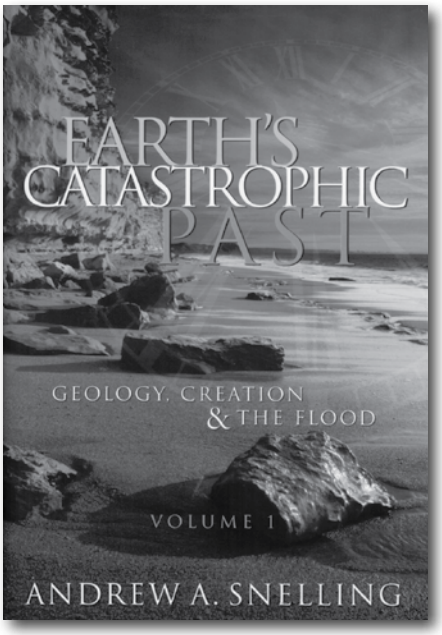
Excellent summary of scientific evidence for Creation and the Flood, but controversial in some areas



A review of
Earth's Catastrophic Past: Geology, Creation & the Flood, volumes 1 and 2
by Andrew Snelling
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This is the most comprehensive book available on the abundant evidence for Flood geology. It is meant to be an update of the classic *The Genesis Flood*.[1] The two volumes add up to a whopping 1,102 pages. Anyone who wants an update on the status of creation research in earth science can easily do it by reading these two volumes. And the readers would only be digesting a summary of the evidence, as noted by Dr. Snelling on page 196 and in one of the final sections called *Concluding Challenges*. Moreover, some of the details are admitted to be tentative and subject to revision as more data become available and helps give us better understanding (p. 197).

The book is divided into ten major parts with 126 short chapters. The short chapters are an advantage when reading such a comprehensive book; it breaks the information into smaller chunks. There is a general lack of figures, which is partially made up for by 74 colour figures at the back of each volume. Both volumes have a relatively small selected bibliography in the back. Volume 2 has a short topical index. There is no glossary.

A global Flood from Scripture

The first three major parts present excellent scriptural evidence for a global Flood. After an introduction showing the importance of the straightforward account in Genesis 1–11, Part I delves into the biblical support for the global Genesis Flood. He provides a convincing case that the water of the Flood rose for 150 days and likely did not peak at Day 40 (pp. 20–21). He states that it is unclear why the life spans of the post-Flood patriarchs decreased, but lists a dozen possibilities (p. 65)—good subjects for future research.

Snelling debunks a host of non-geological arguments used against the global Genesis Flood in Part II. He points out that Christian scholars are much too trusting of evolutionary/uniformitarian interpretations and too critical of the straightforward biblical account of the Creation and Flood. They also fail to examine creationist information closely (chapter 12).

One of the most significant arguments against a global Flood is that universal terms, such as "all the earth", do not always mean the entire planet, but only the known world at the time Genesis was written. Snelling debunks this thinking by noting a great majority of places in the Bible where 'all' and 'every' are literal. The context also decides the issue. He questions how the Flood could only be local when around 30 universal terms are used in Genesis 6–9. The context also excludes a local flood. If some insist Genesis 6–9 means a local flood, they do great damage to the clear accounts in the rest of Scripture.

In Part III, Snelling summarizes the many details showing the Ark described in the Bible is adequate to the task of providing a haven for eight people, two of each unclean animal, and seven clean animals. Those who care to examine the details will be satisfied that the Bible is an accurate account of the Ark.

Chapter 23 discusses the important topic of the interaction between the natural and the supernatural. The Bible teaches that God was in charge of the Flood, for instance in Psalm 104:7: "At Your rebuke they [the Flood waters] fled" (NASB). Therefore, there was a supernatural component, but God must have let nature take its course, for instance, allowing water to flow downhill.

Part III ends by addressing the challenges of post-Flood animal dispersions—a difficult problem for both creationists and evolutionists. There are a number of unique ways for animals to disperse. Creationists have one additional mechanism, however, that may be important. Both animal and plant migrations would be enhanced by floating log mats that likely would have existed for up to a few hundred years after the Flood.[2]

The scriptural geological framework

Part IV provides a framework for a biblical geology. It includes the days of creation and man's fall into sin in Genesis 3. At this point uniformitarian conditions likely existed in the pre-Flood world. Then came the global Genesis Flood and the new post-Flood Earth was again mostly dominated by uniformitarian processes. Part IV starts off with an excellent introduction.

Most of Part IV is very good, but there are a few things I question. Snelling suggests that on the third day of creation an enormous amount of geological work took place as probably one super-continent uplifted from a previously created silicate Earth on Day 1 (more on this subject in Part VII). This kind of activity would result in tremendous erosion and huge sedimentation in the pre-Flood oceans. However, Genesis 1:9 states:

> "Then God said, 'Let the waters below the heavens be gathered into one place and let the dry land appear'; and it was so" (NASB).

In verse 10, God calls the water gathered into one place "seas". Snelling's interpretation of Day 3 is only one possibility. The dry land appearing within the waters below could have been a complete miracle with no geological activity, since the Creation described in Genesis 1 was one super-miracle. Moreover, the *waters* were gathered into one place, not the land. Verses 9 and 10 may imply that the pre-Flood ocean consisted of interconnected bodies of water that were generally isolated from each other. Regardless, the geographical significance of Genesis 1:9, 10 is ambiguous because the pre-Flood oceans and land were destroyed by the Flood, and it is questionable whether there are any pre-Flood sedimentary rocks (see below).

What uniformitarian interpretations to use for biblical Earth history?

Part V, the last part of volume 1, goes over the modern geological synthesis from which Snelling gleans data to develop a model of biblical Earth history. He reminds the reader that it is imperative all scientists heed the fact that there is a difference between observations and interpretations. An example is whether sandstone is from a desert or subaqueous.

So, when working with uniformitarian data and interpretations, creationists need to be very careful. It can be difficult to know whether the data is a true sample or whether theory is built into the data or whether some data is left out, resulting in a biased sample. I suspect that determining what uniformitarian interpretations we accept has caused most of the controversy within Flood geology.

Snelling ends the introduction by stating that there are two paradigms of uniformitarian geology that we can accept: the geological column, minus the long ages, and plate tectonics (p. 297). As a result, the book becomes controversial in Part V, and I do not believe he has demonstrated that the geological column and plate tectonics need to be accepted by creationists. Many articles should have been written with in-depth analysis and published in the creationist technical literature defending these interpretations *before* incorporation into any Flood model. So, many creationists are left with having to take it on faith that the geological column and plate tectonics are absolutes that creationists need to fit into biblical Earth history.

Is the geological column an absolute record of biblical Earth history?

In regard to the geological column, he uses two local to regional 'columns' to make his case: (1) the strata from England (Chapter 45), and (2) the strata from Grand Canyon and the Grand Staircase in Utah (Chapter 46). This is all well and good. Even most creationists who are skeptics of the geological column accept these. The issue really is whether the geological column is a *global* sequence or even a continental sequence. I don't believe Snelling has made a case for a global geological column in this book or elsewhere. Furthermore, the acceptance of a global geological column means the fossil order in the column is also an absolute sequence for biblical Earth history (chapter 52). Needless to say, this creates problems for creationists.

It is true that some geological formations, especially in the Paleozoic, can be traced over much of the intermountain region of the western United States. I have checked this out myself, and it is based on lithology. But to demonstrate that this lithology continues over most of the North American continent and worldwide is another matter.

Figure 1. The Grand Staircase showing about 3,000 m of sedimentary rock (view north from the northern Kaibab Plateau). The Grand Staircase is an erosional escarpment composed of five cliffs in a stairstep pattern.

Figure 2. The Claron Formation exposed in Cedar Breaks National Monument on the western edge of the Markagunt Plateau, Utah.

Then there is the problem of correlating local or regional areas, such as the Grand Canyon/Grand Staircase, to other areas. Snelling believes it is possible to correlate local or regional columns from area to area:

> "On the other hand, indirect correlation can be established by numerous methods, such as visual comparisons of instrumental well logs (drill-hole records) or fossil assemblages. However such comparisons have different degrees of reliability and therefore can never be entirely unequivocal" (p. 313).

Snelling admits that there is no unequivocal way to correlate over large distances. I would not trust either of his suggestions.

Snelling goes on to mention other possibilities for long distance correlation, such as the Sloss megasequences based on what are believed to be large transgression-regression cycles (p. 319). There are six megasequences across North America from the late Precambrian to the present. Whether the uniformitarian interpretations of transgressions and regressions are sound, especially when thinking in terms of the Genesis Flood, needs justification in the creationist technical literature. Another possible analysis tool mentioned is sequence stratigraphy (Chapter 51). However, Klevberg has previously raised valid problems with sequence stratigraphy that need to be answered before we can assume it is reliable.[3–5]

Snelling uses old terminology when dealing with the sequence on the Grand Staircase, which exemplifies a few of the reasons why I am skeptical that the geological column represents an absolute sequence in biblical Earth history.[6–8] He calls the top step of the Grand Staircase the Eocene Wasatch Formation (p. 311). However, this formation was renamed quite a while ago to the Claron Formation.[9] I have seen both formations in Utah. The Wasatch Formation is coarse grained with lots of conglomerate. The Claron Formation is a limestone with very few fossils—very different from the typical Wasatch Formation. I am suspicious that the top stair of the Grand Staircase was once called the Wasatch Formation because this formation automatically comes after the Mesozoic strata of the Grand Staircase in the pigeonhole system of the geological column. The Wasatch Formation was early Cenozoic and so fit well atop the Mesozoic, giving the appearance of a complete Phanerozoic geological column from the Grand Canyon to the top of the Grand Staircase (except the Ordovician and Silurian are missing in the Grand Canyon). However, geologists realized the lithology was wrong, and so they renamed it the Claron Formation. The Claron could have easily been placed within the Mesozoic, but it is considered early Cenozoic. So, it could be the subconscious desire to show all three eras of the geological column in one region that inspired the naming of the Wasatch Formation.

The problems for the geological column magnify when dealing with the Precambrian, Mesozoic, and Cenozoic; much more analysis is needed to show how these fit into biblical Earth history. Snelling believes there is a Precambrian geological column based on lithology. However, this 'lithology' is most likely based on relative radiometric dating, which I believe is questionable. I regard relative radiometric dating, based on literature dates, as questionable because some dates are divergent from expectations by billions of years, and we know many divergent dates have already been thrown out.[10]

In regard to the Cenozoic, using Walker's classification, based on biblical data, I can make a strong case that the Cenozoic can be early Flood, late Flood, and post Flood, depending upon the location on the Earth and the particular index fossils used.[6] Cenozoic ocean bottom sediments are predominantly dated by microfossils, which could easily be post-Flood, while the Cenozoic strata in the basins of the Rocky Mountains are primarily dated by mammal biostratigraphy, and are very likely from the early Flood.[11]

And what about accelerated plate tectonics?

Chapters 54–59 are devoted to a defense of plate tectonics, which accelerated results in catastrophic plate tectonics (CPT) during the Flood. Snelling provides a weak defense for plate tectonics by giving superficial evidence with little in-depth analysis. His most compelling arguments are the fit of the continents across the Atlantic, apparent polar wander paths, geodetic data, and the dipping Wadati-Benioff earthquake zone. This is why I believe CPT may help explain some data, although there could be other ways to explain the data.

I have found that new data sets are often contrary to many aspects of plate tectonics, which is why I don't believe plate tectonics can explain most of the data. For instance, in my analysis of trenches,[12–14] I discovered many anomalies, four of which are:

1. many trenches have little if any sediments, when they should have lots of sediments if plates are slowly colliding over millions of years, or if they rapidly collided as in the CPT model;
2. where there are trench sediments, the sediments are horizontally bedded with *extensional* features, when there should be convergence features;
3. the heat flow patterns in the trenches, arcs, and back arc basins are anomalous; and
4. the forearc of an island arc or continental margin should have compressive features due to plate convergence, but sometimes have extensional features.

This last one has been a difficult pill for plate tectonics people to swallow, but this opposite result has simply been fit into the paradigm. Although mentioning some of the complications, Snelling gives the old, simplistic explanation of the formation of these 'accretionary wedges':

> "An accretionary wedge forms at a subduction zone in a manner similar to the action of a bulldozer. At the trench, the sediment is scraped off the sinking plate by the upper or overriding plate, and it piles up there" (p. 401).

Listric normal faults, evidence of extension, are being found more and more on forearcs.[15] Trenches show the geological features of a graben, a down-faulted trough, and not the location for plate convergence. The CPT model needs to demonstrate how the observations at and near trenches fit into their model.

There are many other anomalies like those observed at trenches, some of which have been published.[16] One should be very cautious adding plate tectonics into a Flood model until the problems are resolved in the creationist technical literature.

Much geological evidence for the Genesis Flood

Part VI in Volume 2 is a wonderful summary of a host of Flood evidences. It goes through the evidence of catastrophism in the strata; evidence for rapid deposition of the Grand Canyon strata; evidence of rapid, widespread deposition by water-laid deposits elsewhere in the rock record; the lack of time demonstrated between strata; soft sediment deformation features; evidence of rapid fossilization; fossil graveyards; polystrate trees; and the evidence from coal. The big picture of the rock and fossil record shouts a catastrophic, global flood.

Snelling's model of biblical Earth history

Indeed, the rock and fossil record supports the Flood, but the key question is: what is the Flood mechanism to explain all this evidence? Finding a viable model of biblical Earth history is a worthy goal that occupies many creationist earth scientists. Part VII fleshes out Snelling's model of biblical Earth history, essentially the CPT model but with additions for geological activity during Creation Week.

Creation Week geological activity?

Snelling places most of the Precambrian rocks into Creation Week (Chapters 77 to 80), a contention I find far from demonstrated.[17] He believes that during Creation Week there may have been an early form of CPT, and that stromatolites are biogenic and were fossilized—an assumption that needs proof.[18] Were one-celled plants fossilized as early as the middle of Day 3; does the end of Day 3 correspond to the Archean/Proterozoic boundary conventionally dated at 2.5 billion years; and could the pre-Flood/Flood boundary be at the top of the Mesoproterozoic that is dated at 1 billion years by uniformitarian scientists? I found one problematic statement in which Snelling claims that there are virtually no stromatolite fossils in the Phanerozoic (p. 634), generally considered Flood rocks. This is not true,[19] and the fact there are claimed Phanerozoic stromatolites would suggest an abiogenic origin is more likely for stromatolites.

Chapters 81–85 have good information on various aspects of the creation and pre-Flood time such as the issue of the 'appearance of age', problems with the big bang theory, questions about the vapor canopy theory, and the deduction that pre-Flood climate and geological activity was probably benign.

Catastrophic plate tectonics?

Chapters 86 and 87 briefly outline the catastrophic plate tectonics (CPT) model as the mechanism of the Flood. I cannot get as enthused with this model as Snelling, since there are many observations that still need explaining. He does present evidences for plate tectonics, but the subjects need much more development.

I will mention just a few other problems for plate tectonics and CPT, besides trenches (see above). CPT needs to explain why ultra-high pressure minerals and microdiamonds are found in many places on the earth, commonly far from subduction zones. Mountains are supposed to be caused by plate tectonics, but many mountain chains are *within* plates, such as the Transantarctic, Ural, and Rocky Mountains.

Another problem for CPT is which supercontinent within uniformitarian plate tectonics split at the beginning of the Flood. There are at least six of them that split and the pieces of all but the last have come back together again:(1) 'Kenorland', an Achaean northern supercontinent; (2) a Paleoproterozoic southern continent; (3) a Paleoproterozoic northern Laurasia; (4) Columbia in the Mesoproterozoic; (5) a succession of Neoproterozoic supercontinents including Rodinia, and (6) the Phanerozoic Pangea.[20] John Baumgardner has maintained that it was the last supercontinent that split, and because the 'ages' of the ocean basalts that re-carpeted the ocean floor as the continents moved apart are mid Mesozoic and Cenozoic, he believes that the split occurred during the *middle*

of the Flood. This is understandably a problem for CPT, because this means CPT would *not* be a mechanism of the Flood but a consequence. Furthermore, Baumgardner has postulated jets of water shooting high into the atmosphere causing 40 days and nights of rain at the beginning of the Flood. But how would these steam jets help if they blew in the middle of the Flood? Snelling thinks he has solved the problem by postulating it was the third-to-last continent, Rodinia, that split. But this also puts CPT in a muddle because the CPT mechanism has only postulated the *splitting* of a supercontinent; nothing has been worked out, even in theory, of how the pieces of the supercontinent crunch back and then split a second or third time in the CPT Flood model. The book is understandably silent on this problem.

Some good and some problematic deductions

Chapter 88 spells out Snelling's reasons for putting the pre-Flood/Flood boundary in the late Neoproterozoic around 700–740 million years ago in the standard geological column (p. 710), a location that Froede and myself have challenged.[18]

Chapters 89–92 list more great observations indicating a global Flood laid down the strata and fossils. I thought chapter 91 was excellent in describing some of the reasons why the Flood can account for the fossil order in the strata.

Chapter 93 shows the problem of taking the geological column as a general linear sequence of biblical Earth history. Snelling states:

> "Many amphibians and reptiles were actively leaving footprints on the surfaces of the sediments being deposited during this middle to late stage of the Flood" (p. 747).

He also believes Mesozoic strata were deposited late in the Flood (p. 748). But all air-breathing, land animals had to be dead by Day 150 and so could not make tracks in the middle or late in the Flood (there could be tracks in the middle of the Flood if defined before Day 150). Since the Mesozoic is loaded with billions of dinosaur tracks, the Mesozoic must be early Flood, being deposited before Day 150. Thus, the deposition of continental strata must be highly nonlinear—mostly occurring early in the Flood.

The above example is one of many reasons why I believe we must view the strata and fossils from the mechanism that deposited them—the Flood.[21] The last half of the Flood after Day 150 was mainly an erosional event, taking off thousands of meters of strata from the continents. It appears then that the Mesozoic and Cenozoic of the high continental areas, such as the western United States, must have been deposited *before* Day 150. Such conclusions are rather radical when considering the geological column as a linear sequence of biblical Earth history, but the strata, the fossils, and a number of other difficult observations make more sense to me within Walker's model.

Where is the Flood/post-Flood boundary?

Chapter 94 discusses the location of the Flood/post-Flood boundary—an important boundary in Flood geology of which I have spent over 20 years analyzing. Overall, this is a good chapter on the controversy. He goes through a variety of arguments on where to place the boundary, assuming the geological column. He ends up stating that the Flood/post-Flood boundary is certainly above the Cretaceous/Tertiary in the geological column (pp. 760–761), but from the next chapter he probably would put the boundary in the early Cenozoic.

I have come to believe the boundary is in the late Cenozoic most areas, assuming the geological column for sake of argument. I have about three-dozen criteria to support this position, one of which, coal, is alluded to in this chapter but not fully developed. Snelling states that 30% of coal is found in the Cenozoic (p. 758). Some thick coal seams are as late as the Miocene—early late Cenozoic. Coal is very likely only a product of the Flood, and so a Miocene date implies a lot of strata, probably many hundreds of meters, must have been laid over the plant material in order to change the plant material to coal. So, a coal seam dated as Miocene would likely require not only hundreds of meters of strata deposited over the seam, but also this strata subsequently eroded off to near the level where the coal is found. This much catastrophic geological activity would have occurred after the Miocene, which would place the Flood/post-Flood boundary in the very late Cenozoic.

Other problems surface in chapter 95 on climate and geological activity of the post-Flood world because of the location where Snelling tentatively places the Flood/post-Flood boundary. I will mention three examples.

Snelling states that the Yellowstone 'fossil forests' were buried after the Flood (p. 764). These vertical, petrified trees, dated as Eocene, are found at numerous locations within the Absaroka Volcanics, which covers 23,000 km^2 and is up to about 2,000 m thick. The Absaroka Volcanics represent the depositional area of numerous volcanic debris flows and currently is located at high altitudes, up to about 3,500 m above sea level. Furthermore, the top has been eroded off, leaving behind an erosion surface (very likely from Flood runoff), and valleys have been deeply eroded up to 1,200 m into the formation. There are 200 species of trees and pollen ranging from tropical to cool temperate climates, an impossibility in the area today. It appears to me the so-called fossil forests of Yellowstone and the Absaroka Volcanics must be Flood features with the trees being deposited from a log mat.[22]

The second example of the placement of the Flood/post-Flood boundary in the early Cenozoic is that Snelling believes heavy rainfall over large areas would have resulted in the formation of planation surfaces on the earth, commonly dated as mid to late Cenozoic. One problem with this idea is that the atmosphere simply cannot sustain that much precipitation over a wide area without soon drying out. Snelling seems to believe that hypercanes can produce

Figure 3. Soda Butte Valley, northeast Yellowstone Park, USA, showing 1,200 m of channelized erosion in the horizontally bedded Absaroka Volcanics, a redeposited volcanic breccia. Vertical and horizontal trees, the so-called multiple petrified forests of Yellowstone Park, are found at many locations within the breccia.

enough water to overcome the rainfall problem to plane the land. Hypercanes are super hurricanes generated from very hot ocean water around 40°C or more. However, hypercanes would either be rare or nonexistent after the Flood,[23] because they require hot sea surface temperatures and almost calm air to form—neither very likely in the post-Flood period. Besides, if hypercanes could form, they would weaken rapidly after leaving the area of hot ocean water and fall apart quickly when hitting land. Moreover, heavy rain is not observed to plane strata and granite, but to dissect rock. The many planation and erosion surfaces seen today are not forming but being destroyed by water. It makes much more sense that surficial planation and erosion surfaces occurred during the runoff of the floodwater from the continents.[24]

The third example is that Snelling wants to hold off the Ice Age for several centuries after the Flood (p. 759). I see this as very difficult from the field of atmospheric science. The two major ingredients for an Ice Age are in place starting at the end of the Flood: (1) volcanic ash and aerosols to cool the mid and high latitude continents, especially in summer, and (2) the warm ocean at all depths and latitudes.[25] The volcanic ash and aerosols from the Flood would be replenished as they fall out of the sky by copious post-Flood volcanism, as the Earth settled down from the Flood catastrophe. The reason Snelling wants to hold the Ice Age off for a few centuries is because he needs time for mid and late Cenozoic post-Flood catastrophism in which a great amount of warm-climate plants and animals from that 'age' were buried at mid and high latitudes in thick Cenozoic strata. The bias toward an early Cenozoic Flood/post-Flood boundary is driving this belief in the delayed Ice Age. This belief needs justification within the creationist technical literature.

Part VII ends on a high note

Chapters 96–98 end a checkered Part VII on a more positive note in dealing with the Ice Age to the present time. I will end this section by mentioning Snelling's suggestion that much post-Flood dispersal of animals and plants could have occurred by floating log mats after the Flood, some logs which would have floated for several hundred years. The log mat idea is taken from a paper by Wise and Croxton.[2] I believe it can explain many uniformitarian mysteries in biogeography.

Dating and other geological challenges answered

The rest of the book, Parts VIII to X, has much excellent material related to the challenges of time. Part VIII deals with new, powerful results that the radioactive dating methods should not be trusted. Snelling has been on the vanguard of this research by being on the RATE (radioisotopes and the age of the earth) project. He states that stratigraphic ages, based mainly on fossils, are often adjusted to radiometric dates (p. 838). That is interesting because I have found references that they date by the fossils and fit radiometric dating to the fossils.[26] Maybe it is both. He goes into some of his key research results of the RATE project; for example, the implications of polonium halos in biotite, helium retention in zircons, and carbon-14 in coal and diamonds.

Part IX delves into the many chronometers that contradict the naturalistic old universe/old Earth paradigm and adds support for the short biblical chronology. This part delves into young ages for the universe and solar system derived from the lack of supernova remnants in the universe, the decay of comets, the decay of the Earth's magnetic field with the naturalistic problem of keeping a magnetic field going for billions of years, the amount of sea salt in the ocean, the lack of continental erosion in millions of years, the lack of sea floor sediments, the lack of volcanic material on the Earth, too much helium in the atmosphere, the existence of short-half life polonium radiohalos, and human population statistics.

Part X, the last, provides answers to the many challenges from rocks, fossil, and processes that imply slow deposition or formation. We have been familiar with these 'slow processes' since early grade school, such as the claim it takes millions of years to form oil. People claim that all these features take place slowly mostly because naturalistic scientists have assumed that they had to occur slowly. When we bring the Genesis Flood back into

our thinking, all, or practically all, these 'slow' processes could have happened rapidly. The Flood is the great 'time cruncher'.

Creationists have answers to dozens of these Earth science challenges, which Snelling summarizes in one convenient spot in Part X. Some of the many processes that can occur rapidly during or after the Flood are: (1) deposition of thick sediments and lithification, (2) hardgrounds, (3) chalk and diatomite beds, (4) coral reefs and limestone, (5) 'evaporites', (6) varves and rhythmites, (7) buried 'fossils forests', (8) coal beds, (9) oil deposits, (10) limestone caves and cave deposits, (11) regional metamorphism, (12) granite formation, (13) ore and mineral deposits, and (14) ancient 'ice ages'. This material is a summary of more extensive creationist writings on these subjects. So, we have reasonable answers to many earth-science challenges.[27]

I was uneasy with the chapter on granite formation, intrusion, and cooling. I believe that more research is needed on all facets dealing with granite, such as how and why should a huge amount of rock be melted in the lower crust, the gathering together of all the small melt areas into a large magma chamber, the uplift and emplacement of this magma, and the cooling and solidification into the unique texture of granite—within a very short time scale associated with the Flood. I have found evidence that granite plutons and batholiths were solid late in the Flood, based especially on the formation of planation surfaces and pediments on granite during the Flood (they will not form on a liquid surface) and the erosion of granite masses forming conglomerate during the Flood. Snelling has found evidence that granites crystallized rapidly from the existence of polonium halos adjacent to uranium halos, which implies that the granite magma cooled and solidified in just days to weeks!

Despite the success in explaining many Earth science challenges, there are still a few hundred left to go. There are so many challenges left because we lack researchers, time, and finances. Fortunately, much of the research to answer these challenges has already been performed and published by uniformitarian scientists; we just need to reinterpret the facts under the paradigm of biblical Earth history. To provide reasonable answers to some of these challenges, however, will take great effort—on the scale of the RATE project that discovered powerful evidence against the old ages deduced from radiometric dating. The project cost about US$1.5 million.

Summary

Although there are controversial subjects in this book, it is definitely worth reading for creationists and even non-creationists. The two volumes provide a great amount of evidence for the Flood. The volumes are written within the paradigm of the catastrophic plate tectonics model that assumes an absolute geological column, a pre-Flood/Flood boundary in the Neoproterozoic, and a Flood/post-Flood boundary generally in the early Cenozoic.

I believe much more research is required in the controversial areas that I have pointed out. Many more details need fleshing out in the creationist technical literature. Snelling acknowledges this in the section at the end of volume 2 on concluding challenges:

> "Not even a detailed analysis of this size [1,102 pages] is able to present all the evidence, discuss all the objections, and solve all the difficulties in understanding the catastrophic past of our planet … this discussion has been limited by space constraints" (p. 1033).

I could see where this book could have been 5,000 or 10,000 pages if Snelling delved more into the evidence, objections, and solutions to problems in Flood geology.

Note to critics

Let the critic of young-earth creationists realize that there is a host of evidence for biblical Earth history as defined from the Scripture. Critics should apply the scholarly approach by examining these issues beyond the superficial level. Flood geology has progressed a huge amount since the time of Whitcomb and Morris,[1] but because the Earth sciences are so complex, there are still many unknowns and some issues have not been worked out. This is where it is good to have multiple working hypotheses.[28] It is hoped that after critics read Snelling's work, their articles and books that challenge young-earth creationists, will have far fewer wrong assumptions and conclusions. Before a critic tries to refute a position he believes is wrong, he should first learn what the opposition actually believes.

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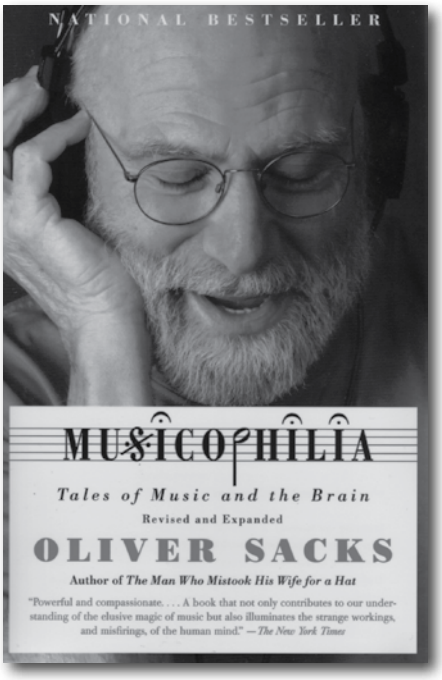
Does music have evolutionary origins?

A review of
Musicophilia, Tales of Music and the Brain (revised and expanded)
by Oliver Sacks
Vintage Books, New York, 2008

Greg Demme



Music has fascinated and entertained people across all cultures during all of history. But few of us stop to think, where did music come from? What is its purpose? Can such questions even be answered?

Dr Oliver Sacks, the brilliant neurologist, ambitiously tackles many neurological and experiential aspects of music in his book *Musicophilia, Tales of Music and the Brain*. Sacks is well known for his popular level collections of case studies of people with neurological disorders, such as *The Man Who Mistook His Wife for a Hat*.[1] His 1973 book *Awakenings*[2] was adapted into an Academy-Award-nominated film[3] of the same name in 1990, starring Robin Williams (portraying Sacks) and Robert DeNiro. And his book *An Anthropologist on Mars*[4] catapulted animal behavioral scientist Temple Grandin into fame by describing her case of high functioning autism. One of the stories in this book was the inspiration for the 1999 Val Kilmer film *At First Sight*, and also helps explain an otherwise puzzling miracle of Christ.[5]

In *Musicophilia*, Sacks addresses numerous categories of how the human brain processes music: extreme musical giftedness (and its opposite, amusia) as well as the loss thereof, musical seizures and hallucinations, the use of musical therapy in treating various neurological conditions, such as aphasia, dementia (like Alzheimer's), Tourette's syndrome, Parkinson's disease, and depression. The sheer scope of *Musicophilia* is impressive, as is the way Sacks relates the case studies and the complex neurological concepts in his characteristically lucid and engaging style.

Music—uniquely and universally human

Throughout *Musicophilia*, Sacks repeatedly (and correctly) identifies music, like language, as an ability that has developed uniquely (and universally) in humans, as opposed to animals. The very word *musicophilia* refers to this human propensity for music. In describing the human ability of musical imagery, he writes

> "Our susceptibility to musical imagery indeed requires exceedingly sensitive and refined systems for perceiving and remembering music, systems far beyond anything in any nonhuman primate" (p. 42).