ABSTRACT

The purpose of this lecture is to explore how best to read scripture, particularly when it refers to natural phenomena, in the light of modern science. It will be argued that when scripture speaks of natural phenomena, it is not speaking scientifically but theologically. A first step in establishing ground rules for reading scripture in today’s scientific and technological age involves identifying the metaphysical assumptions and methodologies that underpin both theology and science. These assumptions are not ‘set in concrete’, nor were they delivered on ‘tablets of stone’. In fact they go on being refined by informed feedback. Once there is some agreement regarding underlying assumptions it becomes possible to entertain meaningful dialogue concerning links at the metaphysical level between theological and scientific concepts that relate to the same reality. The discussion will be in the context of a view of creation theology which acknowledges a real debt to modern science and in which science is seen to be God’s gift to us. This implies the need to relate science and theology carefully when both address the same reality. An important consequence is that science can, and must, inform our reading of scripture while Scripture can and does inform our science. Examples will be drawn from well-known creation texts [Genesis 1-3, John 1:1-14, Colossians 1:15-19], the Psalms and other references to natural phenomena found elsewhere in both NT and OT. They will be considered on their own merits, taking into account the kind of literature involved.

Key Words: Metaphysical assumptions, theology of nature, science, critical realism, physics, cosmology, evolution, biology, natural phenomena.

INTRODUCTION

The purpose of this lecture is to explore the reading of scripture in the light of modern science. It will be argued that when scripture speaks of natural phenomena, it is not speaking scientifically but theologically.

While it is acknowledged that science depends on metaphysical assumptions that lie outside science, I will suggest that similar considerations apply when we seek to establish ground rules for reading scripture in today’s scientific and technological age. These assumptions are not ‘set in concrete’, nor were they delivered on ‘tablets of stone’, but they have been refined over two millennia. It is important to understand this when interpreting biblical statements that relate to natural phenomena. Examples will be drawn from well-known creation texts, the Psalms and other references to natural phenomena in scripture.
In his 2009 Gifford Lectures, Alister McGrath (McGrath 2009) argued for a **theology of nature**, not to try to prove God’s existence, but rather as an outworking of a Christian understanding of reality. I pursue this idea here with a view of creation theology which acknowledges a real debt to modern science and in which science is seen to be God’s gift to us. Francis Collins\(^1\) puts it like this,

"Science is not threatened by God; it is enhanced. God is most certainly not threatened by science. He made it all possible. So let us together seek to reclaim the solid ground of an intellectually and spiritually satisfying synthesis of all great truths". (Collins 2006 p 233).

**NATURE OF SCIENCE**

The pursuit of science is actually an act of faith for lying behind the pursuit are metaphysical assumptions that cannot be derived from within science. They include:-

1. Science is a valid form of human enquiry.
2. The universe is rational.
3. Critical realism i.e. reality is independent of our personal encounter with it.
4. Science explores what is the case.
5. Deals with *how* rather than *why* questions.
7. Counter intuitive ideas needed e.g. wave-particle duality, quantum entanglement.
8. **From a Christian perspective I would add** - Science gains its legitimacy from God, the ground of all being. **Why?** Because I see science to be God’s providential gift to the world.

**Methodology**

1. Experiment [laboratory sciences] and Observation [Astronomy, fossils, much of biology]
2. Employs methodological, but not ontological, reductionism.
3. Employs hypotheses, models, metaphor and analogy.
4. Establishes theories to explain existing phenomena and to predict new phenomena.
5. Uses abduction [inference to the best explanation – LENNOX, MCGRATH].
7. Science builds on the work of others!
8. Assumptions and methodology are refined through feedback.

---

\(^1\) Director of the NIH former Director of the Human Genome Project.
What do we find?

1. Science is a universal activity.
   a. Scientists come from all cultures and religious traditions, or no religious tradition at all.
   b. They share a commitment to scientific methodology.
2. Scientific papers are peer reviewed. Thus published science is not a matter of personal opinion.
3. God is not invoked as a scientific explanation!
4. Worldviews influence what we think about the significance of science.
5. The consensus amongst scientists about the science challenges post-modernist ideas that there is no objective reality.
6. While the natural world reveals something of God’s nature through the underlying structure in the universe, this is not proof that God exists and is more likely to lead to Deism.
7. Metaphysical questions arise such as “Why is there something rather than nothing?”
8. Love, forgiveness, altruism, aesthetics, music, purpose, good and evil, right and wrong all lie outside the purview of science.

SELECTED EXAMPLES FROM MODERN SCIENCE

PHYSICS

Concepts in modern physics are far removed from everyday experience:-

- The universe exhibits an underlying mathematical structure.
- The physical world contains subtle symmetries e.g. matter won out over antimatter in the very early universe; biologically active
molecules are ‘left handed’ while the DNA double helix is right handed!

- The universe\(^9\) is running down\(^10\) thermodynamically, becoming less ordered. However, systems that receive energy from their surroundings, such as living cells, can become more ordered, without which life could not exist.

- Time, the 4\(^{th}\) dimension of spacetime in relativity\(^11\) is not absolute. Relativistic effects matter for objects travelling close to the speed of light or near massive objects, but do not affect our ordinary sense of time (or cosmic time).

- Quantum mechanics encapsulates the dual wave-particle character of the world of the very small. ‘Particles’ appear to be particle-like in some circumstances, wave-like in others\(^12\). Consequently we cannot know simultaneously the speed of an electron and its location or when a radioactive nucleus will decay. These are examples of the well-known Heisenberg Uncertainty Principle\(^13\).

Classical physics continues to work in everyday situations, but at a deeper level is an approximation to quantum mechanics and relativity. It also provides surprises\(^14\), particularly chaos theory, discovered in the context of long-range weather forecasting. Miniscule differences in the starting values of say temperature and pressure can lead to quite different long-term outcomes, often referred to as “The butterfly effect”.

**What do we learn from this?**

The deterministic clockwork universe of classical physics has given way to a new understanding of an unpredictable world at the atomic and sub-atomic level which, coupled with chaos theory, complexity theory and self-organizing principles of matter, points to a profound degree of openness to new possibilities and fruitfulness in the universe. John Polkinghorne puts it like this - the ‘evolving world (is) to be understood theologically as a world allowed by the Creator to make itself to a large degree’ (Polkinghorne 1994 p43).

**COSMOLOGY**

Modern cosmology reveals that we inhabit a very large, continually expanding universe consisting of some 100-200 billion galaxies, each with about 100 billion stars, and that it is 13.7 billion years old. Earth at 4.5 billion years, orbits an ordinary star [the Sun] far from the centre of a typical spiral Galaxy. In about 5 billion years, the sun will become a Red Giant. Life as we know it will be impossible long before that.

---

\(^9\) Closed, finite and expanding.

\(^10\) 2\(^{nd}\) Law of Thermodynamics

\(^11\) E = mc\(^2\) the most well-known equation in the world.

\(^12\) Particles can be both here and there at the same time!

\(^13\) An ontological gap or intrinsic unknowability. Stars continue to be born while others die. Nuclear fusion inside 1\(^{st}\) generation stars converts hydrogen to helium. The other 90 elements have been produced by nuclear fusion in later generation stars.

\(^14\) Then there is the strange world of fractals, leading to the so-called strange attractor, with many actual examples. This is a phenomenon where there is no absolute scale.
Big Bang Cosmology which encapsulates the history of the universe from near time zero, when space, time and matter came into existence, is confirmed by two critical observations:-

1. Galaxies continue to move away from each other; the further away they are, the faster they move. This information is used to determine the age of the universe. At present it does not explain why astronomers observe only about 5% of the matter in the universe.

2. The faint microwave ‘hiss’ from the very early universe, discovered in 1964. This radiation has taken 13.7 billion years to reach us from the outer edges of the expanding universe. Penzias and Wilson 1965

What do we learn from this?
- The universe is vast.
- The earth is not the centre of the universe [known since the time of Galileo].
- We are made from the ‘stuff’ of burnt-out stars.

**BIOLOGY & EVOLUTION**

Theodocius Dobzhansky [1973] [who was also an Orthodox Christian] said some 40 years ago, "Nothing in biology makes sense except in the light of evolution".

Today it seems incredible that Darwin was able to arrive at his theory of ‘descent with modification’ [or evolution] without any knowledge of genetics. Darwin’s contemporary Gregor Mendel’s principles of inheritance were not unearthed until 30 years later! Evolution involves consideration of morphology, geographical isolation, embryology, the fossil record, natural selection and, increasingly, molecular genetics.

Natural selection occurs within populations\(^\text{15}\). Those ‘organisms’ that survive possess a reproductive advantage. There can be a cost! In the case of sickle-cell anaemia, protection from malaria does not guarantee longevity!

The discovery of the DNA double-helix in 1953 was a landmark for biology. DNA molecules involve sequences of just four bases [A,G, C or T] while the genetic code [1961] is based on ‘triplets’ such as AAG, GCG etc., each of which code for particular amino acids in proteins.

Natural selection depends on mutations, the simplest involving a change of just one base, which are caused by cosmic rays, X-rays, from copying errors during transcription or, in the case of rapid evolutionary changes, from ‘jumping genes’, where whole sections of DNA relocate. ‘Jumping genes’ are involved in the immune system\(^\text{16}\).

---

\(^{15}\) Consciousness and intelligence are also believed to be emergent properties of the evolutionary process.

\(^{16}\) Up-to-date research reported by Darrel R Falk in his ISCAST Victoria Lecture 2006.
Comparison of gene sequences confirms our common ancestry. We share 98% of our DNA with chimpanzees while about 8% of our genome consists of non-active retroviral genes (de Parseval et al. 2003) that are the basis for genetic trees going back about 100 million years. We also share Hox genes with fruit flies, instructions that determine our anatomy from head to tail\(^{17}\). Amino acid sequences in proteins provide another fingerprint for genetic comparison between species.

A dominant view in modern biology is that evolution is a mindless chance process, without direction. However, noted Cambridge paleontologist Simon Conway Morris (Conway Morris 2006), argues that evolution is not totally random but shows evidence of convergence\(^{18}\) i.e. some things simply won’t work while others have evolved independently several times, such as the camera eye we share with other mammals\(^{19}\).

There is apparent waste in evolution, extinctions galore and also much suffering. This appears to be the price that has to be paid to allow for a universe endowed by the Creator with considerable freedom.

To avoid discussions at cross purposes regarding evolution, I suggest the following distinctions\(^{20}\):

1. The fact of evolution;
2. Mechanisms involved in evolution
3. The theory of evolution.

**What do we learn?**

- Evolution, though constrained, continues to provide on-going novelty in an ‘open’ universe where not everything is determined.
- The genetic code is common to all life.
- We are intimately connected to the rest of creation.

**READING SCRIPTURE IN THE CONTEXT OF MODERN SCIENCE\(^{21}\)**

Here, as with science, certain metaphysical assumptions are needed, as an act of faith. The necessary interpretive principles cannot be derived from within scripture. They include.

1. OT and NT texts are the primary sources of God’s word to us.
2. God is the ground of being.
3. The rational universe exists by the will of God.
4. God interacts with the created order, providentially, in history, in prayer etc...

\(^{17}\) Professor Phil Batterham, Department of Genetics, University of Melbourne, in a lecture, July 2009.

\(^{18}\) Conway Morris gives the examples of two ancient sabre tooth wolves, one a mammal, the other a marsupial. He points out that if we were confronted in the dark, it would not matter which one it was.

\(^{19}\) Conway Morris points out that some 3000 transitional forms are known from the fossil record.

\(^{20}\) Richard Dawkins and also young ear th creationists assert that evolution necessarily leads to atheism. Dawkins makes a metaphysical assumption that science is the ultimate reality. Creationists make one or more category errors.

\(^{21}\) Here the author argues for the interaction of science and theology as another form of contextual theology.
5. Critical realism – we have to dig beneath personal knowledge.
6. As rational beings, we can reflect on God, life and the world.
7. Counter intuitive ideas are necessary e.g. forgiveness, love, the dual nature of Christ, trinity...

At his trial, Galileo said "Scripture is intended to teach us how to go to heaven, and not how the heavens go."

**Methodology**

1. Whether we recognise it or not, interpreting scripture\(^22\) involves tools and methods from all forms of human enquiry:- philosophy, linguistics, history etc. underpinned by illumination through the Holy Spirit.
2. We have to recognise different types of literature as well as the use of models, metaphor and analogy.
3. We need to compare scripture with scripture to avoid making particulars universals.
4. Abduction\(^23\) or inference to the best explanation.
5. Assumptions and methodology are refined through feedback.

**Those of us who do not know the primary languages are at some disadvantage and have to trust translators and commentators!**

I can’t emphasise enough the need to understand the metaphysical assumptions involved in both science and in our approach to scripture. This is so we can properly assess scriptural references to natural phenomena and to be able to address the same reality from both perspectives\(^23\). Today I shall focus on physical phenomena, how the bible speaks about them and how we should understand them in today’s world.

**NATURAL PHENOMENA IN SCRIPTURE**

Foundational biblical creation texts include Genesis 1:1-2.4a, John 1:1-18 & Colossians 1:15-20 where the primary message is theological, not scientific or historical. Scripture is **not about scientific processes, but about ontology, why there is a universe at all.** There are other foundational statements e.g. Hebrews 11[with an emphasis on faith] and Job 38-41. These are also theological in intent.

The established long history of the universe should caution us against reading Genesis Chapter 1 as either science or history. John Thompson’s little gem, *Genesis 1-3: Science? History? Theology?* (Thompson 2007) is but one of many assessments of the nature of the genesis literature. Thompson concludes that Genesis 1-3 is about theology! This view is supported by recent texts by Denis Alexander (Alexander 2008), Margaret Towne and Ernest Lucas.

---

\(^22\) We have to avoid simply having only an existential & personal understanding.

\(^23\) Conflict or disagreement most usually arises through category errors. Science is not ‘all there is’ and religious views, in particular, Christianity, provide a complementary way of looking at ourselves and the world.

14/12/2010
Genesis 1 explores our relationship to God, to each other and the world from a **monotheistic** viewpoint, in contrast to stories of warring gods from other ancient creation myths. NT Wright has pointed out that Genesis is written for us, not written to us.

In Creation, God has created something other than himself\(^{24}\). In John 1, the writer invokes the concept of the *Logos*\(^{25}\), identified with Christ, in developing an argument around the powerful image of ‘the Word of God’. This provides an important link between the life of faith and the reality investigated by science.

Creationists raises a number of issues for us\(^{26}\):- I disagree with them regarding the nature of science and reject their claims that we can find modern science in scripture. Their concern that the image of God in us could only come about through special creation is readily answered by noting that our dignity\(^{27}\) is not about how we evolved but is secured in the words of John 1:14 "And the Word became flesh and lived among us". (NRSV)

**Psalms:**

Before we can reach any meaningful conclusions about particular statements in the Psalms, we need to understand something of their place in the history and practice of the Jewish people within their life of worship and prayer. Let us consider a few examples.

Psalm 95:4-5 (NRSV) In his hand are the depths of the earth; the heights of the mountains are his also. The sea is his, for he made it, and the dry land, which his hands have formed.

Ps 33:6 (NRSV)— By the word of the Lord the heavens were made, and all their host by the breath of his mouth.

Ps 33:9 (NRSV) - For he spoke, and it came to be. He commanded and it stood firm.

We notice that the writers don’t make the distinctions we regard as important today. The world and what is in it is clearly regarded as God’s handiwork. Today we would say that these writers don’t distinguish between agency and process. As Bernard Ramm informed us more than 50 years ago, the language used in the bible is observer language, everyday language, not scientific language (Ramm 1955).

The next two examples raise a different issue:-

Ps 93:1 (NRSV)- ...He has established the world; it shall never be moved. Ps 96:10 (NRSV) – The world is firmly established; it shall never be moved.

---

\(^{24}\) We are not to worship the creation. We are concerned with what is, not what might have been.

\(^{25}\) Translated *Word*, it can also mean ‘reason’.

\(^{26}\) I further disagree with creationists in their claim that evolution [and maybe all of science] leads to atheism. They fall into category errors and also advance conclusions ahead of the facts.

\(^{27}\) This knowledge in no way diminishes what it means to be made ‘in the image of God’.
These texts which were believed to support the idea that the sun moved around the earth, got Galileo into a lot of trouble. The traditional understanding at that time was that science was to be found in scripture. But what do these texts really tell us? Most of all that the world is rational and not capricious. Today it would make no sense to try to read science into it. This case illustrates that what is considered biblical has changed with time!

**Joshua & Hezekiah**

There has been a good deal written about how we might understand statements such as Joshua 10:12, "sun stand still" or after Hezekiah prayed to be healed [Is 38] we read [v.7] (NRSV)

"This is the sign...from the Lord.. See, I will make the shadow cast by the declining sun on the dial of Ahaz turn back ten steps”. So the sun turned back on the dial the ten steps by which it had declined.

These are certainly situations where we need to be critical realists and not simply take the statements at face value, for the consequences of such phenomena could be catastrophic. I don't intend to join in the chorus of speculation regarding these two scriptures. However, we would do well to heed Dutch Christian Historian/Philosopher of Science, Reijer Hooykaas (reference ####), when he urged scientists to pursue scientific explanations for what are often referred to as miracles. Thus we should be suspicious of explanations for texts such as these which imply that God overrules the laws of nature; for that would be to have God opposing God!

**Exodus**

Much has been written about the Exodus and crossing the ‘Red Sea’. While many believe the crossing was probably at the Sea of Reeds somewhere in the Nile delta, a detailed analysis in the excellent book, *The Miracles of the Exodus* by Sir Colin Humphreys (Humphreys 2003), distinguished Cambridge Materials Scientist, suggests an alternative at the top of the Gulf of Aqaba. Humphreys also advances convincing scientific explanations for the plagues in Egypt, the cloud by day, the fire by night and the burning bush in Exodus chapter 3.

**CONCLUSIONS**

Scientifically, biology, geology and cosmology contribute to a grand historical narrative of our universe. Both Big Bang cosmology and evolution confront us with our intimate connection to the rest of creation in a universe ‘open’ to novelty and fruitfulness.

---

28 Abp Rowan Williams in a recent sermon commemorating the 350th Anniversary of the Royal Society, said this, "Faith, our Christian faith, presupposes that we are indeed as human beings attuned to truth and to growth, made by a God whose love has designed us for joy, and discovering that this directedness towards joy mysteriously comes alive when we look into the living truth, the living wisdom, of the face of a Christ who drives us back again and again to question ourselves so that we stay alive".

29 There is more to it than what we believe as individuals but what is. Erroneous views don't change the world but will, of course, affect our attitude towards it.

14/12/2010
The question for Christians is how much weight to give to the findings of modern science when reading Scripture. Meaningful conversation between science and a correct reading of scripture is possible only when relevant metaphysical assumptions are clarified. An important consequence is that science can, and must, inform our reading of scripture while Scripture should inform our science in appropriate ways. When these principles are ignored and people seek to find modern science in scripture we find we are dealing with God the tinkerer or God the deceiver, not the God revealed in the bible, particularly in the person of Jesus Christ.

I conclude with words of wisdom written by St Augustine of Hippo [354-43] some 1600 years ago [see Taylor 1982, pp. 42-43]

“Usually, even a non-Christian knows something about the earth, the heavens, and other elements of this world, about the motion and orbit of the stars and even their size ..., and this knowledge he holds to as being certain from reason and experience.

Now, it is a disgraceful and dangerous thing for an unbeliever\(^{30}\) to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn ...

If they find a Christian mistaken in a field which they themselves know well and hear him maintaining his foolish opinions about our books [meaning the bible], how are they going to believe those books in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven?”

Bibliography
Alexander, D 2008, Creation or Evolution: Do we have to make a choice? Monarch, Oxford.
Lucas, E 2001, Can we believe Genesis today? The Bible and Questions of Science, IVP, Leicester.

---

\(^{30}\) I replaced ‘infidel’ with ‘unbeliever’.


