Some Thoughts on the Precambrian Fossil Record

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ABSTRACT

The relative position, thickness, areal extent, and structures of the Precambrian sediments indicate that they were formed in a global water catastrophe which either predates the Flood or corresponds to its earliest stages. Yet, the quality of preservation, abundance, and diversity of Precambrian fossils severely challenges the idea that Precambrian fossils were formed during Noah's Flood. It is proposed here that

(1) ocean microorganismal ecosystems were created on Day Two of the creation week;

(2) most of the pre-Vendian sediments and all the pre-Vendian fossils were deposited and buried during the third day of the creation week in the 'Day Three Regression'; and

(3) the basal Vendian tillites and the Ediacaran organisms were the first buried sediments and organisms in Noah's Flood.

INTRODUCTION

Andrew Snelling, in a recent article,[1] called for further discussion on the proper place of the Precambrian in the creation model. Focusing only on the fossils and the fossil-bearing sediments of the Precambrian, I would like to defend an alternative placement of those sediments from that suggested by Dr Snelling.

THE NATURE OF THE PRECAMBRIAN FOSSIL RECORD

A successful creation model for the Precambrian must provide an adequate explanation for the various features which characterize the Precambrian fossil record. This discussion draws attention to three very important characteristics of the Precambrian fossil record which should be explained in a good model for the fossil record.

First, the stratigraphic sequence of Precambrian fossils must be explained. In this paper it will be assumed that published radiometric ages provide reliable information about the **relative** ages of Precambrian rocks. Although it is acknowledged that this claim still needs to be properly evaluated in a creationist model, and may turn out to be incorrect in many instances, it will be accepted here for three reasons:

(1) Until creationists can provide a model which can explain the radiometric ages which we observe,[2] at least the relative ages provided by radiometry are 'best' interpreted in more or less the conventional manner;

(2) Even if it were to turn out that radiometric dates are random and completely unreliable as time markers, the **published** radiometric ages may still be reliable in a relative sense. Since non-radiometric indicators (for example, superpositional stratigraphy) are often used in concert with radiometry, the published ages may have been chosen from among the full range of available radiometric dates on the basis of truly reliable non-radiometric indicators of relative age;

(3) The relative order of events summarized below appears to be verified with superpositional stratigraphy in Precambrian sections.[3]

From the radiometric data, the following claims can be made about the stratigraphic sequence of major organismal groups in the Precambrian:[4]

(a) no undisputed fungi or (true) plant fossils have been found in Precambrian sediments.

(b) Undisputed animal fossils are found only in the very uppermost Precambrian sediments, above the so-called 'double tillite' in what are called Ediacaran sediments (conventionally dated to 680 mybp). Furthermore it is still unclear whether these organisms are classifiable with any organisms in the Phanerozoic.[5]

(c) Undisputed heterotrophic eukaryote fossils are found in the Upper Precambrian sediments, reaching down somewhat below the double tillite (to sediments conventionally dated at 1.4 bybp).
(d) Undisputed autotrophic eukaryotes are found in Upper Precambrian sediments, reaching down just a bit below the lowest eukaryotic heterotroph.
(e) Undisputed prokaryotes are found in both the Upper and Lower Precambrian rocks.

It should be further noted that since Precambrian sediments can preserve such relatively delicate body fossils as those of bacteria (and in rather high abundance and diversity — see below) it would seem that those sediments would have preserved less delicate organisms (for example, animals and plants) **if they were available at the time of deposition.**

Second, the relative abundance of Precambrian fossils needs to be explained. Precambrian microfossils are found within approximately 100 microbiotas, almost all of which are scattered among approximately 1000 stromatolitic occurrences.[6,7] Considering the vast thicknesses of Precambrian sediments,[8] the frequency of body fossils (and even of stromatolites) in the Precambrian is very low. Beginning in the lowest Phanerozoic, one hundred stratigraphic horizons can be located within individual formations.[9,10] At least some of the difference in fossil horizon abundance is likely to be due to the fact that in the field it is far more difficult to find microfossils than it is macrofossils. Though this has not yet been quantified, it is the author's impression that the frequency of fossils in the Precambrian is substantially lower than the frequency of fossils in the remainder of the fossil record (that is, the Phanerozoic).

Third, the diversity and abundance of Precambrian fossils needs to be explained. Precambrian (especially Precambrian bacterial) species are usually represented by abundant specimens in any particular horizon. They are also often found in association with a variety of other taxa. Microbiotas are only rarely monotypic, and can be surprisingly diverse. There is every reason to believe that the Precambrian fossils are representing an ecological complexity similar to the complexity of modern microbiotas. Many Precambrian fossils are well enough preserved and similar enough to modern forms to be able to classify them in modern taxonomic categories. For example, both modern classes of cyanobacteria are represented by several fossil species,[11,12,13] at least one fossil representative of the micrococci bacteria has been claimed from the Precambrian,[14] and several Precambrian fossil representatives have been found of the budding bacteria.[15,16] Beyond those species which are easily classified among modern groups, several dozen more Precambrian microfossil species have been described in the literature. Most of these 'species' lack characters necessary to suggest that they are eukaryotic, so they are generally assumed to be bacteria. Even the very oldest stromatolites, though they lack body fossils, contain carbon isotope ratios, kerogen residues, and general structures consistent with the idea of photosynthetic activity. The organisms responsible are inferred to be cyanobacteria because they are found as body fossils in chemically and structurally similar stromatolites farther up the column, as well as in modern stromatolites. The similarity in chemistry and structure may also indicate that a similar poly-taxon ecology existed within these earliest stromatolites. Evidence seems to indicate then, that polyspecific prokaryotic communities were extant at the time of deposition of some of the world's first-formed sedimentary rocks. Besides the prokaryotic organisms, in the uppermost Precambrian several taxa have been described which are almost certainly eukaryotic — some most probably algal, and others most probably heterotrophic. Additionally, in these same sediments, dozens of 'species' of acritarchs have been described. Most or all of these acritarchs are likely to be resistive stages of eukaryotic algae.

AN ALTERNATIVE EXPLANATION OF THE PRECAMBRIAN FOSSIL RECORD

Snelling[17] has suggested that much or all of the Precambrian fossil-bearing sediments need to be considered Flood sediments. Yet, it would be difficult to explain some of the above-mentioned features of the Precambrian fossil record in Noah's Flood. Although most of the Precambrian sediments are not chemically or structurally different from Phanerozoic sediments, and they preserve the delicate body fossils of a diverse array of microorganisms, it is only in the very uppermost part of the sequence (that is, in Ediacaran sediments) that body fossils of any plants, animals, or fungi are found. It is difficult to understand how sedimentary processes which are capable of preserving bacteria would not have preserved macrobiota if they were living anywhere nearby. The photosynthetic nature of many of the Precambrian organisms seems to imply that the organisms had to have lived in the photic zone. This is further evidenced by the fact that modern stromatolites are restricted to the upper photic zone and are very similar in chemistry and gross structure to Precambrian stromatolites. This would argue that the Precambrian organisms were not growing (for example) in pre-Flood subterranean caverns. In fact, it would seem to argue against them living anywhere which is inaccessible to other organisms. Although many modern microbiotas (for example, stromatolites in Shark Bay, Australia) live in environments with otherwise low taxonomic diversity, even those environments are not completely lacking in macroorganisms. Furthermore, Precambrian fossils are found in large geographical areas scattered over many parts of the earth.[18] It is difficult to understand how so many thousands of meters of sediments over such vast areas could be accumulated in so many different places preserving only microorganisms without preserving the macroorganisms which we know were otherwise abundant on the earth's surface (since they are preserved in Phanerozoic sediments). Another problem with explaining Precambrian fossils in terms of the Flood is the change of frequency of fossil horizons near the Precambrian/Cambrian boundary. This change seems to reflect a distinct change in depositional mode — comparable only to the taxonomic and sedimentological changes which occur at the Paleozoic/Mesozoic, and perhaps also the Mesozoic/Cenozoic boundaries. It is not at all clear what sort of event in the course of a Flood model this kind of change would represent. The fossil content of the Precambrian would seem to argue that the sediments of the Precambrian were deposited before the creation of any true fungi, plants, or animals (that is, before the creation of the land plants on Day Three).

As Snelling pointed out,[19] evidence in the Precambrian sediments argue for depositional processes which are rapid and water-dependent. The great thickness and geographic extent of the Precambrian sediments also seems to argue for deposition on a global scale. The most likely event to explain worldwide water catastrophe before the creation of the land plants would be what the author calls the 'Day Three Regression'. On the third day of creation, the position of the global ocean was adjusted to make way for the dry land 'to appear'. If this event was allowed to run some or much of its course according to physical processes which we currently understand, it might have involved the rising of continental crust from a subaqueous to a subaerial position with the water running off as it rose. The events of that day may have begun with the formation of continental crust by partial melting and fractionation of the earth's upper mantle, and continued with an isostatic adjustment of the lighter crust to form the continents. Perhaps it was on this day that the lithospheric plate boundaries were formed which would later be the locations of active tectonics during the Flood. In any case, in the process of the elevation of the continental crust, the ocean would be forced to 'move aside' as the waters ran off the continents. This regression would be a worldwide water catastrophe capable of substantial erosion, redeposition, and burial. If the oceans already contained diverse microbiotas, then the 'Day Three Regression' could provide a context for the processes which led to the deposition of the Precambrian sediments and the burial of Precambrian microorganisms. Since the Day Three Regression involved a different biota with a different population density than that involved at the time of the Flood, the rarity of Precambrian fossils as opposed to Phanerozoic fossils can be explained. On the other hand, the similar water-driven nature of each event explains the similarity in sediments and modes of lithification and fossilization between the Precambrian and the Phanerozoic. Furthermore, the sequence of Precambrian fossils, from the dense benthic stromatolites and stromatolitic-bound cyanophyte-based biotas to biotas lightly associated with the stromatolites to finally planktonic biotas (including eukaryotes) may reflect a decrease in depositional vigor through the regression event.

What reason is there to assume that microbiotas existed in the seas by early Day Three? Other than as a means of explaining the fossils of the Precambrian, this author proposes an aesthetic justification for this position. As has been pointed out many times before, there is an interesting parallel between the first three days of creation and the second three days of creation. It can be argued that Day One involved the creation of space ('heavens' of Genesis 1:1) and Day Four the creation of the 'things therein' (that is, sun, moon, stars, etc.); that Day Two involved the creation of the atmosphere and oceans (the 'firmament' and the 'waters which were below the firmament' of Genesis 2:7) and Day Five the creation of the 'things therein' (that is, the flying creatures and swimming creatures); and that Day Three involved the creation of the land and Day Six the creation of the 'things therein' (that is, land animals and man). If this observation is in any way valid then it is perhaps significant that not only was the land created on Day Three for the land animals and man on Day Six, but also the plants (Genesis 1:11–12) were created which would be their food (Genesis 1:29–30). Perhaps similarly Day Two creation events included the creation of ocean microbiotas which would be the food for the sea creatures created on Day Five. If this were true, then the ocean would have contained the biotas necessary to explain the fossils in the Precambrian.

DISCUSSION

This hypothesis is not without its difficulties. Among them, one might argue that the creation of fossils during Day Three of the Creation week would involve the death of those organisms. This, one might argue, is impossible since death did not occur before the curse of death, which follows Adam's sin. However, it is likely that life and death are defined differently in Scripture than in biology. Even as Adam and Eve ate the fruit which they were allowed to eat, cells in the fruit would 'die'. This form of biological death must have preceded the fall of man. In like manner, single celled organisms (for example, bacteria, protists, algae) may have died before the fall without violating the fact that death did not precede Adam's sin.[20]

Yet, even granting this were so, it might be argued that the biological death of plant cells was allowed before the fall in order to fulfill the immediate and important purpose of providing food for animals and man. Also, it is assumed that the plants in the perfect pre-fall world would be efficiently used and not wasted in any way. This would apparently contrast with the microorganisms killed and buried in a Day Three Regression. They would, at first glance, seem to have been wasted — to have 'died in vain'. On the other hand, not enough is understood about the pre-Flood world, these fossils, and the will of God to exclude the possibility that they served some sort of efficient purpose. They may have even provided food for other organisms. For example, decomposition of some or most of the organisms may have released organic materials which migrated through the rocks to become food for some other organisms (just as oil has been produced from many organisms buried in Flood sediments and then has migrated toward the surface to be utilized by another portion of the earth's biota). Perhaps more directly, the burial of these stromatolite-based microorganismal communities became food for the kind of bacteria which we have recently come to recognize exist at great depths below the earth's surface. In short, it is not possible, with our current understanding, to exclude the possibility that these buried organisms efficiently fulfilled a purpose on the pre-fall earth. In fact, it is consistent with the evidence to claim that **all** the microorganisms created on Day Two had the purpose of providing food for other organisms.

Another challenge to this paper's suggestion concerns how large stromatolitic structures could have been formed within the time constraints imposed by Scripture. Living stromatolites are the microorganismal equivalent of coral reefs. They contain within their structure both organic remains of past organisms and inorganic substances ordered into layers by those organisms. If God had created such a structure He would have created evidence of 'past' deaths (albeit biological, and possibly not 'biblical' death) which never actually occurred! To have God create such evidence in the midst of the constructive activity of the Creation Week seems (superficially at least) to be against His nature. If God does not create such things, then it would seem that stromatolites had to have been produced by growth since the creation of the organisms. Since normal photoautotrophic activity is restricted to periods of light, normal stromatolitic growth would also be restricted to periods of light. Assuming the earliest time for the creation of stromatolitic organisms (the first moment of Day Two) and the latest time for their burial in the Day Three Regression (the last moment of Day Three), the maximum amount of time available for stromatolite growth before their burial is two light cycles.[21] Two light cycles (or three, or even 100) seems like too short a period of time to account for the many layers of organismal growth implied by the extensive banding of the Precambrian stromatolites.

If the 'days' of Genesis 1 — even those which came before the creation of the sun — cannot be considered longer than 24 hours,[22] then it would seem that at least some of the structure of Precambrian stromatolites was created by God. Perhaps the innermost inorganic/organic layers of the stromatolites were created as a substrate upon which created organisms could thrive. It is suggested that the organic matter in the interior of stromatolites is the result of

(1) created organic molecules,
(2) created organoheterotrophs which thrived in the interior of stromatolites, and
(3) descendants of created organoheterotrophs which thrived in the interior of stromatolites.

This hypothesis can be tested by examining the structure of Precambrian stromatolites. Body fossils of photoautotrophs should be found only in the stromatolites' surface layers which could have survived because of access to light, and/or could have been produced in the course of a single light cycle. Otherwise, the deeper layers of the stromatolite should contain only organic molecules and/or body fossils of organoheterotrophs.

Another consequence of this paper's hypothesis is that at least some of the Precambrian would have to be included in Flood sedimentation. Since the Ediacaran deposits (by definition) contain true multicellular animals, these Uppermost Precambrian sediments must have been deposited in the Flood. As a reasonable boundary between Flood and pre-Flood deposits is sought, it must be noted that just below the Ediacaran fauna, defining the base of the 'Vendian System', is a 'tillite' (and in many places a characteristic double 'tillite'). It is provisionally proposed that this 'tillite' is incorrectly identified and actually represents the first clastic deposits of the Flood. This hypothesis predicts that this 'tillite' is better interpreted as a high-energy water deposit than as a glacial deposit. Also by this hypothesis the only possible multicellular fossils below this 'tillite' would be those buried since the creation of land plants and before the Flood (that is, in the antediluvian world). Since it is generally thought that there were no global or even regional diluvial events in this period of earth history, no true multicellular organisms should be found in substantial flood deposits below this 'tillite'. As a result, this hypothesis would predict that this tillite would be nowhere underlain by thick, laterally extensive, water-lain deposits containing fossils of true animals, plants, or fungi.

CONCLUSION

The quality of preservation of Precambrian fossils combined with their low abundance and lack of multicellular examples, severely challenges the idea that the Precambrian sediments were formed during Noah's Flood. On the other hand, the global extent, thickness, and sedimentary structures of Precambrian sediments argue for their formation in a global, water-driven catastrophe. Since they are found below Flood sediments in many places, it must be reasoned that the Precambrian sediments were formed in a pre-Flood global water catastrophe. The best Scriptural candidate for such an event is the 'Day Three Regression' implied in Genesis 1:9–10.

In order to best rationalize these facts, the following is here proposed:

(1) on Day Two microorganism communities were created in the worldwide oceans to provide food, espe-

cially for the sea creatures created three days later;
(2) included in the creation of Day Two were the floating and swimming communities of algae and protists as well as the benthic, stromatolite communities;
(3) in addition to the complex auto-/hetero- troph community structure near their surfaces, stromatolites were created with alternating internal bands of organic molecules and inorganic particles, and possibly with internally-thriving organoheterotrophs;
(4) the microcommunities of the sea were allowed to thrive and grow for at least the one light cycle of Day Two;
(5) on Day Three continental and ocean crust may have been differentiated by partial melting and fractionation;
(6) on Day Three continental crust rose and ocean crust sank isostatically, redistributing ocean water off of the continents and into the ocean basins (called here the 'Day Three Regression');
(7) the Day Three Regression deposited all of the catastrophically-deposited Precambrian sediments;
(8) the earliest Flood sediments begin with the erosional event represented by the basal Vendian double tillite where it is preserved; and
(9) the earliest Flood fossils are the Ediacaran fauna.

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