not convinced by young Earth claims, which seem at variance with both physical laws and scientific observation. The variables do not seem to me to be more than one would expect with the improvement in measuring methods and instruments. The destructive implications of even small variations in the velocity of light rule out the decay rates claimed by Setterfield and Norman.

Time - Curse or Blessing?

Let us turn from speculation to the biblical text. There is one important implication of the term 'day' in Genesis that is often overlooked: a 'day' is a specific, concrete, finite amount of time. Time doesn't come to us in a stream of infinity; it comes to us packaged in discrete units, suited to our creaturely finitude. Imagine what it would be like if we lived in a stream of time, rather than time marked by specific days. How boring, or alternatively, how exhausting, it would be! Time would be a curse, not a blessing.

Imagine what it would be like to live on Jupiter, with each day roaring past every 9 hours 55 minutes 30 seconds - what a frantic life our business executives and stockbrokers would have to lead! Or, conversely, on Mercury, where each day takes two Mercury years, 176 Earth days! What an endurance test, what an exercise in survival each day would be! The blessing of specific days is an example of the *anthropic principle*, that the Creator has carefully shaped the universe to be a suitable habitat for human life, right down to the time in which we live.

Biblical time goes from evening to morning, the opposite of our way of marking time. 'There was evening and there was morning, the first day.' (*Genesis 1:5*). Why the reverse order here? Clearly, this is the origin of the Jewish method of reckoning time, especially the Sabbath. The Jewish day begins at 6 pm, at evening, around sunset. It begins with evening, then moves to morning.

Nature's tendency is to move from order to disorder. The Law of Entropy or Second Law of Thermodynamics describes how everything in the universe tends to a state of greater disorder and disintegration. Order out of chaos is so improbable a trend that the opening chapter of the Bible mentions it six times in this repeated formula. The Hebrew word *erev*, meaning 'evening' or 'twilight', comes from a root meaning 'to grow or become dark', implying what is 'indistinct', 'disordered' or 'chaotic'. The Hebrew word for morning is *boker*, meaning 'to discern', implying what is 'distinct' or 'orderly'. 'In the subtle language of evening and morning, centuries before the Greek words of chaos and cosmos were ever written,' explains Gerald Schroeder, 'the Bible described a step-by-step flow from disorder (*erev*) to order (*boker*); from the plasma of the Big Bang to the harmony of life.' (*The Science of God: The Convergence of Scientific and Biblical Wisdom* [New York, Free Press, 1998] p. 97).

This progression is a source of enormous comfort. For the biblical worldview, day does not begin with light and end in darkness, commence with existence and conclude in oblivion. Rather, it moves from twilight to daylight, from disorder to order, from entropy to harmony, from death to life. The threat of night, darkness, oblivion, is flanked by the hope of the dawning of a new day - of sunrise, the resurrection morning, and eternal life. There are many passages which suggest this in the Bible. I read one this week in my personal devotions:

The path of the righteous is like the first gleam of dawn,
shining ever brighter till the full light of day.
But the way of the wicked is like deep darkness;
they do not know what makes them stumble.

(Proverbs 4:18-19)

We forget the dread of night-time before there was electric light. How much greater the dread of a universe without light. The late evening prayer of *The Book of Common Prayer* expresses our dependence on God to bring us through the darkness of night to each new day: 'Lighten our darkness we beseech you O God, and by your great mercy defend us from all perils and dangers of this night, for the sake of your only Son our Saviour Jesus Christ, Amen.'

The Origin of Life

Did Life Arise in a Primordial Soup?

(Genesis 1:9-13)

For fifty years pop science has trumpeted that life arose by entirely natural processes through the spontaneous synthesis of chemicals in a primordial soup. The implausibility of this scenario is much less widely known, but far better established by the scientific evidence, as Rob Yule, minister of St Albans Presbyterian Church, Palmerston North, New Zealand, outlines in this address. Fourth in a series on 'Beginnings', it was delivered at St Albans on 12 March 2000.

The Miller's Tale

In 1950, at the University of Chicago, a twenty-two-year-old graduate student, Stanley Miller, attended a course of lectures by Nobel prize-winner Harold Urey, on the origin of the solar system. The lecturer discussed the view put forward by Russian biochemist Alexander Oparin in 1924, that the atmospheric conditions of the early Earth would have been very different from today. He commented that it would be interesting to see what would happen if someone did an experiment with the chemistry of Earth's early atmosphere and passed energy through it.

Miller was fascinated by the suggestion. He performed a single, simple experiment. Taking the ingredients of Oparin's suggested early atmosphere, Miller put ammonia, methane and hydrogen into a sealed glass apparatus containing boiling water, and simulated lightning with a high-voltage induction coil. Within a few days the water and glass were stained with a reddish goo. Chemical analysis showed that the goo contained amino acids - the building blocks of protein, the basic stuff of life. Miller published the results in a modest two-page article, 'Production of Amino Acids Under Possible Primitive Earth Conditions,' in the journal *Science* (117 [1953], pp. 528-9).

The rest is history. Miller's experiment was hailed as providing stunning evidence that life can arise out of simple chemical reactions in a 'primordial soup', and found its way into science textbooks the world over.

Astronomer Carl Sagan, famous searcher for extraterrestrial life, called it 'the single most significant step in convincing many scientists that life is likely to be abundant in the cosmos.' Chemist William Day described it as 'an experiment that broke the logjam' by showing that the origin of life was not a chance event but one that had been inevitable. Astronomer Harlow Shapley told a television audience in Chicago in 1959, on the eve of the Centennial of Darwin's *Origin of Species*, that the Miller experiment 'assures us what we had suspected for a long time: that one can bridge the gap between the inanimate and the animate and that the appearance of life is essentially an automatic biochemical development that comes along when the conditions are right.' (Quotations from Walter L. Bradley and Charles B. Thaxton, 'Information and the Origin of Life', in J. P. Moreland, ed., *The Creation Hypothesis: Scientific Evidence for an Intelligent Designer* [Downers Grove, Illinois, InterVarsity Press, 1994], pp. 173-4).

In the Primordial Soup

For a couple of decades after Miller, making life looked a cinch, as easy as following a recipe in a cookbook. 'Pre-biotic Soup. Place ammonia, methane and hydrogen in glass vessel, boil and stir slowly, zap occasionally by immersing electric beater.'

If only it were so easy. In fact there are many problems with Miller's scenario for the origin of life (see Bradley and Thaxton, *art. cit.*, pp. 182-8, Michael J. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* [New York, Simon and Schuster, 1996], pp. 166-70):

1. Miller used only one energy source, a spark to simulate lightning. There would have been other energy sources in the early atmosphere, including ultraviolet radiation, which would have converted any existing

methane to higher molecular weight hydrocarbons, forming an oil slick not a slimy pond, hardly a promising scenario for the origin of life, as environmentalists well-know.

2. Oparin's theory of the composition of the early universe - a reducing atmosphere of ammonia, methane, and hydrogen - has been shown by modern astrophysicists to be wrong. The early universe most likely consisted of neutral gases like nitrogen, carbon dioxide and water vapour - but water vapour produces oxygen which plays havoc with prebiotic simulation experiments.

3. While short wavelength ultraviolet light may help convert ammonia, methane and hydrogen into amino acids, the longer wavelengths of light in the early atmosphere would have destroyed them. Ultraviolet radiation is so lethal that it is nowadays used to sterilise counter tops and surgical instruments. The absence of organic compounds in the soil of Mars has been attributed to just such ultraviolet radiation bombarding the Martian surface.

4. Making amino acids out of ammonia, methane and hydrogen is an exothermic reaction, a reaction in which energy is released; but making them out of nitrogen, carbon dioxide and water is an endothermic reaction, into which significant amounts of energy must be added. Early Earth conditions would not have provided sufficient energy for this to happen.

5. A major problem with prebiotic soup experiments is that they produce an equal distribution of mirror-image left- and right-handed molecules. Yet all biological proteins occurring naturally in living organisms contain only left-handed or L-amino acids.

6. When amino acids are joined in simulation experiments fewer than half the bonds are peptide bonds. Yet functioning protein requires that 100 percent be peptide bonds to be able to fold into the three-dimensional structures that form living organisms. If we cannot consistently produce these with all our learning and technology in a laboratory, how could they possibly bring themselves together in just a few million years in the chaotic random world of nature?

7. Finally, the prebiotic soup has never been found in the fossil record, not even in the oldest rocks on Earth, the 3.9 million year old 'dawn rocks' of Western Greenland. 'Considering the way the prebiotic soup is referred to in so many discussions of the origin of life as an already established reality,' says Michael Denton, 'it comes as something of a shock to realise that there is absolutely no positive evidence for its existence.' (*Evolution: a Theory in Crisis* [Chevy Chase, Maryland, Adler & Adler, 1986], p. 261).

One hundred and forty years after Darwin's *Origin of Species*, a supposedly scientific account of origins, one might have expected evolutionists to come up with more convincing observational evidence for the spontaneous origin of life than this. But they have not, and cannot. Life is not explicable only in terms of physical and chemical processes. Origin of life hypotheses are still where they began - in the primordial soup.

Hero of the Plot?

It is often blithely assumed that the combination of time plus chance can account for the origin of life. World-famous Nobel prize-winning biologist George Wald, writing in the *Scientific American* in 1954, not long after the Miller experiment, argued that random processes following the physical laws of the universe can account for the spontaneous generation of life from nonliving matter. He argued that life is just an inevitable product of chemical processes. 'Time is in fact the hero of the plot. The time with which we have to deal is of the order of two billion years. . . . Given so much time the "impossible" becomes the possible, the possible probable, and the probable virtually certain. One has only to wait: time itself performs the miracles.' ('The Origin of Life,' *Scientific American*, 191 [1954], p. 48).

More recently Stephen Hawking, in his *Brief History of Time* (1988), repeats a notion first popularised by Thomas Huxley: 'It is a bit like the well-known hordes of monkeys hammering away on typewriters - most of what they write will be garbage, but very occasionally by pure chance they will type out one of Shakespeare's sonnets.'

From well-known scholars who should know better, this will not do. Darwin, perhaps, could be excused. He had no idea that a single cell has a more complex structure than the social organisation of a modern megacity. He had not the faintest inkling what a fantastically complex set of roads, pathways, delivery systems, communications, telephone networks, power stations, construction sites, manufacturing industries, factories, water reticulation, sewage systems, and civil defence capabilities the cell contains. But Darwin's modern followers do. They know that life is so enormously complicated that it could not possibly have come about by chance. I have a chart, produced by the German firm of Boehringer in Mannheim, representing the 'Biochemical Pathways' of a single cell. Measuring 2.5 metres by 1 metre, printed in 12, 10 or even 8 point type, it is immensely more complex than a street map of Greater London or New York.

In 1968, Professor Harold Morowitz, a molecular biophysicist at Yale University, published a book called *Energy Flow in Biology*. Morowitz was concerned about the casualness with which some scientists, in their enthusiasm to demonstrate naturalistic evolution, were making unwarranted assumptions about the origin of life. Morowitz was the first to rigorously investigate the mathematical probability of such events. He computed the time required for random chemical reactions to form a bacterium - not an organism as complex as an animal or a human, not even a flower, just a simple, single-celled bacterium. Basing his calculations on optimistically rapid rates of reactions, he calculated that the time it would take for a single bacterium to form would exceed not only the 4.5 billion year age of the Earth, but the entire 15 billion year age of the universe.

Visiting Jerusalem in 1991, I met the Jewish physicist and science writer, Gerald Schroeder. He told how, on hearing the Huxley-Hawking throw-away line about typing monkeys producing a Shakespearian sonnet, he had undertaken a very Jewish experiment. He took a Shakespearian sonnet, 'Shall I compare thee to a summer's day?', which ends with the appropriate lines

So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

He counted the number of letters in this sonnet. (Some of us remember that a sonnet has 14 lines, but it takes a Torah-observant Jew to discover that this one has 488 letters!) Assuming that the monkeys always hit the keys, and ignoring the spaces between the words, Schroeder calculated that the chance of randomly typing the 488 letters to produce just this one sonnet is 1 in 10^{690} (1 followed by 690 zeroes)!

The immensity of this number can be seen when we compare it with the age of the universe. Since the Big Bang, 15 billion years ago, there have been only 10^{18} seconds! 'To write by random one of Shakespeare's sonnets,' says Schroeder, 'would take all the monkeys plus every other animal on earth typing away on typewriters made from all the iron in the universe over a period of time that exceeds all the time since the Big Bang and still the probability of a sonnet appearing would be vanishingly small. At one random try per second, with even a simple sentence having only 16 letters, it would take about 2 million billion years (the universe has existed for about 15 billion years) to exhaust all possible combinations.' (*Genesis and the Big Bang* [New York, Bantam, 1990], pp. 186).

Twenty five years after Wald's article, in a special publication entitled *Life: Origin and Evolution* (1979), the *Scientific American* published a rare retraction, stating that Wald was in error. 'Although stimulating, this article probably represents one of the few times in his professional life when Wald has been wrong.' Since that date, to the best of my knowledge, no leading scientific journal - *Nature*, *Science*, *Scientific American* and the like - has accepted for publication any article based on the premise that life occurred by chance. Even for the simplest life forms this is now acknowledged to be an impossibility. (See Gerald Schroeder, *The Science of God: the Convergence of Scientific and Biblical Wisdom* [New York, Free Press, 1997], pp. 83-6).

Gone Offshore

The impossibility of life originating by chance on Earth explains why the latest phase in the search for life has moved offshore - to outer space. This is why Sir Fred Hoyle and Chandra Wickramasinghe wrote their book *Evolution from Space* (New York, Simon and Schuster, 1981), seriously suggesting their theory of 'transpermia' - that life originated in outer space and got transported here via comets, meteorites and interplanetary dust. This is why we have the enormous sums of money being spent on the SETI programme, the

Search for Extraterrestrial Intelligence, which former United States senator William Proxmire suggested would be better spent looking for intelligent life in Washington. This is why NASA, the United States National Aeronautic and Space Administration, has been desperately trying to discover signs of life on Mars, and drawing a blank there is now turning its attention to Jupiter's icy moon Europa.

When it comes to the origin of life anything will do, it seems, however implausible, provided it does not invoke divine agency and creativity. Yet according to the measured statement of the opening chapter of the Bible ([Genesis 1:9-13](#)), it was shortly after the emergence of the early Earth that God commanded the land to bring forth the first elementary living organisms - *deshe* or 'green matter', not 'vegetation' as so often translated, but rudimentary unicellular organisms like bacteria and blue-green algae. The origin of life is a mystery, incomprehensible to us and inexplicable to naturalistic science. Life involves such a transcending of the purely material that it requires a creative initiative of God, just as the Bible says.

Life to Order

The Sudden Emergence of Complex Life

(Genesis 1:20-25)

The gradual emergence of complex life-forms, central to the theory of evolution by natural selection, is called in question by the discovery that complex organisms arose with un-Darwinian suddenness in the Cambrian era, and by the absence of transitional forms in the fossil record. In this address, fifth in a series on 'Beginnings', given at St Albans Presbyterian Church, Palmerston North, New Zealand, on 19 March 2000, Rob Yule shows the growing agreement between the scientific and biblical accounts of the development of complex life on Earth.

Buried Fossils

Charles Walcott loved the Canadian Rockies. High on the Burgess Pass, he could see spectacular mountain scenery falling to the valley floor 1500 metres below. On a combined summer holiday and field trip, he was horse trekking across the shale ridges of eastern British Columbia, in search of fossils that would tell the story of how life-forms originated on Earth.

Using his geologist's hammer, Walcott tapped a multi-layered slab on its edge. The layers fell apart. There, within, was the perfectly preserved imprint of a crustacean, a hard-shelled marine animal. 'This is curious,' he thought to himself. 'This shale is too old to contain a fossil as complex as this. At the start of the Cambrian period, 550 million years ago,' he mused, 'the only life on Earth was the simplest of forms: one-celled bacteria, algae, protozoans, and a few multi-celled soft-bodied worm-like organisms called Ediacarans. There's no way that evolution could have advanced from one-celled protozoans to a crustacean of this complexity in the mere twenty or so million years of the Cambrian era.'

As he worked away, other slabs of shale yielded an abundance of equally fantastic animal fossils. Walcott, always meticulous, recorded their details in his diary. Representatives of every animal phylum, the basic anatomies of all animals alive today, were present among those half-billion-year-old specimens. That he had made a major discovery is obvious from the vast number of fossils he gathered. During the next decade, Walcott collected and transported over sixty thousand of these specimens back to his institution in Washington, D.C.

The fossils from Burgess Pass revealed an extraordinary fact. Eyes and gills, jointed limbs and intestines, sponges, worms, insects and fish, had all appeared simultaneously. There was no sign of a gradual evolution of simple phyla such as sponges into the more complex phyla of worms and then on to other life-forms such as flying insects. From the evidence of these fossils, the dogma of classical Darwinism that animal life had evolved from the simple into the complex, from invertebrates into vertebrates, over a period of one to two hundred million years, was pure fantasy, not empirical fact. These fossils showed complex forms arising quickly and simultaneously, and coexisting side by side.

It was 1909 when Walcott made his discovery. Evolutionary fervour was at its height. German biologist Ernst Haeckel was propounding his view that the Roman Catholic Church promoted superstition and that the German Empire was the highest evolved form of human civilisation. Lenin was in Zurich plotting revolution in his homeland. The scholarly establishment in Europe and America had canonised Darwinian orthodoxy. It would have taken a courageous scientist to have swum against the tide, especially if that scientist was the director of the largest and most prestigious museum organisation of the day.

So Charles Doolittle Walcott, director of the Smithsonian Institution, did little to publicise his find. He printed a modest announcement in the *Smithsonian Miscellanies*, a publication of limited circulation. Then he reburied his fossils, all sixty thousand of them, in the drawers of his Smithsonian laboratory. They lay there for another seventy-five years, buried under the mental sediment of what psychologists now call 'cognitive dissonance' - humanity's inbuilt desire to ignore unpleasant facts. They were not rediscovered until the mid-1980s, by a graduate student at the Smithsonian, Simon Conway Morris. (See Gerald Schroeder, *The Science of God: the Convergence of Scientific and Biblical Wisdom* [New York, Free Press, 1997], pp. 34-9.)

Evolution's Big Bang

The rediscovery of Walcott's fossils has challenged the very concept of evolution. The sudden burst of multi-cellular life that they revealed at the start of the Cambrian era, 550 million years ago, was so dramatic that the *New York Times* (23 April 1991) reported it in its science section under a page wide heading, 'Spectacular Fossils Record Early Riot of Creation', and said the fossils demonstrated 'revolution more than evolution'. *Time* magazine (4 December 1995) featured them in a cover story entitled, 'When Life Exploded: Evolution's Big Bang'. In the light of mounting evidence that the classical concept of evolution is flawed, the prestigious journal *Science* (267 [1995], pp. 1421-2), featured a report entitled 'Did Darwin Get It All Right?' It says, 'the most thorough study of species formation in the fossil record confirms that new species appear with a most un-Darwinian abruptness.'

The rediscovery of the Burgess Shale Fossils has underlined three things: firstly, that animate life began suddenly on Earth; secondly, that the broad phyla or classes of life also appear suddenly, without evolutionary transitions; and thirdly, that a comparison of existing life-forms with their fossil counterparts shows that they have not evolved significantly but are morphologically stable throughout their history.

God's Orders

It is not just in astrophysics, with new discoveries about the origin of the universe, but also in biology, with the study of fossils and DNA, that we are witnessing in our day a growing convergence between science and the Bible, the book of Nature and the book of Scripture. We see this convergence in what science and Scripture tell us about life's structure and life's sequence.

1. Life's structure: ordering the orders

In [Genesis 1](#), God gives orders. He acts, as we would expect from an ancient Middle Eastern document, like an oriental monarch of the time giving orders from his throne, expecting to be obeyed. The phrase, 'And God said', is repeated nine times, followed by the words, 'And it was so', repeated seven times. Each major step in the origin and development of the universe and of life is introduced as a special creative act of God accomplished by his word or command.

Speech is how we convey what is in our minds to someone (a person) or something (a recording machine). By bringing things into existence by speech, God imparts information to what he creates. Through his word or speech (*logos*), God's intelligence or rationality is embedded in the structure of the universe and of living things (cf. [John 1:1-4](#)). [Genesis 1](#) describes ascending levels of ordered complexity. Living beings display increasing levels of information or intelligence, from the less complex to the increasingly complex, the inanimate to the animate, finally reaching the sophistication of human life and intelligence.

These biblical descriptions of embedded information and ordered complexity have been dramatically expanded by the scientific discovery that life is information. The structure of the double helix, and how it 'unzips' to replicate itself, was first identified by Francis Crick and James Watson at Cambridge University in 1953. Since then research on DNA has shown that it is a highly complex information code, an entire library or databank of information - in the case of a human genome bigger than ten *Encyclopaedia Britannicas* - that instructs each cell how play its part in forming a living organism.

Ten times Genesis 1 also tells us that God gave the phyla or classes of organisms the capacity to reproduce 'according to their kinds' (verses [11](#), [12](#), [21](#), [24](#) and [25](#)). Each broad grouping of animals, from the simplest to the most complex, is distinct from every other, but each has the power to replicate itself within the potentiality of its genetic databank. What we might call *micro-evolution* - the power to adapt to the challenge of their environment - is possible for living organisms, because they can draw on all their genetic resources to respond to new or hazardous circumstances. But *macro-evolution* - the ability to change over time from one class or phyla to another - is not possible for living organisms, because what they can become is also limited by the constraints of their genetic endowment.

Most of the founders of the modern disciplines of biology and taxonomy, prior to Darwin's *Origin of Species* (1859), rejected macro-evolution because it did not correspond to what they observed in nature. Swiss-American zoologist Louis Agassiz, Swedish botanist Carl Linnaeus, French palaeontologist Georges Cuvier, British anatomist Richard Owen, and Scottish geologist Charles Lyell all opposed the idea of evolution, not primarily on religious grounds, but because they saw no evidence for the existence of transitional species between major morphological types as required by the theory (Michael Denton, *Evolution: A Theory in Crisis* [Chevy Chase, Maryland, Adler & Adler, 1986], pp. 93-105). Today inter-phylum or trans-phylum development, the crux of classical evolutionary theory, would also seem to be ruled out by the constraints imposed by the finite genetic potentiality of living organisms. The Creator, giving them existence 'according to their kinds', has set typological limits to their range of adaptability.

2. Life's sequence: order of the orders

When we turn to the sequence in which animate life appeared on Earth, we find an even more remarkable agreement between science and Scripture. The opening chapter of the Bible tells us that the very earliest life on Earth, shortly after the appearance of dry land, was in the form of primitive algae ([Genesis 1:11](#)). The Hebrew word used here, *deshe*, is not 'grass' or 'vegetation' as often mistranslated, but 'greenness' (Gerhard Von Rad, *Genesis* [London, SCM Press, 1972], p. 55), referring to 'green matter', the most rudimentary form of vegetative life, single-celled organisms like bacteria and blue-green algae.

Science tells us that the Earth formed through meteorite accretion, and only began to cool, some 4.5 billion years ago, as meteorite bombardment abated (Peter Ward and Donald Brownlee, *Rare Earth: Why Complex Life is Uncommon in the Universe* [New York, Copernicus, 2000], pp. 43-54). Liquid water began to appear on Earth, initially through outgassing from the Earth's interior, forming oceans and an initially hot, steamy atmosphere. At this stage Earth was a single landmass or super-continent, 'Pangaea', which later separated to form our present continents. The first tenacious microbial life-forms appear early in this period, around 4 billion years ago (Ward and Brownlee, *op. cit.*, pp. 55-60): single-celled prokaryotic organisms, lacking a cell nucleus and DNA - stromatolites and algae, later protozoans and Ediacarans. This was the time when Earth's dense early atmosphere became transparent, when - according to [Genesis 1:14-19](#) - the sun, moon and stars became visible. The resultant sunshine caused photosynthesis, oxygenating the atmosphere for the first time, making Earth suitable for complex plant and animate life.

When a habitable Earth was ready, the Genesis account then tells us that 'swarms' of animate life appeared, suddenly and prolifically ([Genesis 1:20-21](#)). The use of the Hebrew verb *sharats*, 'to swarm' or 'teem', underlines the capacity of primitive life-forms to multiply or increase rapidly, explaining their proliferation in what is now described as the 'Cambrian Explosion' of complex organisms. The succession of animal life described in Genesis 1 begins with soft-bodied marine animals (*sherets*) that teem in lakes and waterways, and winged creatures that hover above them (the Hebrew is not *tsipporim*, 'birds', but *hoaphim*, 'winged insects'). Special reference is made to God creating *tanninim*, 'sea monsters', referring to large marine and river animals, including reptiles and perhaps the now extinct dinosaurs. Then come land animals, mammals and last of all, as a special creation, humans.

Science agrees with the biblical sequence. Scientists now tell us that much later than prokaryotic life, and very suddenly, 550 million years ago in the Cambrian Period, appear the first eukaryotic life-forms, containing a cell nucleus and DNA (Ward and Brownlee, *op. cit.*, pp. 125-56). It appears to be the presence of DNA that accounts for the sudden explosion of life-forms. First come multi-cellular organisms: soft-bodied, invertebrate, aquatic animals, living in the oceans. 150 million years later appear, simultaneously, the first vertebrates, backboneed fish, and soon after, flying above the swamps and lakes, myriads of winged insects, some with 30 centimetre wing spans. Then, another 100 million years later, amphibians, capable of living in water or on land. Another 70 million years later appear land reptiles, with scales, and the great dinosaurs. Later still, some 200 million years ago, appear mammals, suckling their young. 40 million years after appear the apes, walking on all fours and swinging on all five. Last of all appear humans, walking upright (except when drunk) and swinging to music.

Fossils, Frauds, and Falsification

For a hundred and forty years since Darwin evolutionists have tried to find evidence of intermediate forms between these successive orders of life. Hundreds of thousands more fossils have been found since his day, but the lack of transitional forms becomes increasingly apparent. Fossils discoveries are not bridging gaps between phyla, only adding to our knowledge of them. It is this paucity of links which has led to sophisticated hoaxes like Piltdown Man, a supposed link between apes and humans, or Archaeopteryx, a transitional form between reptiles and birds.

Archaeopteryx was long a puzzle to zoologists, because the flying reptile was obviously a reptile, but its feathers were like those of modern birds. It was leading Cambridge scientist, Sir Fred Hoyle, who solved the riddle of Archaeopteryx. He examined the fossil under a microscope, and discovered that birds' feathers had been stuck on with glue. So Archaeopteryx, prime exhibit of the British Natural History Museum, joins a long list of evolutionist frauds. There is no evidence in the fossil record of scales forming into feathers, or of reptiles evolving into birds. Hoyle, once an ardent atheist, has come to believe in a Creator, and says that his student generation 'was brainwashed into accounting for origins without God.' (Victor Pearce, *Evidence for Truth: Science* [Eagle, Guildford, 1998], pp. 135-6, 120.)

In Chapter 6 of *The Origin of Species* (1859), Charles Darwin dealt with objections to his theory, admitting the lack of 'transitional forms' in the fossil record of his day. He said, 'if my theory be true, numberless intermediate varieties, linking closely all the species of the same group together, must assuredly have existed.' In a genuinely scientific manner he invited empirical confirmation, saying that 'evidence of their former existence could only be found among the fossil remains.' The lack of intermediate forms therefore counts heavily against his theory. One hundred and forty years after the *Origin of Species*, the fossil record more than ever bears witness to the differences between the main orders of animal life, the suddenness with which they appeared, and their continuity throughout subsequent zoological history. Is it not time to admit, for the good of science, that his theory has been falsified?

In God's Image

The Importance of Being Human

(Genesis 1: 26-31)

A seldom-noticed difficulty with the theory that humans evolved from animals is its inability to explain how human beings can do what animals cannot. In this message, sixth in a series on 'Beginnings', Rob Yule, minister of St Albans Presbyterian Church, argues that the irreversible qualitative difference between humans and animals cannot be explained by naturalistic evolution, but is accounted for by divine creation. Given in St Albans on 26 March 2000, Rob's address emphasises the capacity of humans for artistic creativity and abstract thought, and defends the value and responsibility of science.

What Caveman Did

The popular idea of early man, found in countless books, magazines, comics and films, is of a rough, stooped, hairy biped, whose main occupation in life was going around with a club dragging his wife about by the hair and treating women with contempt. His type appears in fiction and psychology, and as an adversary in feminist literature. I have never been able to discover any scientific evidence for his uncouth behaviour, what primitive diaries or prehistoric divorce-reports it is based on. Indeed, it always seemed odd to me that the caveman when courting should have behaved in a more brutal manner than the brutes from which he was supposedly evolved. His courtship practices seem thoroughly regressive compared with the mating rituals and dances we observe in birds and animals.

The fact is, as Christian apologist G. K. Chesterton once pointed out, that 'people have been interested in everything about the caveman except what he did in the cave.' (*The Everlasting Man*, [London, Hodder & Stoughton, 1925], p. 25). It so happens that we do have some evidence of the real caveman and his cave, as opposed to the fictional caveman and his club. In 1940, in the Dordogne region of France, four boys searching for a dog found a mysterious and magnificent cave, with a main cavern and several steep galleries. What they discovered, in its deep recesses, was not a gory club with matted blood, not the scattered bones of hapless victims, not rows of female skulls on a ledge all cracked in like eggs. What they found were drawings and paintings of animals - paintings by someone who was a consummate craftsman and an artist.

The paintings were done on a light background, executed with bold black outline filled in with various shades of yellow, red or brown, shading off towards the underparts of the animals depicted. They include red deer, horses, the head and necks of several stags, which appear to be swimming across a river, and, most wonderful of all, three huge aurochs (now extinct long-horned wild oxen), their horns portrayed in twisted perspective. The artist was obviously someone who found great delight in observing animals. His technique is excellent, attempting difficult things like the motion of a stag when he swings his head around toward his tail. His palette shows a mastery of pigments: natural oxides of iron and manganese supplied hues of red and black; iron carbonate gave yellow; manganese oxides provided dark-brown and blue-black.

This, then, is hard evidence of what the real caveman did. The cave paintings of Lascaux - like those in the Sahara which featured in the film *The English Patient* - provide a true portrait of young man as an artist. They call in question the whole evolutionary theory of human origins. When you actually look at the cave, you see something grand and unique; something so obvious you would have to be blinded by a preconceived notion to miss it. The caveman was close to animals. He knew them and observed them intimately. But he is qualitatively different from the animals. There is no animal depicted on those walls that could exchange places with the caveman; no animal anywhere that could observe the conduct of human beings, descend into the depths of a cave, make light, mix pigments, and draw sketches from memory of those strange upright bipeds it had seen on the surface. Animals are magnificent. But not one of them is an artist. The caveman could draw, but the aurochs and the stag could not.

What Animals Cannot Do

The qualitative difference between animals and humans cannot be accounted for by naturalistic evolution, the theory that humans have evolved, over time, from the higher primates. Indeed, if anything, evolutionary theory makes the artistic feats of which early man was capable appear even more inexplicable, the oddity of human beings still more odd. For if the theory of evolution is correct, and the caveman was really as much an animal as the animals depicted on his cave-wall, then it is all the more remarkable that he could do what none of them could do, and create such stunning works of art. If humans are only animals, and came only from animals, the riddle of their creativity is truly inexplicable. If early man 'was an ordinary product of biological growth, like any other beast or bird,' says Chesterton in his discussion of human origins, 'then it is all the more extraordinary that he is not the least like any other beast or bird. He seems rather more supernatural as a natural product than as a supernatural one.' (*op. cit.*, p. 33).

It is worth reflecting on what animals can and cannot do. A number of experiments have been carried out to train chimpanzees and gorillas to use elementary tools and rudimentary sign language. For ten years in the 1970s a lovable gorilla named Koko was trained by Stanford psychologist Francine Patterson to recognise some six hundred symbols of American Sign Language. She was credited with such speech acts as bantering, cursing, arguing with her trainers, pretending to smoke a stick, lying about poking holes in the screen mesh of her trailer home, holding pretend tea parties, reacting to childhood stories such as 'The Three Little Kittens Who Lost Their Mittens' and other kinds of humour.

The achievements of Koko and other chimps have been evaluated by linguists. Firstly, Koko tended to forget her words quickly and like a fourth-rate actor had to be prompted frequently about words she was already supposed to have learnt. Secondly, and more fundamentally, while apes can be trained to associate a surprisingly large number of actions with sign language gestures or keyboard keystrokes, showing that they are intelligent animals, they are not able to use abstract representations or enter the distinctively human realm of abstract thought. Trained apes cannot ask questions. They cannot distinguish the simplest elements of sentence structure such as nouns and verbs, as normal infants and young children do when learning their first language. Apes cannot practise what linguists call 'recursion', which is the ability to comment on a comment or talk about what has been talked about - the basis of both story-telling and analytic thought. (John W. Oller and John L. Omdahl, 'Origin of the Human Language Capacity: In Whose Image?', in J. P. Moreland, ed., *The Creation Hypothesis: Scientific Evidence for an Intelligent Designer* [Downers Grove, Illinois, Inter Varsity Press, 1994], pp. 257-65).

No one denies that a human being is an animal. But a human being is a qualitatively different kind of animal. The qualitative difference between humans and even the most advanced animals can be seen if we were to do an Einsteinian thought experiment and reverse the relationship. We simply cannot imagine Koko the gorilla setting up a research project to train a Stanford University psychologist to learn the communication skills of apes. Not even the most advanced apes and chimpanzees shows a capacity to be a craftsman, a hobbyist, an abstract thinker, a research scientist, an artist - in short, to be a creator - as our friend the caveman undoubtedly was.

What a Consummate Artist Did

The qualitative difference between animals and humans cannot be accounted for by the theory of naturalistic evolution. But it is exactly accounted for by the biblical record of divine creation, as described in [Genesis 1: 26-31](#). The Bible recognises humanity's closeness to the animals, for it depicts humans as being created in close juxtaposition with them on the sixth day. But the Genesis account clearly differentiates man from the animals, in four instructive features of the very precise language of this passage:

1. The use of the word 'create'

The Hebrew word 'to create' (*bara*) is used sparingly in the creation account in [Genesis 1](#). *Bara* is the only available Hebrew word to mean create out of nothing, to bring into existence something quite unique and unparalleled that did not exist before. It occurs here three times. It is first used in [Verse 1](#), of the creation of the inanimate universe or of matter. It is used a second time in [Verse 21](#), when animate life first emerges. And it is used a third time in [Verse 27](#), when human beings come into existence.

Each of these occurrences of the word is significant, because it corresponds to the three critical transitions in cosmic development that the theory of naturalistic evolution cannot explain. The first is the transition from nothing to something, explaining how the universe exists at all. The second is the transition from non-living matter to living organisms, explaining the miracle of life. The third is the transition from the biological to the human, explaining the mystery of human creativity, intelligence and spiritual awareness.

These three levels of existence can be called the physical, the biological, and the anthropological. They correspond to what evolutionist Sir Julian Huxley described as the three phases of the evolutionary process: the inorganic, the organic, and the human cultural or psycho-social ('The Human Animal', in *The Humanist Frame* [London, Allen & Unwin, 1961], p. 72). But a process of evolutionary development following the course of natural processes cannot account for the quantum transitions that take place between the phases. Only a special act of God's creation can adequately account for the jump from one level to the next: that there is something and not nothing, that life began so suddenly in the Cambrian era, and that humans are so uniquely creative in relation to the animals.

2. The reference to God's 'image'

The second element that differentiates humans from animals is the fact that God created us in his own image ([Genesis 1:26 & 27](#)). By our physical constitution we are related to the material universe and the animals. But there is an additional dimension to human existence that the Bible describes as God's image, which distinguishes us from everything else in the universe and relates us to the Creator who made us. The Bible, with one exception which I will describe shortly, does not define what the image of God is. This is because the image of God is the totality of what makes us human.

The image of God includes our intelligence, our ability to think, reason and communicate. It includes our moral conscience, spiritual awareness and artistic creativity, as already mentioned. Above all it includes our freedom, that great but dreadful capacity to transcend our nature, reshape our nature and, misused, deface and destroy our nature. It is because of the image of God in us that we feel strangers in the very universe which is our home. It is this, as Augustine said at the beginning of his *Confessions*, which makes our hearts restless till they find rest in the one who made us.

3. The presence of the plural number

A third sign in the Genesis text of the difference between humans and animals is the instructive use of the plural in verses 26 and 27. According to Genesis 1, as we have seen, God brought into existence the sub-human orders of creation simply by issuing commands. But before creating human beings God is represented as having a conversation with himself: 'Let *us* make man in *our* image, in *our* likeness.' Then, when God has carried through his intention and brought human beings into existence, we read: 'So God created man in his own image, in the image of God he created him; male and female he created *them*.'

This implies that there is a relationality in God which is hidden from the rest of creation but is replicated in the structure of our humanness by virtue of our being created in God's image. Genesis 1, in the highest evaluation of human gender and sexuality in world literature, says that the relationship of male and female in our humanity corresponds to the relationship of persons in the Godhead. Far from dragging women around by their hair and asserting his dominance with a club, what we could truly call 'sensitive early New Age man' experienced under God a perfectly nuanced partnership of male and female, masculine and feminine.

4. The content of God's blessing

The fourth sign of humanity's difference from the animals is the content of God's blessing, which consists in their being given dominion over the animals. 'God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground.' ([Genesis 1:28](#)). This is not unlimited authority over the earth, still less a license to abuse it. It is a delegated authority, under God, within God-given limits.

It is fashionable to censure the Judaeo-Christian world view for our modern environmental crisis (Lynn White, 'The Historical Roots of Our Ecologic Crisis,' *Science*, 155, [1967], pp. 1203-7). It would be more correct to blame it on the rejection of the biblical world view by the European Enlightenment, with the imperialistic and exploitative

attitudes to nature that it spawned. It is not belief in God and respect for God-given authority that has caused today's ecological crisis, but rejection of God and of God-given restraints. One need only contrast the polluted, ravaged, landscapes that emerged from the collapse of Communism, with the exquisite landscapes of medieval Christian Europe, reflecting sustainable agriculture, a partnership of humans with their environment, and landscape elevated to an art-form, to see the striking difference of values.

God is Creator *of* the universe; but he has made man creator *in* the universe. This explains why humans can domesticate animals, run safari parks, teach apes American Sign Language, save whales, rescue kiwis and kakapo, breed livestock, improve crops, make wines, cook meals, transmit radio signals, split atoms, shine lasers, make tiny electronic switches in slivers of silicon. God now rests ([Genesis 2:1-3](#)). But creation does not stop, because the Creator has made one creature, alone among all other creatures, to be creative in his image. To these creatures, and to them alone, has been given the unimaginably high calling of developing the universe for God and representing the universe to God.

We humans are unique, the only place in the universe where the universe becomes aware of itself and intelligible to itself. We dwell at once within the universe and beyond it. We embody the universe in ourselves and mediate the universe to God. Like a tensile concrete arch we link the vast galactic macrocosm beyond with the minute genetic microcosm within. Like a towering suspension bridge we span the void between the space-time universe and a supra-temporal Creator.

We do not know whether the cave man wove rushes or wore makeup, whether he climbed trees, built pole huts, or crossed rivers in tiny coracles. We don't even know if he lived in his cave, or just used it as a studio or gallery. But we do know that he was human, because we know that he was an artist. His magnificent cave paintings are testimony to something absolute and unique, the property of a human being and nothing else, a difference in kind and not a mere difference of degree. An ape cannot draw like this. As Chesterton said, 'A line of some kind has been crossed before the first faint line can begin.' (*op. cit.*, p. 45). Before a creative artist drew animals, a Consummate Artist had drawn him.

In God's Time

The Time-Scale of Creation

(Genesis 2:1-4)

Both evolutionists and Young Earth Creationists have problems with a fifteen billion year age for the universe - the former because it is too short, the latter because it is too long. In this address, seventh in a series on 'Beginnings', given at St Albans Presbyterian Church, Palmerston North, New Zealand, on 30 April 2000, Rob Yule discusses the time-scale of origins, argues on biblical grounds that the days of Genesis are long time periods, and urges greater cooperation between scientists and biblical scholars.

Evolutionists and Young Earth Creationists both have problems with the current scientific consensus that the age of the universe is some fifteen and a half billion years, derived by the following means:

| The Observed Age of the Universe | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Expansion rate of universe | 15.3 ± 1.6 billion years |
| Burning and formation times of oldest stars | 15.1 ± 1.6 billion years |
| Decay of radiometric elements | 16.0 ± 4.0 billion years |
| Mean age | 15.5 ± 2.4 billion years |
| From Hugh Ross, 'Big Bang Model Refined by Fire,' in William A. Dembski, ed., <i>Mere Creation: Science, Faith and Intelligent Design</i> (Downers Grove, Illinois, InterVarsity Press, 1998), p. 368. | |

For supporters of evolution, the time scale is far too short for complex life to have arisen by natural means. For defenders of a young Earth, the time scale is far too long for their claim that a literal reading of the opening chapter of Genesis requires six 24-hour days. Examining the time question is therefore unlikely to win me friends,

but critically important to address if I am to establish my thesis about the remarkable convergence of the scientific and biblical worldviews in our day.

The Goal of Creation

The Bible tells us that God has 'ceased' or 'desisted' (*shabat*) from creative work ([Genesis 2:2-3](#)). This can be compared to [Exodus 31:17](#), which says that 'on the seventh day [God] *ceased working* and was *refreshed* [literally, 'took breath']. Every artist likes to enjoy their masterpiece. Like a landscape-gardener who has finished laying out the grounds, God paused to savour the view, and declared it 'very good'. After Day Six, there is no reference to God creating. There is no ongoing 'continuous creation.' If God has stopped creating, does that mean creation has stopped? No, God has made us creators in his image ([Genesis 1:26-27](#)). He has entrusted us with the ongoing responsibility for managing the universe and being creative ourselves ([Genesis 1:28-30](#)). That is why God invites us to 'enter his rest' - so that we will not become workaholics, enslaved to toil (as the Hebrew slaves were in Egypt before the Exodus from Egypt and the institution of the Sabbath). That is why we need a regular Sabbath rest, so that we can be refreshed and not grow exhausted in our work. We also need a Sabbath so that we do not do our work independently of God - the chief pitfall of secular culture - but out of a life lived in relation to God: inspired, guided and kept accountable by frequent renewal of our companionship with God.

The seventh day is not an appendix, tacked on to the other six days but unrelated to them. Rather, it is an intrinsic part of the whole sequence. The seventh day is the goal of all the other days. The purpose of our life is not work and drudgery, but recreation - enjoyment of creation and its Creator. 'Man's chief end is to glorify God and enjoy him for ever' (Westminster *Shorter Catechism*, 1). The Sabbath is an invitation to enjoy 'God's time.' The Bible has two words for time. '*Chronos*' is 'clock-time', the workaday week, which often drags. '*Kairos*' is 'high time', the rest-day celebration, which always goes too fast.

The Sabbath completes God's creation. All the other days lead up to this. It is the goal of the creation week, what God had in mind when he began his creative work. The structure of creation days indicates that a teleological, goal-oriented process was at work in the universe from its inception. Confirmation of this has come from modern scientific discovery, which has provided abundant evidence of the Anthropic Principle - that the universe has been finely-tuned from the beginning to provide a habitat for human life. God has designed the entire universe with human life and enjoyment in view.

The Revelation of Creation

Several times in this series I have remarked that the content of Genesis 1, a pre-scientific account of creation, contains insights that anticipate modern scientific discoveries with remarkable exactness. The opening of the Bible includes information about the universe that could not have been known by human observation or deduction, especially when compared with other cosmologies from the ancient world. Examples are the fact that the universe had a beginning, that light could not shine until the early universe had cooled, that light came before the origin of the sun and stars, that animate life forms appeared suddenly fully formed, and that the sequence of creation corresponds to the order established by science. These insights were so in advance of their time that they could not have been dreamed up; they must have been divinely revealed.

Do we have any clues how or where this information could have been revealed? I believe we do. The time sequence of Genesis 1 is a seven day week. Do we know when the seven day week entered history? Yes - it was during the giving of the Ten Commandments, in the great forty-day theophany or appearance of God to Moses on Mount Sinai, after the exodus of the Hebrews from Egypt ([Exodus 19:1-20:21](#)). The fourth commandment concerns keeping one day of rest in seven, because 'in six days the Lord made heaven and earth, the sea, and all that is in them, but rested on the seventh day' ([Exodus 20:11](#)). The instructions regarding Sabbath observance are also repeated, just before the account of the Sinai theophany ends ([Exodus 31:12-18](#)). Does this not provide the obvious context for the revelation of the six days of creation to human beings? It was an unparalleled revelation of God's glory, when the Lord spoke personally to Moses, 'face to face' as to a friend ([Exodus 33:11](#)). It is the only extended occasion suitable for conveying to Moses the extraordinary information

contained in Genesis 1 - with its precise language, orderly creation sequence, and remarkable anticipations of modern scientific knowledge. It fits with the tradition that Moses wrote - or at least compiled from earlier sources - the Pentateuch, the first five books of the Bible. And its telltale signature is the time sequence of the seven day week.

The theory of a divine origin is consistent with the fact that the frame of reference of [Genesis 1](#) is God's viewpoint, the perspective of the Creator. This differs markedly from [Genesis 2](#) and [3](#), which is from a human viewpoint. [Genesis 2](#) deals only with realities near to human experience - the land, its geography and horticulture, the animals, the companionship of men and women - all looked at from a human standpoint, within the horizon of human life. 'In chapter 1 man is the pinnacle of a pyramid, in chapter 2 the centre of a circle.' (Benno Jacob, quoted by Gerhard Von Rad, *Genesis* [London, SCM Press, 1972], p. 77). In contrast Genesis 1 takes a magisterial view, looking at the entire creation systematically and synoptically, progressing teleologically towards its goal.

The Riddle of Creation

In the text of Genesis 1 the first three days come before the formation (or appearance) of the sun and moon on the fourth day. This means that the first three days cannot be twenty four hour solar days marked out by sunrise and sunset. It suggests that the narrative, like a puzzle inviting a solution, challenges us to find other chronological clues to the time-frame of creation elsewhere in the text, and in the structure of the created world itself. It appears that the Creator has set a profound riddle in both nature and in Scripture, challenging biblical scholars and scientists alike to work together to unlock it.

Like an encrypted message that cannot be solved without the key to the code, both science and Scripture are needed to explain the riddle of the universe. It cannot be unlocked by science or theology on their own. Only when nature and Scripture are studied cooperatively can this riddle be solved. Unilateral approaches, using a single source of knowledge, will not find it. Naturalistic science, trying to explain reality without reference to a Creator or a transcendent mind, cannot account for the evidence for design or purpose which is everywhere apparent in the universe, so emptying human life of meaning and significance. Conversely, single source approaches to revelation, employed by both Barthians and fundamentalists, devalue God's revelation through nature and accept the Bible as the only valid source of information. This removes Christian belief from its factual footing in the empirical world of nature and history where it can be examined by scientific and historical study, thus depriving people of evidences for faith (Hugh Ross, *The Fingerprint of God*, 2nd. ed. [Orange, California, Promise Publishing, 1991], p. 164).

The Days of Creation

To claim that 24 hour days are meant in Genesis 1, is actually to go against the time indications given in the text itself. The Hebrew word for 'day', *yom*, like our word 'day', is used variously of different time periods depending on the context. This is so even within the Genesis narrative itself. [Genesis 2:4](#) summarises the entire sweep of God's work of creation, all six days, with the words, obscured in many translations, 'These are the *generations* of the heavens and of the earth when they were created, *in the day* that the Lord God made the earth and the heavens.'

'Day' here refers to the whole period of creation. The Hebrew term 'generations' (*toledoth*) also refers to a long time period. It is used in biblical genealogies, and as an editorial marker throughout Genesis, to mean an 'account of a man and his descendants' or 'successive generations of families'. In this passage it means an 'account of heaven and earth and that which proceeded from them' (Brown, Driver, and Briggs, *Hebrew and English Lexicon*, p. 410). Clearly an extended time period is indicated, analogous to the unfolding of human generations, certainly not anything as short as a week.

If, as I believe, Moses was the person to who Genesis 1 was revealed, then his reference to God's time scale, in the Prayer of Moses, offers important guidance on this question ([Psalm 90:1-4](#)):

Lord, you have been our dwelling-place
throughout all generations.
Before the mountains were born
or you brought forth the earth and the world,
from everlasting to everlasting you are God,
You turn people back to dust,
saying, 'Return to dust, you mortals.'
*For a thousand years in your sight
are like a day* that has just gone by,
or like a watch in the night.

Peter is probably alluding to this Psalm when he says, 'with the Lord a day is like a thousand years, and a thousand years are like a day' ([2 Peter 3:8](#)).
Most decisive, but often overlooked, is the fact that the seventh day is not closed off in the text. The formula, 'And there was evening, and there was morning, day x', which marks the close of each of the previous six days, is absent from the text in the case of the seventh day. This would suggest that while the first six days had a beginning and an ending, the 'rest' of the seventh day continues throughout all subsequent history. That is why elsewhere in the Bible the possibility of entering God's rest is still open ([Hebrews 4:1,6,9,11](#), cf. [Psalm 95:11](#)). God's Sabbath rest on the seventh day will not end until he creates the 'new heaven and new earth' envisioned in the prophecies of Isaiah ([Isaiah \(65:17, 66:22-23\)](#)) and [Revelation \(21:1\)](#), on what Eastern Orthodoxy calls 'the eighth day', the resolution of the creation octave.

Given that the structure of Genesis 1 is based on a sequence of creation days, if the seventh day is an extended length of time, it suggests that the other days are too. Since the seventh day is the only part of the sequence of creation days which we have direct experience of, its use to describe an extended period of time would suggest that it is a defining chronological clue as to how the other days of creation are to be understood.

Evidence for Design

The Complexity and Fine-Tuning of the Universe

(Isaiah 40:12-15, 21-23, 25-26)

It is widely assumed that the origin of the universe and life can be explained by random natural processes. But randomness can only account for loss of order and information, not for the existence of order and information in the first place. In this address, eighth in a series on 'Beginnings', given at St Albans Presbyterian Church, Palmerston North, New Zealand, on 7 May 2000, Rob Yule argues that the high information content and fine-tunedness of the universe are inexplicable without a supremely intelligent Creator as their cause.

A majestic passage in the prophecy of Isaiah has the Creator of the universe challenging his creatures, questioning them about his superior wisdom and power:

Who has measured the waters in the hollow of his hand
or with the breadth of his hand marked off the heavens? . . .
Who has understood the mind of the Lord,
or instructed him as his counsellor? . . .
Who was it that taught him knowledge,
or showed him the path of understanding?

(Isaiah 40:12-14)

We could paraphrase, 'Who set the universe's parameters? Who instructed God, taught him knowledge, gave him information?' God is not simply challenging us about his power, his superior ability. He is drawing attention to his wisdom, his superior intelligence. How vastly superior to ours is only today being fully appreciated, as modern scientific discoveries reveal the astonishing complexity of the universe and of living organisms.

This complexity can be best brought out by asking further questions. What is intelligent design? How would we recognise if it was present in the universe? These are fundamental philosophical questions, widely ignored till recently, but now emerging as a leading area of contemporary inquiry, and promising a new partnership between science and theology.

How do we Detect Intelligent Design?

The issue of what constitutes intelligent design was first raised by the SETI programme, the Search for Extraterrestrial Intelligence. Scanning the heavens with the 305 meter-wide radio telescope at Arecibo in Puerto Rico, NASA's High Resolution Microwave Survey can survey more than eight million radio channels for possible intelligible signals from space. In 1992, the United States Congress assigned US\$100 million for this project - money Senator William Proxmire suggested would be better spent searching for intelligent life in Washington!

SETI's radio receivers and computers are programmed to intercept messages if they contain prime numbers. The assumption is that reception of prime numbers would constitute evidence of intelligent communication - as opposed to random or naturally-occurring noise, such as the Cosmic Microwave Background radiation or radio emissions from pulsars. So far, no such messages have been found. 'It would be nice if they sent something obvious, like the digits of pi', a woman scientist on the programme remarked wistfully to the *National Geographic*, in an issue which showed a photo of a bored technician yawning in front of a computer screen (January 1994, p. 39).

There is a paradox in this. If such a simple deviation from randomness as the occurrence of prime numbers would satisfy SETI scientists that extraterrestrial life exists in the universe, why should not far greater evidence of complexity and intelligent design be allowed to constitute evidence for the existence of a Creator of the universe?

What Does Chance Explain?

Contrary to the common assumption of naturalistic evolution, chance cannot explain order. Chance can account for randomness and disorder. But order always points to the involvement of a purposeful and intelligent mind or personal agent who arranged the order in the first place.

The great philosopher of science, Michael Polanyi, describes seeing a railway station pebble garden on the English-Welsh border reading 'WELCOME TO WALES BY BRITISH RAILWAYS'. Such a sign indicates the initiative of a thoughtful and friendly border station master. Chance or randomness could only explain the disarrangement and loss of order if the pebble garden ceased to be cared for. 'Randomness alone cannot produce a significant pattern', says Polanyi. It cannot explain how that order got there in the first place. (*Personal Knowledge* [London, Routledge, 1962], pp. 33-40).

A little reflection will show that this disqualifies naturalistic evolution as an explanation of the origin of an ordered system. Undirected, purposeless, random processes cannot account for the high information content and evidence of order we find in our universe as a whole and in even the simplest living organisms. Empirical confirmation of this comes from the observation that naturally occurring mutations in living organisms are only regressive not progressive, leading to loss of form or function, not to the initial achievement of form or function. Chance can explain loss of order or information, but only intelligent design can explain how that order or information came to be there in the first place.

What Counts as Intelligent Design?

Intelligent Design (ID) is a significant new educational and cultural movement, based on modern information theory, that is seeking to reinstate the category of intelligent design in science and philosophy. Its leader is William Dembski, who defines intelligent design as 'specified complexity.'

Briefly, intelligent design infers that an intelligent cause is responsible for an effect if the effect is both *complex* and *specified*. A single letter of the alphabet is specified without being complex. A long sentence of random letters is complex without being specified. A Shakespearian sonnet is both complex and specified. We infer design by identifying *specified complexity*. (*Intelligent Design: the Bridge between Science and Theology* [Downers Grove, Illinois, InterVarsity Press, 1999], p. 47).

Something specified without being complex, like the letter Y, might occur randomly in nature (a forked twig, for example), or be an accident of nature (three twigs fallen in a pattern). Something complex but unspecified (like the following string of random letters) could be the doodling of an infant on a computer keyboard (TYBRLOEURE). But those same ten letters ordered by intelligent design reflect both specificity and complexity:

ROBERTYULE

Specified complexity - or as Dembski calls it, *complex specified information* (CSI) - is how we detect design in everyday life. The sixteen digit number on our VISA cards is an example of CSI. The complexity of this number ensures that a would-be thief cannot randomly pick a number and access your VISA account. Our telephone number, Inland Revenue number, car registration number, driver's licence number, all represent CSI. As Dembski says, 'CSI makes the world go round.' (*Intelligent Design*, pp. 159-60).

Specified complexity offers a new approach for scientists to distinguish design and intentionality from chance and randomness in the universe and living organisms. It enables the setting of a probability threshold beyond which chance is not acceptable as an explanation. The French mathematician Emile Borel proposed 10^{-50} as a universal probability bound below which chance could definitely be precluded. (*Probabilities and Life* [New York,

Dover, 1962], p. 28). That represents 166 bits of computer information. Dembski himself prefers a more stringent universal probability bound of 10^{-150} , based on the number of elementary particles in the universe, the duration of the universe until its heat death, and Planck time (*Intelligent Design*, p. 166). This translates to 500 bits of information. Anything beyond that threshold cannot reasonably be attributed to chance.

How Do Complex Systems Evolve?

A major difficulty for evolutionary theory is that it requires the slow, piece by piece, acquiring of morphological changes for systems that cannot work unless all of the component parts are assembled together as a whole. These are what biochemist Michael Behe calls 'irreducibly complex systems', systems displaying *irreducible complexity*. Behe illustrates this with reference to a simple domestic mousetrap, comprising five fundamental parts - the platform or base, the spring, the hammer, the catch or bait holder, and the holding bar. Each of these parts must have what he calls 'minimal function', the physical strength or characteristics to accomplish the task. And every one of these five parts must be present for the mousetrap to work. It cannot be assembled as a functional piece of equipment just one part at a time. (*Darwin's Black Box: the Biochemical Challenge to Evolution* [New York, Simon & Schuster, 1996], pp. 39-46).

Examples of irreducible complexity in living organisms are the major functional organs of birds or animals, such as wings or eyes, which have been widely discussed in evolutionary literature. An even more astounding example of irreducible complexity is the DNA in the cell nucleus. Many functions must happen simultaneously and harmoniously, not piecemeal bit by bit, if cell function is to occur normally. A dozen sophisticated proteins are needed to prise apart the two strands of DNA, to align the copying machinery at the right place, to stitch the nucleotides together into a string, to insert the copy back into the DNA, and much much more.

One of the most surprising examples of irreducible complexity discovered in recent years by microbiologists is the propulsion system of some bacteria. We are inclined to think of bacteria as simple organisms. In 1973 it was discovered that some bacteria swim by rotating their flagellum - a long, hair-like filament embedded in the cell membrane, which spins like the propeller of a reversible inboard motor. Studies using electron microscopes have discovered that the motor has similar elements to man-made electric motors: a rotor (a rotating part) and a stator (the stationary component). Michael Behe says the flagellum motor was a 'startling, unexpected discovery'. A good example of an irreducibly complex system, it has been the subject of thousands of papers since its discovery, but not a single scientist has ever published an explanation of how such an elaborate molecular machine might have evolved (*Darwin's Black Box*, pp. 70-73).

To explain the origin of this organism by Darwinian evolution, from a bacterium without a flagellum, beggars the mind. The flagellum requires more than forty proteins, each necessary for it to function. How can chance modifications generate all forty proteins, and selection preserve them, in the space of just one generation? Moreover, as Dembski points out (*Intelligent Design*, p. 178), the complex specified information of a flagellum far exceeds 500 bits, well beyond what might be explained by reference to chance and random processes. In Chapter 6 of *The Origin of Species*, discussing 'Organs of Extreme Perfection', Darwin wrote: 'If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.' The humble bacterium flagellum would appear to be just such an instance.

Could Life Exist Elsewhere in the Universe?

Much evidence for the design of the universe has been gathered in the last thirty five years. In the mid nineteen sixties I remember disagreeing with my theology professor, who questioned the value of the argument from design, represented by William Paley's early nineteenth century classic, *Natural Theology* (1802). In dissenting from his view I pointed to the 'freeze-fry factor' - that a small change in Earth's distance from the sun would destroy all life on Earth, freezing if it was further away or evaporating if it was nearer all liquid water without which life cannot exist.

In 1967 when I made that remark, astrobiology did not exist, and very little had been done by scientists to examine the physical parameters within which life can exist. Since then it has become a burgeoning area of scientific research, led paradoxically, by the quest of secular scientists like Frank Drake, Carl Sagan, John Barrow and Frank Tipler to find suitable habitats in the universe where life might have arisen by natural means. Since then more than fifty five parameters have been identified, showing the narrow limits within which life can exist, and providing astonishing evidence of the fine-tunedness of the universe to support life on Earth.

The first parameter to be measured was the universe's expansion rate. If the universe had expanded too rapidly, matter would have dispersed too much to form galaxies. Our Milky Way, solar system, and home planet Earth would not have formed. But if the universe had expanded too slowly, matter would have clumped and entered gravitational collapse before any burning stars could form. Astrophysicist Hugh Ross points out that the universe's expansion rate is so delicately balanced for life to exist that it cannot differ more than one part in 10^{55} from the actual rate (*The Creator and the Cosmos*, 2nd ed. [Colorado Springs, Colorado, NavPress, 1995], p. 116). That is so precise that it has been compared to throwing a dart across the entire universe and hitting the bullseye on a dartboard!

What Are the Odds for Life on Earth?

In their book *Rare Earth: Why Complex Life is Uncommon in the Universe* (New York, Copernicus, 2000), astrobiologists Peter Ward and Donald Brownlee argue that the Moon, the planet Jupiter, the Solar System's position in the Milky Way, and a host of other special conditions make Earth probably the only environment in the universe suitable for human life. 'Almost all the environments in the universe are terrible for life,' Brownlee told the *New York Times*. 'It's only Garden of Eden places like the Earth where it can exist.'

Brownlee and Ward point, for example, to the planet Jupiter (pp. 235-42). Jupiter's orbit is remarkably stable, and nearly circular. Otherwise, our Solar System would be torn apart by Jupiter's massive gravitational forces. Other recently discovered Jupiter-like gas giants elsewhere in the universe have surprised astronomers by exhibiting wildly eccentric or highly elliptical paths. Such orbits would be destructive to any small Earth-sized planets in their path. On the other hand, it is now being realised that Jupiter's immense size protects the Earth. With its great mass, 318 times greater than the Earth's, and resultant massive gravity, Jupiter intercepts comets, meteorites and other inter-stellar material that might otherwise - as in the movie *Armageddon* - collide destructively with our home planet. It seems that Greek mythology was wrong. Jove does not hurl thunderbolts at us; it protects us from them!

Rare Earth has stirred controversy in the scientific community because it challenges the conventional wisdom that the universe is just a product of random natural processes, and that there are plenty of other habitats for life out there. If dozens of conditions - such as the shape of Jupiter's orbit or its mass - need to be precisely specified for human life to exist, might that not be evidence for divine design? Brownlee and Ward are agnostics, but some reviewers are complaining that their view that our planet is unique lends support to theism.

The individual parameters for life are impressive enough, for without any one of them life on Earth would be impossible. Taken cumulatively, they provide overwhelming evidence for divine design, more than satisfying the most rigorous probability bounds. 'The more accurately and extensively astronomers measure the universe,' says Hugh Ross, 'the more finely tuned they discover it to be. . . . the degree of fine-tuning is utterly amazing - far beyond what human endeavours can accomplish.' (*The Creator and the Cosmos*, p. 118).

Ross has calculated the probability of all 55 parameters now known to be necessary for life support occurring simultaneously to be less than one in 10^{69} - 'much less than one chance in one hundred billion trillion trillion trillion' that even one such planet would occur anywhere in the universe ('Big Bang Model Refined by Fire', in William Dembski, ed., *Mere Creation: Science, Faith and Intelligent Design* [Downers Grove, Illinois, InterVarsity Press, 1998], pp. 371-82). Contemporary science thus provides overwhelming evidence that our Earth and universe are the result of supremely intelligent design - far beyond what humans are capable of, just as the prophet Isaiah said.

Christ and Creation

Science and the Bible on the Wonder of Life

(John 1:1-14)

The last fifty years, since the description of the double-helical structure of DNA in 1953, have seen a revolution in understanding the living cell. Yet these discoveries, far from making the Bible seem dated, make its portrayal of the nature of life as an information system even more relevant to understanding why we are here. In this address, ninth in a series on 'Beginnings', given at St Albans Presbyterian Church, Palmerston North, New Zealand, on 21 May 2000, Rob Yule shows the remarkable convergence between the scientific and biblical descriptions of life.

In Goethe's play *Faust*, there is a famous scene where Faust opens the Gospel of John and begins to read. He hesitates at the first sentence, 'In the beginning was the Word' ([John 1:1](#)). Unable to give the Word such a prominent role in creation, he tries alternatives. He rejects 'In the beginning was the Thought,' for thought alone is not creative. He toys with in 'In the beginning was the Power', but hesitates to accord such a role to brute force. Finally, he settles on the translation, 'In the beginning was the deed.'

The Explanation of Life

Deed, or Word? Random development, or intelligent design? Natural processes, or a transcended mind? Which framework offers the right explanation of how we come to be here?

The theory of evolution has appealed for the past century and a half, because it offered a naturalistic explanation for why we are here. It sought to explain the origin of the universe and of living beings without reference to supernatural agency or a transcendent cause. Given time plus chance, it was assumed that natural processes would provide an explanation of how energy formed matter, molecules formed life, and mutations formed human beings. Evolution was the orthodoxy of a secular age.

But the edifice of naturalistic evolution is crumbling. The discovery that the universe had a beginning removes the infinity of time for random processes to cycle through the options necessary to come up with something as complex as life. The discovery that mind-bogglingly complex biochemical systems operate in even the simplest single-celled organisms, effectively renders impossible the hypothesis that life could have originated by undirected random processes. Above all has come the unexpected finding that life is ordered by a sophisticated genetic information code, with an identical structure in all living organisms. It seems after all that we are creatures formed by the Word, not at all the products of a blind and purposeless Deed.

The Book of Life

In the nineteen twenties, life was thought to be a very simple thing. Little was known about the cell. It was thought to be just a blob of undifferentiated protoplasm. Now we know better. The cell is extraordinarily complex. I will try to explain it as simply as I can, but as microbiologist Michael Behe said, 'complexity must be experienced to be appreciated' (*Darwin's Black Box: the Biochemical Challenge to Evolution* [New York, Simon & Schuster, 1996], p. xii).

1. DNA Code

Deoxyribonucleic acid, or *DNA*, is the genetic material which determines the characteristics of an organism by controlling protein synthesis in a cell. It is an information code, rather like the computer code of an enormous software programme, recorded in four nucleic acids (adenine, thymine, guanine and cytosine) which combine in

pairs (A-T, C-G) in the elegant, spiral, ladder-like structure of the double-helix. The code contains the complicated technical instructions to make a living organism, whether a plant, an animal, or a human being.

The genetic code is a triplet code, with three bases (a codon) acting as a code for one amino acid, the subunit of protein. There are sixty four possible triplets of the four bases, and sixty one of these code for an amino acid. GCA, for example, codes for glycine, the structurally simplest amino acid and one of the earliest to be found. The remaining three triplets act as 'punctuation' signals which tell the translation process when to stop translating the coded instructions and halt protein production.

In this code, a gene is like a sentence, a chromosome like a book. Twenty three chromosome books comprise the shelf of instruction manuals needed to specify a human being. Perhaps because of its obstinacy, a donkey needs even more chromosomes than a human being. As in computing, where we keep a backup copy of our operating software, each cell retains a master copy of its DNA in its nucleus. Thus every human cell has 46 chromosome books or two sets of manuals, the equivalent of a million pages or more than ten *Encyclopaedia Britannicas* of instructions.

In computing language, the entire human genome comprises some 3.4 billion letters or bytes of information (Michael D. Lemonick, 'Spelling Out the Book of Life', *Time*, 17 April 2000, p. 55). Even an infinitesimal portion of this far exceeds William Dembski's stringent 500 bit universal probability bound, beyond which it is nonsensical to attribute anything to chance (*Intelligent Design: The Bridge Between Science and Theology* [Downers Grove, InterVarsity Press, 1999], p. 166). The only possible mechanism to account for this complexity in Neo-Darwinism is mutation. But mutations are errors in instructions. How could errors, loss of information, account for the existence of such an information-rich code?

2. Code Decryption

The DNA code needs translation, and in each cell there are some 15,000 sophisticated organelles or intra-cellular machines, called *ribosomes*, which translate the message into a protein. It is difficult to imagine how this could be accounted for by natural processes. How could a natural process produce the original information-rich code, somehow acquire and preserve the means to decode it, and also assemble the translator or decoder? It has taken ten years with some of the world's largest super-computers for Celera Genomics merely to sequence the human genome - sparking the recent frenzy of gene patent applications from biotechnology firms wanting to find the genetic roots of diseases and their cures. Neo-Darwinism is powerless to explain how random chances could cycle through all the possibilities to break the code, remember it, and incorporate it into a functioning parallel decryption system. Only a super-intelligence could possibly account for the existence of such complex information, let alone possess the knowledge necessary to design the cell's system for decrypting or unlocking it.

The problem can be illustrated by a simple code:

THE GENOME IS TOO DARNED COMPLICATED
TO EXPLAIN BY RANDOM MUTATIONS

A secret agent will have a numeric key to decode this message: 4, 7, 15, 20, 26, 31, 39, 51. By using those numbers to pick out the 4th, 7th, 15th . . . letters of the code, as follows:

THE GENOME IS TOO DARNED COMPLICATED
TO EXPLAIN BY RANDOM MUTATIONS

the agent will decrypt the message:

GOD DID IT

We have to explain here the production of the original message, the key to decode it, and the decoded message. We naturally assume that this is not the product of a random natural process, but that an intelligent being who devised the code also devised the means to decode it.

3. Cellular Machinery

In addition to the ribosomes, each cell has some 200 different editor and sub-editor chemical catalysts, called *enzymes*, which trigger the biochemical reactions. But these enzymes are manufactured by the same DNA code which they produce. So how could they have evolved by natural processes?

It is a classic chicken-and-egg situation. They have to exist before they can function. They can only exist if they have been manufactured. But they can only be manufactured by what they produce. The circularity problem of cell enzyme production is a good example of Michael Behe's 'irreducibly complex systems', only they are immensely more complex than his mousetrap, with its five component parts (*Darwin's Black Box*, pp. 39-46). These enzymes, without which no living cell can function, must have been assembled or initiated as whole systems to get them functioning in the first place.

4. Fuel Production

No machinery can work without fuel. The power stations of the cell are the *mitochondria*, which provide the energy for every organelle in the cell, and indeed for all life and movement in every kind of organism. The mitochondria supply fuel in two grades: low and high octane, or ADP and ATP respectively (for adenosine diphosphate and adenosine triphosphate). The supply of these grades is controlled by control switches, to save the ribosome machinery from burning out if they ran on high octane all the time. Each mitochondrion is as complex as an independently-operated and fully-automated oil refinery. It has its own DNA, separate from the cell's master DNA already mentioned. To produce fuel, the raw materials have to go through six successive refining processes.

Mitochondria are also difficult to account for, because of their dependence on their fuel supply. As items of cell machinery, they need fuel to run on. But how did they get their first fuel before they had manufactured a supply? Professor Malcolm Dixon, former head of the Enzyme Biology Department at Cambridge University, in one of the earliest studies of this problem, said that 'It is like trying to build a machine-tool factory without machine tools to build it.' (quoted by Victor Pearce, *Who Was Adam?* [Exeter, Paternoster, 1969], p. 116). Because of this circularity, like enzymes, there is no way of accounting for their existence without a Creator. Mitochondria join the other problematic units of intracellular complexity in resisting the materialist's endeavour to account for the appearance of life by solely naturalistic means.

The Word of Life

These modern discoveries in genetics and microbiology have remarkable anticipations in the Bible:

1. God's Means of Creation

In [Genesis 1](#) God is represented as bringing the universe and life into existence by a series of commands. Speech is God's means of creation. Other biblical passages also link the creation of the universe and the origin of life with God's speech or word (eg. [Psalm 33:6](#) & [9](#), [John 1:1-4](#)).

This corresponds with the discovery by molecular biology and genetics that DNA is a biological code or language, a highly complex information system. Moreover, the discovery that there is only one form of DNA in all living organisms, from the humblest bacteria to the highest humans, is only explicable on the hypothesis of a single rather than a multiple origin of life, and accords with the biblical attribution of all life to a single Creator.

'The common feature of all living organisms is the DNA code,' says Victor Pearce. 'As there is only one language used in it, the instructions must come from one source, and as the instructions for the simplest viable unit of life are complex, that source must be an adequate one with an intelligence equal to that required to invent a computer-automated factory. This code has been added to in the same grammar and vocabulary down - presumably - 4,000 million years, therefore the Being who is the source of that language must be constant and unchanging - not like those who speak human language, for a family of languages will change so much over the centuries that nations of common origin cannot understand one another.' (*Who Was Adam?*, pp. 127-8).

2. God's Book of Humanity

In the Biblical passage which is the *locus classicus* for the origin of human life as the special creation of a personal Creator, the human genome is specifically referred to. [Psalm 139:13-16](#) says:

'For you created my inmost being;
you knit me together in my mother's womb.
I praise you because I am fearfully and wonderfully made
When I was woven together in the depths of the earth,
your eyes saw my unformed body.
All the days ordained for me
were *written in your book*
before one of them came to be.'

Our formation as a unique human being in our mother's womb was encoded beforehand in text form, as in a book. What occurs in the growth of each human individual was 'written before it came to be' - including the timing of the various developmental stages from the womb, through puberty, to the onset of aging. Modern information theory can measure and quantify the amount of information in a system, whether a computer programme or file, or the DNA of a living organism. It takes the entire 3.4 billion byte human genome, the Creator's 'Instruction Book of Humanity', to tell each cell how to make a human being. Truly, we are 'fearfully and wonderfully made.'

3. God's Agent of Redemption

In the passage that confounded Faust, [John 1:1-4](#), we learn that all life owes its existence to the Word (*Logos*), through whom all things were made:

'In the beginning was the Word, and the Word was with God, and the Word was God. He was with God in the beginning. Through him all things were made; without him nothing was made that has been made. In him was life, and that life was the light of all people.'

The Greek term *logos*, here translated 'word', also means 'reason' or 'plan'. John applies it to Jesus Christ, the second person of the Godhead, linking the Hebrew emphasis on God's creation and self-revelation by means of his word, with the Greek understanding of the *logos* as the unifying principle and source of intelligibility in the universe. John views the *Logos* as the cause of all that exists, the origin of all life, and the basis of human consciousness, 'the true light that gives light to everyone' ([John 1:9](#)). Transcending the creation as its Creator, the *Logos* entered his creation and took residence within it, to become its Saviour. The one who was 'with God in the beginning' ([John 1:2](#)) 'came to that which was his own' ([1:11](#)), where he 'became flesh and made his dwelling among us' ([1:14](#)).

Early Christian theology took up the concept of the *logos* to demonstrate the universal significance of Jesus Christ, as the agent of both creation and redemption. Jesus is divine and human; he reveals God the Creator in human form. He is qualified to be the Saviour of all human beings, not merely because of his exemplary human life or moral character, but because he is God's true self-expression in human form. We view him as the Saviour of humanity, not because of any mythological idealising of his significance, but because he *is* the Creator of all humankind, genuinely able to represent each and every human being and atone for our misdeeds.

Athanasius wrote in the early 4th century AD, 'the renewal of creation has been wrought by the self-same Word (*Logos*) who made it in the beginning. There is thus no inconsistency between creation and salvation; for the one Father has employed the same agent for both works, effecting the salvation of the world through the same Word who made it at the first.' (*On the Incarnation*, 1). As we could now say with the benefit of modern genetics, the same Word who encoded the DNA of all life in the beginning by his instruction, became encoded in the DNA of the human Jesus by his incarnation. That is how the Creator of the universe could become its Saviour.

Faith and Science

Their Complementariness and Partnership

(Matthew 22:34-40)

During the last 150 years the relationship between science and Christianity has often been one of conflict and opposition. In this address, the tenth and final one in his series on 'Beginnings', given at St Albans Presbyterian Church, Palmerston North, New Zealand, on 4 June 2000, Rob Yule presents a case for greater cooperation, and critiques tendencies in both science and Christianity that hinder the development of such a partnership.

Loving God with our Mind

Like today, there were conflicts between secularisers and religious hardliners in Jesus' day. Both groups attacked Jesus. Once, when he had just worsted the secularists, the religious saw an opportunity to test his orthodoxy. 'Teacher, which commandment in the law is the greatest?' Jesus replied, quoting the *Shema*, the Jewish credal statement, 'You shall love the Lord your God with all your heart, and with all your soul, and with all your mind.' ([Deuteronomy 6:4-5](#), [Matthew 22:37](#)). In so doing, he affirmed that there is one God, one source of truth in the universe, to be served with a total commitment of both heart and mind.

Today's separation of science and faith is symptomatic of the divorce in our culture between these two elements, faith and reason. In fact, all genuine science - or knowledge of the universe - involves an element of faith. And all genuine theology - or knowledge of God - involves an element of reason. As Jesus recognised, real knowledge of God and the world involves loving God with our mind, as well as our heart and soul.

Rightly interpreted, the book of Nature and the book of Scripture both contribute to our knowledge of the Creator and the universe. But two tendencies hinder the partnership between science and faith needed to understand them:

Scientific Naturalism

1. Extravagant Assertions

Writing recently in *New Scientist* on the conflict between religion and science, Brian Appleyard points out the harm done to science by the grandiose claims of some scientists. Stephen Hawking concludes *A Brief History of Time* with the assertion that science can virtually 'know the mind of God'. Stephen Weinberg ends *The First Three Minutes* by pronouncing the universe 'pointless' and human life 'a little above the level of a farce.' In *The Selfish Gene* Richard Dawkins ridicules religion, and asserts that anyone who denies evolution is either 'ignorant, stupid or insane (or wicked).' (quoted by Michael Behe, *Darwin's Black Box* [New York, Simon & Schuster, 1996], p. 250). John Maddox, former editor of *Nature*, has hinted darkly that 'it may not be long before the practice of religion must be regarded as anti-science.' (*Nature*, 368 [1994], p. 185).

Such assertions undermine science and invite an anti-science backlash. 'These claims adopt the authority of hard science without accepting the humility and uncertainty of true science,' says Appleyard. 'You simply cannot make such large claims in the public realm without attracting a backlash. Attacks on religion, or crude, improperly substantiated claims about the nature of human life will diminish, not increase, the public understanding and acceptance of science.' Appleyard pleads for scientists to exercise greater humility, urging them not to assume 'that a causal explanation of the material realm can be a complete account of the human realm.' (*New Scientist*, 22 April 2000, p. 45).

2. Metaphysical Naturalism

Theoretically science takes no position about the existence or non-existence of the supernatural; it only requires that supernatural factors not be invoked in scientific explanations. The problem comes when this operational naturalism is elevated to the status of a philosophical principle that rules out divine interaction with the universe.

The difference between methodological and metaphysical naturalism is often overlooked. Oxford zoologist Richard Dawkins is a reductionist supremo who claims that 'Darwin made it possible to be an intellectually fulfilled atheist.' Adamant that everything can be explained by the processes of physics and chemistry, he pours scorn on the creationist view of origins, using value-laden language to discredit higher purpose. 'There is no need to think of design, purpose or directedness. . . . There is no mystery. . . . It had to happen by definition.' (*The Selfish Gene* [Oxford, Oxford University Press, 1989], p. 13).

In *The Blind Watchmaker* (London, Norton, 1986, p. 159), Dawkins tells his readers that even if a statue of the Virgin Mary waved to them, they should not conclude that they had witnessed a miracle. Perhaps all the atoms in the statue's arm just happened to move in the same direction simultaneously! Such a phenomenon might not persuade Dawkins to kneel at the altar rail. But my suspicion is that if people did actually witness a religious statue waving to them they would quickly tell him that there are more things in heaven and earth than are dreamt of in his philosophy!

3. Critiquing Reductionism

New Zealand biomechanic Neil Broom has written an incisive critique of Dawkins, accusing him of importing into his argument the very purposiveness his naturalistic theory denies. 'Dawkins, while committed to showing that there is no purpose in nature, that there is no need to consider a nonmaterial force or influence, still resorts to the language of consciousness, intelligence and purpose to argue his case', says Broom. 'Such language seems to betray the reductionist cause Dawkins so powerfully advocates.' (*How Blind is the Watchmaker?* 2nd ed. [Downers Grove, Illinois, InterVarsity Press, 2001], p. 79). Even while denying purpose, Dawkins invokes a more-than-material force to guide the evolutionary process. His colourful language is mere bluster, and establishes nothing about how life actually began.

Recent Creationism

Recent creationism is damaging biblical Christianity just when scientific discovery has raised issues of creation and design more powerfully than at any time in the last two hundred years since the Enlightenment.

1. The Universe an Illusion

Although they would deny it, young-Earth creationists pose a threat to orthodox Christianity and genuine science. Maintaining that the universe is only 10,000 years old - nowhere required by the text of Scripture - they deny the evidence of astronomy. Galaxies cannot be millions or billions of light years from Earth, but must be light beams created in transit, scenes painted by God on the night sky. Even recent but distant events like the enormous supernova explosion in the Large Magellanic Cloud in 1987 must be denied, since its distance from Earth, 80,000 light years, exceeds their stipulated 10,000-year age limit for the universe. Fossils, coal deposits, sedimentary rocks, ice layers, tree rings, and coral banding are merely the appearance of age, a history of cosmic, geological, meteorological or biological events that never actually happened. (See Hugh Ross, *Creation and Time: A Biblical and Scientific Perspective of the Creation-Date Controversy* [Colorado Springs, NavPress, 1994], pp. 122-3).

These denials render the age of the universe a mere illusion. This makes many practising scientists suspicious of genuine creationism. Orthodox Christians should also be concerned, because such beliefs deny the reality of the physical universe and its processes as effectively as modern Christian Science or ancient Gnosticism. They have more in common with the Hindu or Buddhist view that the universe and material existence is *maya*, 'illusion', than with the historic Judaeo-Christian belief in the genuineness and goodness of the created universe.

2. The Creator a Deceiver

By saying that God created the universe with an appearance of age, recent creationism makes God out to be a liar and a deceiver. This is a far more damaging obstacle to faith in God than difficulties posed by the existence of evil and suffering in the world. Christianity has many resources to overcome the problem of evil - evil is the result of the misuse of freedom by human creatures endowed with free-will, suffering is part of character formation in our brief but morally-educative life span on Earth, for example. But there is no theodicy in Christendom capable of defending the integrity and character of a God who deliberately creates a universe with a deceitful appearance of age or an illusion of physical consistency. A God who set out to deceive us would truly be unworthy of our belief and undeserving of our trust.

3. Debate a Charade

Hugh Ross came to belief in God and faith in Jesus Christ through his studies in astronomy and astrophysics. After his conversion he served as pastor of evangelism in an evangelical church, and now heads Reasons to Believe, one of the most effective apologetics organisations in the world today. Yet on his speaking tours he is often confronted by young-Earth creationists who view his belief in an old universe as a betrayal of Christianity.

Ross tells about a speaking engagement near the Oakridge Nuclear Facility in Tennessee (*Creation and Time*, pp. 86-7). With a room full of research physicists, he spoke on evidence from physics and astronomy for the transcendent, personal, caring Creator of the Bible. Unknown to him and the meeting's organisers, a carload of young-universe proponents had driven four-and-a half hours to interrupt the gathering. When question time began they took over, questioning Ross's scientific evidence. They were furious that the scientists in the room would not join them in rejecting Ross's science. Blinded by their views, they disrupted a meeting designed to introduce professional scientists to personal faith in Jesus Christ as Creator and Saviour, all supposedly in the cause of Christian truth. Such behaviour verges on the cultic.

A Better Way

A partnership of Christianity and science offers a better way forward than the twin sterilities of unbelieving science and unthinking Christianity.

1. An Historical Perspective

Historically, Christian belief in the reality and orderliness of the created universe has made an enormous contribution to the growth and advancement of science. For example, the Swiss mathematician Joseph Balmer's desire to reveal 'the Divine orderliness' led him in 1885 to discover the Balmer series of spectral lines emitted by hydrogen, a discovery which is the basis of modern spectroscopy and the study of the chemical and physical properties of the universe (C. A. Coulson, *Science and Christian Belief*, [Oxford, Oxford University press, 1955], p. 59).

A strong personal faith convinced many scientists that a solution was ultimately discoverable, keeping them going despite innumerable difficulties and setbacks. With 1,093 inventions to his credit, Thomas Alva Edison was the greatest inventor of all time. He was sustained through the repeated and seemingly endless failure of his experiments by a belief that God had the answer to his problems. Struggling to find a satisfactory material to make filaments for his now famous electric light bulb, he could say: 'Somewhere in God Almighty's workshop is a dense woody growth, with fibres almost geometrically parallel and with practically no pith, from which we can take the filament the world needs.' (Robert E. D. Clark, *Christian Belief and Science* [London, English Universities Press, 1960], p. 62).

English physicist Michael Faraday believed that God not only made the universe, but made it as a single interconnected whole. It was this conviction that drove his attempts to discover a connection between magnetism and electricity. Time and again he brought wires near to magnets, with no sign of electric current. Then, returning rested from a holiday, seemingly without effort, he made the far-reaching discovery of electromagnetic induction, the basis of modern electric generators and motors (Clark, *op. cit.*, p. 29).

2. An Experimental Contribution

An aspect of scientific progress widely ignored by reductionist science, is that often discoveries have come about not through rational thinking but because of hunches or intuitions more akin to faith.

Carl Friedrich Gauss, one of the greatest mathematicians of all time and pioneer of the application of mathematics to astronomy, tried in vain for four years to solve a mathematical problem. 'At last I succeeded,' he says, 'not by dint of painful effort, but so to speak by the grace of God. As a sudden flash of light the enigma was solved. For my part I am not in a position to point to the thread which joins what I knew previously with what I succeeded in doing. . . . I have my results but I do not yet know how I arrived at them.' (M. Monmasson, *Invention and the Unconscious*, [1931], p. 77, Clark, *op. cit.*, pp. 28-9, cf. Michael Polanyi, *Personal Knowledge* [London, Routledge, 1962], p. 131).

As in the case of Faraday and electromagnetism, these discoveries often come not when consciously working on them, but when taking a break from the problem. Nobel-prizewinning German physiologist Otto Loewi was woken one night by a dream, with a brilliant idea. He scribbled a note and went back to sleep. For the whole of the next day he struggled to decipher his writing, or remember his dream. The following night the same idea came to him. This time he made careful notes, and the following day performed the experiment that first demonstrated the chemical basis for the transmission of nerve impulses (W. B. Cannon, *The Way of an Investigator*, 1945, Clark, *op. cit.*, pp. 30-1).

In 1869, while working on his classic textbook *The Principles of Chemistry*, Russian chemist Dmitry Mendeleev was in a half-awake, half-asleep state when he had a vision of the arrangement of the chemical elements according to their atomic weights or numbers. Thus he invented the periodic table, the foundation of modern chemistry (Clark, *op. cit.*, p. 31).

Many organic chemistry textbooks tell how the German chemist August Kekulé made his two great discoveries on which modern organic chemistry rests - the structure theory and the formula for benzene - the first when he dozed on a bus late one night, the second years later as he dozed by a fireside. In both instances he saw visions of atoms circling before his eyes and was able to watch how they arranged themselves (Clark, *op. cit.*, p. 31).

American inventor Charles Goodyear worked tirelessly to overcome the problem of the stickiness of rubber in hot weather. One night in 1839 he dreamed that a man came and told him to add sulphur. He had tried this before without success, and given up. But now he tried again, mixing sulphur with rubber on a hot stove, and so discovered how to vulcanise rubber (R. W. Lunn, *Industrial and Engineering Chemistry*, 31 [1939], p. 1191, Clark, *op. cit.*, p. 31).

Marconi, the Italian electrical engineer, was gazing one day at the distant horizon. He thought how the human mind knows no barriers but can bridge every distance, reaching even to God in prayer. In a flash the idea came to him that Hertzian waves, also, might overcome the obstacles of space. Thus he invented radio (Clark, *op. cit.*, p. 33).

Robert Clark, who collected many such examples, concludes, 'Unprejudiced investigation shows that in all radically new discoveries a non-rational element is supremely important. Discovery often bypasses reason and involves faith, or something akin to faith. . . .' (*op. cit.*, pp. 23-4).

3. A Future Possibility

Greater cooperation between Christianity and science would result in many benefits for both disciplines.

Science can help Christian faith avoid irrationalism and provide evidences for Christianity. Scientific discoveries about the beginning have provided the strongest evidence for theism and the biblical worldview since the Enlightenment two centuries ago. Science can help theology clarify which worldviews are true and which false, so helping present the truth claims of the Christian message to our increasingly pluralistic world.

Likewise, theology can point to areas of scientific research where natural processes are unable to account for complexity, quantum leaps in development, or the interaction of transcendent and immanent processes. Many

elementary mistakes made by naturalistic science would have been avoided if scientists had shown more humility or demonstrated a greater willingness to learn from the biblical worldview.

Both Christianity and science can give glory to God by rediscovering the wonder of creation. Unbelieving science and unthinking Christianity rob God of honour as the Creator of this vast, intricate, and exquisitely crafted universe. A truly consummate Artist has created our universe, our home planet Earth, and human life upon it. Can science and Christianity join hands in applauding so supreme a performance?