

Genesis and Earth History

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INTRODUCTION

The title "Genesis" means "beginning". This is apt, for the book is about beginnings, including the beginning of the earth. To many, it is the starting point of what Christians and Jews believe about the doctrine of creation. Genesis poses a particular challenge to modern understanding because it portrays creation occurring in six days. This contrasts with geological evidence for an earth 4.5 billion years old. Also, modern cosmology argues for an elapse of some 15 billion years since the "big bang". For many, these differences are insurmountable, forcing them either to ignore scientific evidence or abandon Christian faith.

The challenge for Christians is to integrate Genesis 1 and geology in a way that takes both Biblical and scientific data seriously. This article looks at what Genesis 1 actually teaches, summarises why geologists believe the earth has a long history, and reviews different ways Christians have related Genesis and geology.

UNDERSTANDING GENESIS 1

Interpreting the Bible

There are three questions we need to ask ourselves when we interpret any Bible passage. Firstly, what is the context of this passage? Secondly, what is the message that is being given? Thirdly, how do we apply this to our situation?

The context includes the original audience, the mode of the passage (story, chronicle, parable, etc), and the cultural background. The message consists of the issues the passage addressed to its first hearers. Only when we have considered these questions can we move on to application, which is what the passage says to us and how we should respond.

The context of Genesis 1

Genesis 1 was written in an era when the Hebrew people struggled to maintain their God-given worldview against rival worldviews like those of Egypt and Babylonia. The Hebrew revelation was of one true God, the supreme good creator and ruler of heaven and earth. This contrasted with the polytheistic worldviews of Babylonia and Egypt, with their myriad conflicting gods. The Hebrews constantly fell away into polytheism, and much of the Old Testament is the record of the struggle to maintain faith and right conduct in a hostile religious and moral environment.

Although the worldview of the Old Testament stands in stark contrast to that of the surrounding nations, the Hebrews shared a common world picture with their neighbours. The earth was flat and covered by the rigid dome of the sky, the whole surrounded by primeval chaotic waters. The Bible's timeless revelation about God, its worldview, is expressed in the language of this archaic world picture.

The message of Genesis 1

The message of Genesis 1 is about God, the world, and humanity. In six pictures it shows God as the supreme ruler Who creates all that there is. Unlike other contemporary creation stories, there are no other gods, no conflict, no blood and guts, simply a majestic progression from chaos to order. The sun moon and stars, gods to the other nations, are not even named or are mentioned only as an afterthought. The earth is not divine either, and is portrayed as God's handiwork.

God declares the world as good at each stage of its creation, and, when it is functionally complete, God says that it is very good. There is no room in this account for the material universe being evil or illusionary, it is good because God has made it so. God is supreme over the entire world and is not simply the God of a local group of people.

Finally, humanity, both men and women, are part of God's creation. They are unique creatures created in the image of God, placed in the world to care for it. They are not lord's of the earth, for only God is, but, as the Bible later shows, are accountable to God for what they do in and with the world.

The application of Genesis 1

How do we apply this message at the end of the 20th century? Biblical faith still stands against contemporary worldviews. Genesis 1 contrasts with materialism, and tells us that the world and the material universe is not all there is. It stands against New Age spirituality and says that the world is not divine. Genesis stands against many eastern religions because it tells us that the world is not eternal and that it is good. The passage stands against all of these in affirming there is one supreme creator God.

Genesis 1 teaches clearly that the "Image of God" is not found exclusively in men or in women, but in both. Men and women are equally accountable to God as managers of the world that God has made. The world is not humanity's, but God's, and we are accountable to God for how we use it.

UNDERSTANDING EARTH HISTORY

Can we understanding earth history?

It was only in the 16th century that people started to seriously use geological evidence to discover earth history. Two assumptions were necessary for this. First, that there is such a history to study and second, that the past has left a physical record that we can understand. These assumptions are common to any study of the past, including human history, cosmology, archaeology, and forensic science.

An extreme sceptic can argue that the past is a figment of our imagination, or that God created the world five minutes ago (complete with our memories). Such radical scepticism cannot be disproved, however it cannot be proved either. To argue this is like saying that everything about us is an illusion. The fact we cannot disprove it just shows how good the illusion really is! Such scepticism does not get us anywhere. In reality we live assuming that we can know something about the world about us and it's past.

Ordering earth history

Rocks are not simply geological inkblots which geologists read into what they will. Rather they are like historical documents, which can be read by diligent application of some quite simple principles. Geologists have used *lithostratigraphy* from the 16th century onwards to order the past. Some very simple geometric rules allow us to discover the order in which rocks were formed. For example, in an undisturbed succession of sedimentary or volcanic rocks, those at the bottom must be older than those at the top. A feature cutting a rock must be younger than the rocks it cuts. Rock fragments in sediments are derived from rocks older than those that contain them. Rock successions are often heavily deformed, with the rock succession sometimes repeated and overturned by tilting, folding and faulting. Careful mapping of rock units and their relationships is necessary in such areas to determine the rock succession. Such mapping has been an essential part of any regional geological study from the end of the 18th century.

These techniques allow geologists to work out the geological succession over wide regions. Because exposures are discontinuous and rocks often lens out or change in character laterally, a tool is needed to correlate these succession across greater distances. Fossils, through the discipline of *biostratigraphy*, provide this tool. As geologists refined their maps of Europe in the late 18th and early 19th century they observed that although rock successions might vary from region to region, the overall succession of fossils remained the same. Using fossils as markers to correlate different successions proved successful and the technique was extended worldwide. Today biostratigraphy provides the basic framework of geologic time. When geologists say that a rock is of Jurassic age, they are referring to the fact that these rocks contain fossils characteristic of this age of earth history.

Interpreting earth history

All rocks are the products of physical and chemical processes. Biological processes are also important for the formation of many rocks. Changing any one of these parameters even slightly will result in a rock with quite different characteristics. As a result rocks contain many pointers to their formative processes. Pointers include their physical texture, chemical composition, mineralogy, and fossils (if any). The geometry of rock units, relationship with other units, and their order provide other clues to rock formation and history. Our understanding of these pointers and the formative processes of rocks has grown spectacularly since the 17th century.

Today, geologists can interpret sedimentary environments with considerable precision. Working in limestones, Such as those of the Flinders Ranges, it is possible to map out the depositional environments of the sediments from the inshore lagoons out to the back reef

rubble flats, across the reef itself, down the rubble-covered fore-reef ramp into deep-water sediments. And these patterns occur not just once, but many times through cycles of sea-level change. Sediments accumulated as the sea rose, when the sea fell the sediments were exposed to the air, resulting in the formation of caves and soils. When the sea rose again the ancient land surface would be buried by another cycle of reef sediments. With the passage of time quite different sedimentary environments were established, each with its own characteristic pattern of sedimentation.

In a similar way it is possible to map the changes in environments within cooling bodies of magma. Large magma chambers can have volumes of many tens of cubic kilometres and the environments within them are both complex and dynamic. Geologists can trace the order of crystallisation of different minerals and the effect this had on the composition of the remaining melt. In some cases the magma may be hot enough to start melting the surrounding rock, the extent of this too can be determined, along with its mineralogical and geochemical signature on the magma. With detailed work, it is possible to determine circulating patterns that were established in the body through convection. The chemistry of the rocks also show whether the body cooled from a single Reservoir of magma, or whether there were several pulses of intrusion from deeper inside the earth. Other evidence shows whether the chamber was a source for volcanism at the surface, and tells how the cooling intrusion interacted with groundwater once it had solidified.

Dating earth history

None of these evidences alone can give a quantitative measure of time. The complexity and profusion of events that they reveal, however, all point to an immense abyss of time far greater than humanity can readily conceive. This is especially true of the multiple soil and weathering horizons developed in sedimentary sequences. For these reasons, it was widely accepted that the earth was of great age by the start of the 19th century; many tens of millions or even hundreds of millions of years. Nobody knew the true extent of geologic time.

Many attempts were made in the 18th and 19th century to determine the age of the earth using methods such as loss of heat from the earth, the accumulation of salt in the sea, and the rate of erosion of rocks. The resulting estimates ranged from a few tens of millions of years to trillions of years. Clearly, they were unreliable, but all agreed with what had already been deduced; the earth was immensely old.

The discovery of radioactivity made it possible to determine the age of rocks by measuring the amount of decay specific radioactive isotopes have undergone since they were trapped during the formation of rocks and minerals. More than 40 different radiometric techniques are now used. These allow geologists to place numerical ages on different geological eras. We now know that the Jurassic, for example, lasted from 190 to 135 million years. Radiometric techniques are not foolproof, but generally give results consistent with each other and what is known from other geological evidence. There are also a number of other techniques that give numerical ages. Although not as precise as radiometric dating, amino acid racemisation and thermoluminescence also give results generally consistent with other geological evidence.

THE BIBLE AND EXTRA-BIBLICAL DATA

The challenge

The challenge for Christians is how to read Genesis in an age informed by geology in a way that allows us to learn the theological truths of the text and that is also consistent with the scientific data. To do so we must consider two questions; can we allow scientific data to determine our understanding of the Bible, and can we allow the Bible to effect our interpretation of scientific data?

Can we allow scientific data determine our understanding of the Bible?

Many Christians are shocked by the idea that we might let scientific data determine our understanding of the Bible. However Christians have done this many times over the last 2,000 years. Augustine in the 5th century AD recognised we should not interpret Genesis in such a way as to conflict with what people know from science. The Bible's description on the functions of the body's organs is quite different from that of modern physiology. In the same way Biblical astronomy is not only geocentric but flat earth. In both cases Christians recognise that the language is figurative, and Biblical truth is contained with the world picture of the time it was recorded. The Bible's picture of the history of creation is no different.

Can we let the Bible effect our interpretation of scientific data?

If the Bible is written in the language of the ancient Near East, are there any areas that its teaching can effect our interpretation of scientific data? The answer is yes, but not at the superficial level of specific scientific theories. Rather Biblical theology influences the metaphysical conclusions that can be drawn from them. Although some scientists and philosophers go far beyond the scientific data to argue that because the universe operates and evolves according to natural law, that there is no room for God, the Bible clearly states otherwise. It speaks of natural laws and points to the fact that it is God Who not only established them, but continually upholds them.

Other scientists and philosophers have pointed to the vastness of the universe in space and time in contrast to the Biblical language rooted in the world picture of the ancient Near East. To them this shows the inappropriateness of the Bible to the scientific era. The Bible, however, clearly recognises the insignificance of humanity, even in the world picture of the ancient Near East, and portrays this as a demonstration of the greatness and glory of God. Biblical theology clearly influences the metaphysical conclusions that are made on science.

READING GENESIS IN A SCIENTIFIC AGE

Three ways to read Genesis

How do we understand the early chapters of Genesis in a scientific age? Christians have read it three different ways, literally, concordistically, and figuratively.

Literally

Literalists take the six days at face value, they are 24-hour days and thus the entire universe was created in 144 hours. Generally the geological record is explained as the result of Noah's flood. This was a valid scientific hypothesis in the 17th and 18th century, but was rejected by the end of the 18th century. This was because its advocates discovered that the geological record could not be the product of a single event. Neither could they agree on a consistent set of geological theory they could extract from the text. Also, Bible scholars increasingly recognised that simple literalism did not take the cultural context of Genesis into account.

An alternative explanation, that the earth was created with the appearance of age, is irrefutable. However, it is unsatisfactory for many reasons. It is untestable, requires God to create a lie on cosmic scale, and, like all forms of extreme scepticism, is impractical. It arose in an attempt to defend a literal reading of Genesis 1 in the face of irrefutable geological evidence for the antiquity of the earth.

Revived by the "creation science" movement from near extinction in the 1960's, both these literal approaches have enjoyed a remarkable resurgence. Despite widespread popularity, literal approach used by creation science with respect to geology has still not solved the problems that resulted in its rejection nearly 200 years ago. Expecting scientific answers in Genesis is asking it the wrong question.

Concordistically

A second approach to relating Genesis and geology developed in the 19th century. This was concordism. Concordists see Genesis 1 as compatible with geology. Typically, concordists have used two approaches. They have either squeezed geological time between verse 1 and verse 2 of Genesis 1, or interpret the days of Genesis as a pictorial representations of geological ages.

Concordism is still popular and enjoys the advantage that it takes geology seriously, but suffers from some of the same problems as literalism. First, there has been little consistency in the various ways of reconciling Genesis 1 with geological history. Secondly, concordism still attempts to find scientific data in a passage that is pre-scientific. It is still asking the wrong questions, and getting the wrong answers. Christians need a third approach.

Figuratively

The early Church understood Genesis as teaching us primarily about God. After several centuries of excursions into scientific literalism and concordism, Bible scholars are increasingly returning to this approach. Now, however, we know much more about the cultural context of Genesis and can clearly see how God used the world picture of the day to teach us eternal truths about Himself and our responsibility and accountability to Him.

There is still much to be learned from this approach, but it enjoys many advantages over both literalism and concordism. Firstly, it allows the text to speak for itself, without forcing our scientific preconceptions on it. Secondly, it allows geology to develop,

without trying to squeeze it into an interpretive framework into which it does not fit. Thirdly, we can more clearly see what God has for us in Genesis 1. Fourthly, we can enjoy what geology reveals of the grandeur of God's creation, rather than seeing it as a threat and constantly trying to reinterpret it to fit the Bible or reinterpret the Bible to fit geology.

CONCLUSION

The Bible is a tool to teach us about God, show us how to relate to Him, and help us live as we should. Genesis teaches us that God is the supreme creator of a good universe, humanity is accountable to God. If we misuse it to try and obtain scientific data, then we should not be surprised if the results are confused or unhelpful.

Science is about exploring and understanding the history and operation of the universe. It is a sad fact that arguments over the relationship between geology and Genesis has driven many away from faith and others to be afraid at the awesome vistas of earth history that geology has discovered. The writers of the Old Testament recognised the grandeur of God in the world, even in their limited understanding. What they saw made them worship God. How much greater should be our worship with our much grander understanding of God's majesty revealed in creation?

FURTHER READING

How to find out more

Many university libraries contain books on science and faith. Some of the newer books mentioned below are still in print and can be ordered from any good bookshop.

Getting started

The following books are useful for people interested in learning about issues of science, faith and Genesis. Colin Russel's "*Crosscurrents*" (IVP, Leicester, 1985) provides an overview of the history of science and faith, while his book "*The Earth, Humanity and God*" (Univ Col Press, London, 1993) explores different worldviews and world pictures. Michael Poole's "*A Guide to Science and Belief*" (Lion, London, 1990) is perhaps the best general introduction to science-faith issues about. Ernest Lucas has written a good introduction to the book of Genesis entitled "*Genesis Today*" (Scripture Union, London, 1989). There is also a lot of interesting stuff on the Christian Students in Science website (<http://www.csis.org.uk>).

Digging deeper

If you want to pursue these issues further, "*Portraits of Creation*", by van Till, Snow, Stek, and Young (Eerdmans, Grand Rapids, Michigan, 1990), is a good place to start. This book has chapters on geology, cosmology, and theology. Michael Johnson's book "*Genesis, geology and catastrophism*" (Paternoster, Exeter, 1988) is also very helpful. Henri Blocher's "*In the beginning*" (Inter-Varsity Press, Leicester, 1984) explores the theology of creation in more depth. "*Is God a creationist?*" (Charles Scribner's & Sons, New York, 1983) is a compilation by Roland Frye of interesting essays on theology,

evolution, palaeontology, and geology. **Real heavy stuff**

The following works are essential anyone seriously interested in these subjects. Gordon Wenham's "*Genesis 1-15*" (Word, Waco, 1987) is a major evangelical commentary. The classic work on the role of theology in the development of geology is "*Natural Law and Divine Miracle*," by R. Hooykaas (Brill, Leiden, 1959). Davis Young has documented the development and collapse of literalism and concordism in his two part paper "Scripture in the hands of geologists" (*Westminster Theological Journal* 49: p1-34 and p257-304, 1987). He also wrote a useful book on attempts to reconcile Noah's flood with scientific data, "*The Biblical flood*" (Eerdmans, Grand Rapids, Michigan, 1995).

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