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RADIOISOTOPE AGE, PART III TIME IN SCIENCE AND THE BIBLE

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What is time and why do we think it is so important? Is it because of our need to synchronize schedules, our bodily changes that cause hunger and tiredness, our limited endurance of pain or boredom, and our limited lifespan for accomplishing goals? Time for God is apparently different and doesn't necessarily correspond to human time (Psalm 90:4; 2 Peter 3:8); after all, God knows the end from the beginning. Cannot God create time, exist outside of time, and move back and forth in time?¹ What happens then to time perceptions when God intervenes in His creation? Strange effects result: the appearance of age after the creation, the adjustments in time measurement due to Joshua's long day and Hezekiah's sundial, and the rate change of natural processes during the water-to-wine miracle.

Scientific Time Issues

When viewed from a scientific perspective, time is seen to be a complex subject.²

Time is not absolute. According to special relativity, no absolute measure of time is possible for two objects in relative motion to each other, especially if the relative motion is close to the speed of light. Experimental data confirm that the decay time of a short-lived particle in relative motion to an observer can be much greater than if the particle is at rest (Figure 1). According to general relativity and its experimental confirmation, time moves slower in a stronger gravitational field. The standard scientific literature often speculates about the effects on time of the strong gravitational fields near black holes, even to discussing time travel.³

Time has a beginning. Scripture (Psalm 102:25,26) influenced Lord Kelvin in his development of the second law of thermodynamics.⁴ The second law states that the amount of useful energy in the universe is decreasing, thus suggesting a

beginning for time and the need for a "Beginner."

Similarly, the Big Bang theory points to a beginning for the universe, space, and time and was therefore resisted philosophically when it was first introduced.⁵

Rates may change over time. As a good scientist, I have measured my daughter's height and plotted it over the years. By extrapolating that height, I estimate that she will be 10 feet tall when she reaches age 30 (Figure 2). Fortunately that extrapolation into the future is not valid. Extrapolation back in time from the thousands of years of recorded history to the billions of years for the universe is widely supported scientifically, but it too requires caution. Perhaps time is the god-of-the-gaps for evolution, since it assumes that given enough time anything can happen.

Our perspective of time may change. Unexpected scientific discoveries in the past have changed age estimates by several orders of magnitude. In the 1800s, Lord Kelvin estimated that Earth was about 40 million years old, based on the amount of time it would take for the Earth to cool from a molten ball and assuming that all heat sources were then known.⁶ However, after a new source of heat (radioactivity) was discovered in 1896 the age esti-



Figure 1. In a spectrometer, such as the one shown here, rapidly moving particles take longer to decay than if at rest. Photo courtesy B.L. Clausen.

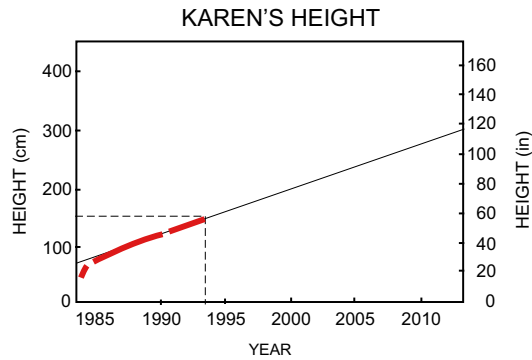


Figure 2. Diagram extrapolating daughter's growth rate over time.

mates changed by two orders of magnitude.

Time is a point of contention between science and Scripture.

Science Gives Long Ages

The matter of the universe and Earth appears to be old based on various radiometric data: the constancy of decay rates for long-lived isotopes, the concordance between various dating methods, the Oklo phenomenon,⁷ and the limited range of half-lives for naturally occurring radioactive isotopes.

The life associated with these old rocks is assumed to have a corresponding old age. Gradual development over millions of years is the easiest explanation for the vertical sequence in the fossil record: the detailed small-scale order, the lack of mixing (no humans with dinosaurs, no angiosperm pollen with trilobites), and the observation that fossils (even of animal types assumed to be on Noah's ark) become progressively more similar to modern forms higher up the geologic column. Although the long-age explanation is not perfect, it does explain more than ecological zonation theory, flotation, and motility. Other geological evidence, although not impossible to fit into a short-age model, is easier to explain in a long-age model: cooling of batho-

liths and tectonic plates, "annual" sedimentary layers that in places may number in the millions (Figure 3), ice core data, evidence of significant animal activity in the geologic record, and coral reefs and their growth rates.

Good scientific evidence supports long ages, and a fairly comprehensive long-age model with supporting evidence

exists. However, science is not perfect, and some scientific evidence to be discussed later does support a short-age model.

Scripture Gives Short Ages

Scripture suggests no long ages of animal death before Adam's sin. Death before sin removes the link between sin and physical death; it makes God directly responsible for competition, suffering, and death; and it seems incompatible with the picture of a God who cares for the sparrow and has prepared a heaven where the wolf and the lamb will dwell together. The God of justice in the Bible would not allow sin, evil, and death any longer than necessary.⁸

The Sabbath commandment commemorates no long period of development for life, but that "in six days the Lord made heaven and earth, the sea, and all that in them is". There is good reason to believe that Scripture intends these to be literal days.⁹ The command emphasizes *that* God created in 6 days, as well as *what* God created in those 6 days, although various interpretations include different features: the entire universe, just life on Earth, or just a local creation of man and his habitat.

The genealogies in Genesis 5 and 11 also favor a short time period

since the creation. Theologically, then, a short-age model is the easiest to defend. However, misinterpretations of Scripture have occurred in the past (geocentric universe, fixity of species, etc.), so it is important not to require more than the Bible requires. Care must be taken not to repeat dogmatic mistakes of the past, and the scientific details in the Bible may require some interpretation into modern technical terms (e.g., the hare chewing the cud, the locust, beetle, and grasshopper having four feet [Leviticus 11:6, 21-23]).

Addressing the Conflict

Conflict between science and revelation on time issues is very apparent and no clear final answer is currently available. However, other examples of conflict due to our finite comprehension do exist: the divine/human nature of Christ, free will/predestination, and the dual wave/particle nature of light. Human logic is limited to an assessment of our experiences.

Empirical evidence should be necessary for any belief system, and there is evidence that a totally

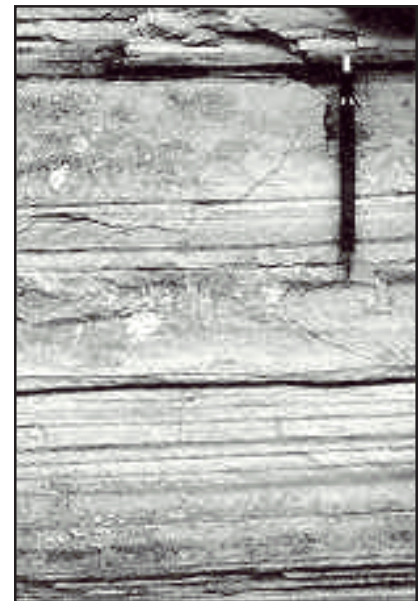


Figure 3. Laminae in the Permian Castille Formation. Photo courtesy B.L. Clausen.

naturalistic world view is insufficient. In addition, those with a Bible-based philosophical framework have found at least some empirical evidence that preferentially supports short ages or that is at least consistent with it.

Some of this evidence is presented in the next section; however, this and similar data must be used with caution: 1) the arguments are more complicated and equivocal when all factors are taken into account; 2) more of the current data is better explained by a long-age model than by a short-age model; 3) demonstrating that certain data doesn't require long ages, doesn't necessarily provide support for a short-age model; it only moves it to a category of fitting either; 4) no comprehensive geologic model fits all the data, so that problems with a long-age model do not necessarily mean that a short-age model is correct; 5) no comprehensive, short-age model is even available to rival the long-age model; 6) ultimately any biblical short-age model would be expected to include some supernatural activity, immediately making it unacceptable as a scientific model at all; 7) accepting the Bible because science supports it tends to put science above the Bible and reason and sense perception above revelation and makes it easy to discard the Bible when the scientific evidence is found to be incompatible.

Science Reinterpretation

Significant data fits a long chronology better; however, much data can be fit into either model (especially after reinterpretation), and some data is better explained by a short-age for rocks and the life they contain: 1) coal expected to be millions of years old is found by carbon-14 dating to be on the order of 40,000 years old.¹⁰ 2) geological rates of erosion, sedimentation, and mountain

uplift suggest a shorter time scale;¹¹ 3) paraconformities suggest a limited time between some sedimentary layers;¹² 4) biological molecules in rocks dated at millions of years would be expected to disintegrate in much less time.¹³

Some of the scientific data can be interpreted in terms of life being young, but the matter of the earth being old. The old radiometric dates are then accepted as real, but not necessarily the age of rock deposition or the constituent fossils. Discordance between different radiometric dates is not uncommon due to argon retention (for K/Ar dating), to metamorphic resetting, and to different source areas for sedimentary rock. Some geochemical considerations may give alternate explanations for the general sequence of lower rock layers dating older than the upper layers: 1) fractionation and zonation in the magma chamber; 2) crustal material being incorporated into the magma as it moves; 3) isochrons not validating the ages, but instead being mixing lines; and 4) the amount of argon escape in submarine volcanic rock being dependent on the hydrostatic pressure.

Those who feel the Scriptures require that the matter of Earth and universe is young¹⁴ use such evidence as: a change in the fundamental constants of nature including the decay rates, a decay in the speed of light, pleochroic halos for polonium, a small depth of meteor dust on the moon, extra-terrestrial effects (e.g., cosmic rays),¹⁵ and quantum mechanical effects (e.g., the uncertainty principle).

Scripture Reinterpretation

Various theories have been suggested to harmonize the short ages of Scripture with the long scientific ages, each with its advantages and disadvantages.

Universe young. This model is the simplest to defend theologically, due to almost complete lack of contrary evidence in Scripture. However, it fits poorly with most of the scientific evidence.

Universe old, but Earth and solar system young. This model helps scientifically in explaining distant astrophysical phenomena, and some Scriptures can be taken to suggest the existence of other beings before the creation of this world. This model could accept long ages for stellar evolution; however, it arbitrarily states that the star in our solar system (Earth's sun) was a fiat creation.

Matter of Earth and solar system old, but life on Earth young. This model suggests a pre-existing Earth and solar system, so the creation in Genesis 1 includes only the atmosphere (firmament or heavens) and the dry land (earth). As noted above, this model may help significantly with the radiometric data. However, Genesis places the sun "in the firmament of the heavens." The Genesis account demonstrates that Yahweh is greater than the nature gods, including the sun (Figure 4). Leaving the sun's creation out of the fourth day easily leads to leaving other creative activity out of creation week. And arguing that rocks with little life

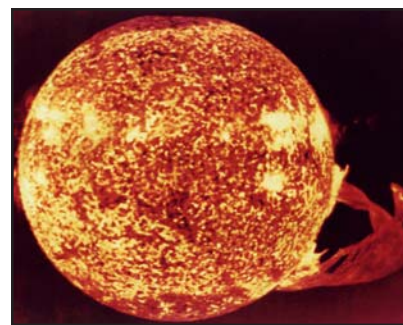


Figure 4. SOHO photo of Earth's sun. Photo courtesy NASA/JPL. <http://photojournal.jpl.nasa.gov/target/Sun>

(Precambrian) are old and those with much life (Phanerozoic) are young is somewhat inconsistent scientifically, because they are geologically similar in many ways.

Life on Earth old, but then destroyed and the present life recently recreated. In this model, the fossil record is due to an old creation destroyed before the Genesis record, and Noah's flood is local. Although this puts death in the fossil record before Adam's sin, it can still be placed after the devil's sin and be the result of his experimentation.¹⁶ However, the Bible assumes that animal death is the result of Adam's sin, and that Noah's flood was worldwide. Migration would have been easier than an ark to save life from a local flood; and many local floods have occurred, invalidating God's promise not to destroy the earth again if Noah's flood was only local. An interesting variation on this model includes relativistic effects.¹⁷

Present life was progressively developed by God over long periods, but God is still the Creator. Progressive creation and theistic evolution accept the standard scientific interpretation of long ages for the geologic data, but still hold God as Creator and/or Designer. However, it removes the literalness of Genesis 1-11 attested by other Bible authors, and it accepts death before sin.

Conclusion

Any of the proposed resolutions to the conflict has significant problems. The pros and cons for each need to be considered, since one can be more objective when considering several options. With the chance of erring in developing an earth history model, I prefer caution — biblical certainty and scientific uncertainty, over scientific

certainty and biblical uncertainty. Some confirmation for belief from the physical world should be expected, but it is unlikely to be overwhelming, considering the difficulty of analyzing God's activity scientifically.

Insight from Job's response to God's questions (Job 40:4,5; 42:2, 3) reminds me that much about time will never be known until we reach heaven. On this earth, continued study and the willingness to change one's opinion are necessary. However, for me there are two non-negotiable points: any origins model that misrepresents God's character or that puts man's reason above God's revelation is unacceptable.

Endnotes

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Editor's Note: Pagination of the original article was p 1-5.