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Forum on the Flood/post-Flood boudary

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Introduction to the Forum the Flood/post-Flood boundary

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The location of the Flood/post-Flood boundary is an important issue for Flood geology because it is the starting point for a host of research questions. Many papers have been published on this topic, but its placement is still controversial. Three main views are advocated: a low Flood boundary in the Paleozoic or below, a boundary at or near the Cretaceous-Tertiary boundary (now the Cretaceous/Paleogene boundary), and a variable boundary towards the upper Cenozoic but with each geographical area to be evaluated on its merits.

In 2012, Marcus Ross, published a biostratigraphic analysis and argued that a Flood/post-Flood boundary at or near the Pliocene/Pleistocene on the geological column was untenable,[1] and that the Cretaceous/Paleogene (or K/T) is the highest possible post-Flood boundary. In a brief letter exchange, Tasman Walker argued that the palaeontological data is biased by hidden assumptions, making Ross's conclusions on the boundary premature. The two-stage letter exchange follows.

Forum contents

Post-Flood boundary—a robust analysis flawed by hidden assumptions

Tas Walker

I want to thank Marcus Ross for his paper "Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary"[1] and the scholarly, robust analysis he reports. His use of biostratigraphy as an argument for the Cretaceous/Paleogene (or K/T) being the Flood/post-Flood boundary has made a valuable contribution toward understanding the issues involved in determining that boundary.

Ross argues there should be a biostratigraphic break marking the termination of Flood sedimentation, and gives a number of reasons for this. I agree with this, having previously suggested that fossils of animals 'native' to a continent would be useful for classifying its various rocks within a biblical geological framework.[2]

From the online Paleobiology Database, Ross examines the North American mammalian fossils to try to determine a specific location on the geological column that could be considered the post-Flood boundary. However, it is incorrect to try to find the post-Flood boundary using the geological column in this way. The problem is that the column is not a physical reality, but a hypothetical construct. The assignment of rock units to the column depends on many different assumptions. The same sort of assumptions feed into the fossil classifications contained in the Paleobiology Database.

This is especially problematic for any analysis that covers Cenozoic sedimentation. Compared to the regional to subcontinental scale of some Paleozoic and Mesozoic sedimentary rocks, Cenozoic sediments tend to be of more limited geographical extent and geographically isolated.[3] Thus, in order to assign these sediments onto a position on the geological column, uniformitarian geologists use a variety of criteria consistent with their beliefs about how geological processes operated in the past. The problem is that their assignment may or may not be compatible with the processes involved in the biblical Flood, which they deny ever occurred.

Any evaluation of the Flood boundary needs to be done using physical evidence—rock units that have been mapped

on a geological map, described in a geological report, and which can be observed and examined in the field. Fossils of native animals may be helpful for classifying such a rock unit within a biblical model. But, even in this situation it is important to use *multiple* classification criteria, and obtain a consistent result across a number of criteria.[2]

Ross notes that views among creationist geologists are mainly divided between a boundary at the Cretaceous/Paleogene (K/T) and one at the Pliocene/Pleistocene, citing Oard as representative of the latter view. However, this misrepresents what many advocates of a late Cenozoic post-Flood boundary are saying. Their idea is that the biblical correlation of each geographical location needs to be assessed on its merits.

Oard discusses this in his paper "The geological column is a general Flood order with many exceptions", concluding that, "Cenozoic strata can be early Flood, late Flood, or post-Flood depending upon the location and the particular fossil used to define the Cenozoic."[3] That being the case, it is futile to try to determine a single location on the geological column for the post-Flood boundary because no such location would exist.

Thus, this biostratigraphical assessment is not able to determine the post-Flood boundary because it does not deal with the primary data. The data it uses has been biased and confused with too many uniformitarian assumptions. In order to evaluate the reliability of this approach the following process is needed:

1. Consider each of the fossils in the database one by one.
2. For each fossil, recover the original scientific paper in which the fossil was classified onto the geological column.
3. From that paper determine the geographical location and geological unit in which it was found.
4. For each geological unit, using geological maps, map commentaries, and relevant geological literature, determine where that geological unit should be assigned within the biblical geological framework. Multiple classification criteria consistent with the biblical Flood and its aftermath should be used. For example, for each geological unit consider its geographical size, thickness, relationships with other units, fossil content, deformation, and erosion, etc.[2]
5. Before any confidence can be placed in this application of the Paleobiology Database it still needs to be checked for accuracy. In particular the identification and name assigned to each fossil needs to be checked because, among other issues, different names are routinely assigned to the same species.[4] For this analysis to be reliable, we need to check that the fossils named and assigned in the database are indeed unique to North America. In other words, does the fossil truly represent a native extant animal in the region, or could it be related to animals from other parts of the world? Transportation of animals by water during the Flood would be a significant factor.

The physical, geographical location of the Flood/post-Flood boundary will become clear as we proceed with such an analysis.

Thus, the paper's conclusion, "Placement of the Flood/post-Flood boundary at or near the Pliocene/Pleistocene boundary [is] untenable", is not justified from the biostratigraphical analysis reported. There are too many hidden assumptions in the data used; that is, in the way the geological units and fossil animals have been assigned to the geological column. The only reliable way to determine the location of the post-Flood boundary is to examine the primary geological data using an analysis that assumes biblical history.

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4. Here is one example from dinosaur fossils: New Analyses Of Dinosaur Growth May Wipe Out One-Third Of Species, *ScienceDaily*, 31 Oct 2009; www.sciencedaily.com/releases/2009/10/091031002314.htm. Based on Horner, J.R. and Goodwin, M.B., Extreme cranial ontogeny in the upper Cretaceous dinosaur Pachycephalosaurus, *PLoS ONE* 2009; DOI: 10.1371/journal.pone.0007626Improving our understanding of creation and its history.

Improving our understanding of creation and its history

Marcus R. Ross

I appreciate Tas Walker's willingness to engage my paper on the post-Flood boundary[1], and for CMI's publication of our dialogue. I wrote my paper with precisely this type of scholarly dialogue in mind. By training I am a paleontologist, by profession an educator, and this response will use real-world examples from vertebrate paleontology to address the challenges presented. For only with the Bible *and* data can creationists build a detailed history of God's creation, its destruction, and subsequent replenishment.

My paper presumed the accuracy of the Paleobiology Database[2] and the feasibility of long-distance correlations, which Walker claims are deeply, systematically flawed. This is manifestly untrue. Regarding the database, my formal training included collecting, identifying, and curating specimens of dinosaurs, mammals, marine vertebrates, and invertebrates. My Ph.D. work involved compiling a database of over 1,800 mosasaur fossils, spending two years visiting museum collections around the world. As such, I can speak to the reliability of collection records.

Among the thousands of specimens I've viewed, I found very few taxonomic or locality errors, and my own identifications and corrections were gratefully accepted by museum staff. The Paleobiology Database amasses these records, which are evaluated for accuracy before inclusion. It is not perfect (nothing man-made is), but it is detailed, accessible, and rigorous. Pervasive identification and reporting error does not exist, and speculations to the contrary have no basis in fact.

But the database is built on the geological column, and so is biased and unusable, right? Let me lay this argument to rest with an example that combines physical geology (which Walker views highly) with biostratigraphy (which Walker views with suspicion). Five mosasaur genera are found among the sandy clay sediments of New Jersey (US), with the highest fossils located just below an erosional scar that in nearby boreholes[3] preserves a layer of impact debris consisting of shocked quartz, anomalous clay deposits, and elevated iridium levels. Across the Atlantic, in the chalk deposits of Maastricht (the Netherlands), four of the same mosasaur genera are present, and the highest fossils are once again found below a layer of impact debris containing similar materials to those in New Jersey[4] (figure 1).

What should we conclude? That these identical geological features and fossils are unrelated? Mere coincidence?

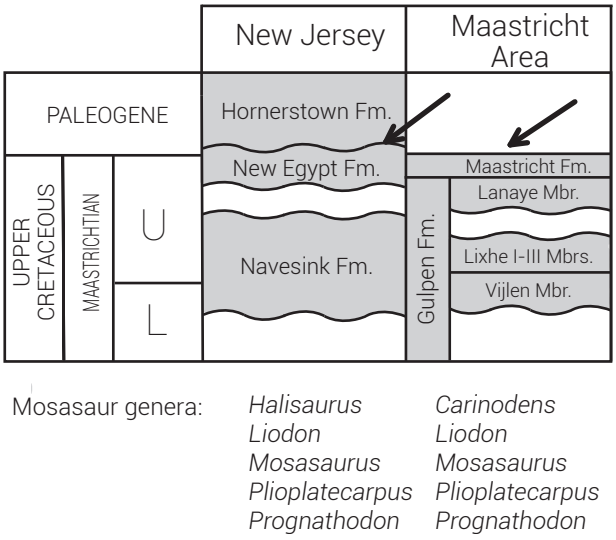

Figure 1. Simplied stratigraphic sections of Maastrichtian rocks from New Jersey (USA) and Maastricht (the Netherlands) and reported mosasaur genera. Arrows note locations of impact debris (see gures 2 and 3). Figure modified from Ross and Fastovsky[5].

Conspiracy? I've personally visited both locations, observed the deposits and verified fossil identifications. The correlation of these sections is robust, based on empirical, verifiable field data, and geologists refer to them as 'upper Cretaceous' and 'Maastrichtian' due to *observable patterns of fossils and rocks*, not 'hidden assumptions' or 'bias'. Walker affirms regional correlation[6]; these data confirm long-distance correlation.

I raise these examples so readers can learn how correlations are actually done by geologists, and how databases are constructed. Claiming that the column is "not a physical reality"[7] isn't just wrong, it misses the point: the column is a construct based on observable, real-world relationships. Recognizing this greatly improves our understanding of God's creation and its history.

Returning to my paper, the North American mammal fossil record is even better than the mosasaur record, involving more localities, taxa, research, and documentation. The Paleobiology Database is replete with references to the information Walker demands. If Walker insists we "consider each of the fossils in the database one by one",[7] he is free to do so for all 1.2 *million* occurrences. Along the way, he will discover, as I have, that the database contains a trove of useful data and only sporadic errors.

It is actually surprising that Walker takes issue with my approach, since he expressed similar expectations of the fossil record in his own model.[8] When drawn at or near the Pliocene-Pleistocene boundary (analogous to Walker's 'late Cenozoic', but see below), the 23% return of positively identified mammal genera back to North America strongly indicates that these sediments are post-Flood, consistent with

other physical geological attributes.[9] Surveying Australian[10] and African[11] fossils yields similar results. When tested against actual data, Walker's own 'natives' criterion points to a post-Flood boundary located below these mammal-bearing Cenozoic deposits on *three continents*, indicating a *global* placement deeper in the geological record.

Incidentally, Walker's use of 'late Cenozoic' is incompatible with his own model, which rejects the biostratigraphy that actually defines the term! This is emblematic of the fact that Walker's model *cannot* provide a global view of Noah's Flood precisely *because* it discards the tools needed to connect distant geological units.

A truly biblical approach to geology recognizes the primacy of Creation Week and the Flood in geological action, and does not mistake interpretation for data. Walker's pervasive skepticisms are unwarranted when confronted by real-world facts. We must not deny observable geological relationships or make wrong-headed assertions of error and bias, for these cannot advance our understanding. But by embracing the physical data of God's creation as they really are, creationists are now better able to discover an accurate and reverently biblical account of earth history.

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Research needed to resolve questions with late Cenozoic post-Flood boundary

Tas Walker

Marcus Ross and I agree it is important for creationist geologists to discuss how they have linked geological evidence to biblical history, and resolve their different conclusions. I appreciate Marcus's paper, which documents his thinking, and his involvement in these subsequent discussions.

To recap, Ross, in "Evaluating potential post-Flood boundaries", used a biostratigraphic analysis to argue that a Flood/post-Flood boundary at or near the Pliocene/Pleistocene was untenable.[1] He argued the analysis indicated the Cretaceous/Paleogene (or K/T) is the highest possible post-Flood boundary.

In my letter, I said that while the analysis was carefully done, the approach was flawed by the hidden assumptions in the 'data'. Namely, the classification of the fossils in the paleontological database to the geological column had been heavily influenced by evolutionary, long-age criteria. The geological processes that long-age geologists envisage are inconsistent with the processes operating during the global Flood.

In his response, Ross assures us that, as a qualified Ph.D. palaeontologist with much experience with mosasaurs, he can personally "speak to the reliability of collection records". Yet, not all palaeontologists are this confident. British palaeontologist Derek Ager, contributor to *Moore's Treatise on Invertebrate Paleontology*, said, "There is much subjectivity in systematic palaeontology."[2] He also highlighted the problems caused because palaeontologists specialise. For example, those working in the Palaeozoic often used different names from those working in the Mesozoic. They also had different classifications, different methods of study, and different terminology for anatomical parts.[3] Ager also noted a peculiarity that some fossil distributions tended to follow national borders.[2] These are some of the issues with the database Ross used, and they need to be resolved before we can draw firm conclusions from the analysis.

What does geological correlation over long distances mean?

Ross argued, on the basis of his research with late Cretaceous mosasaurs, that sediments can be correlated over

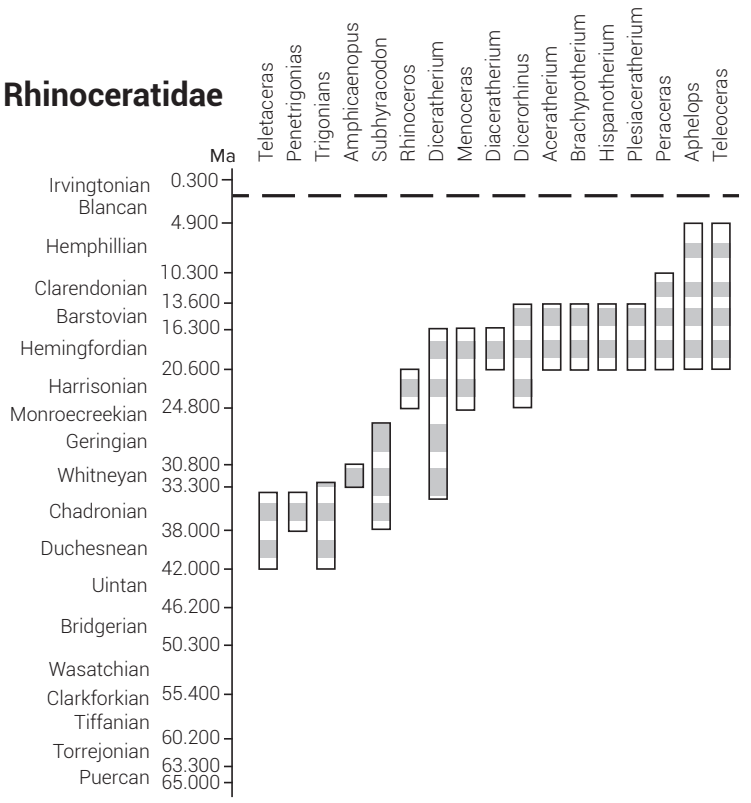

Figure 1. Biostratigraphic fossil distribution of the North American Rhinoceratidae (rhinos) from Ross[12].

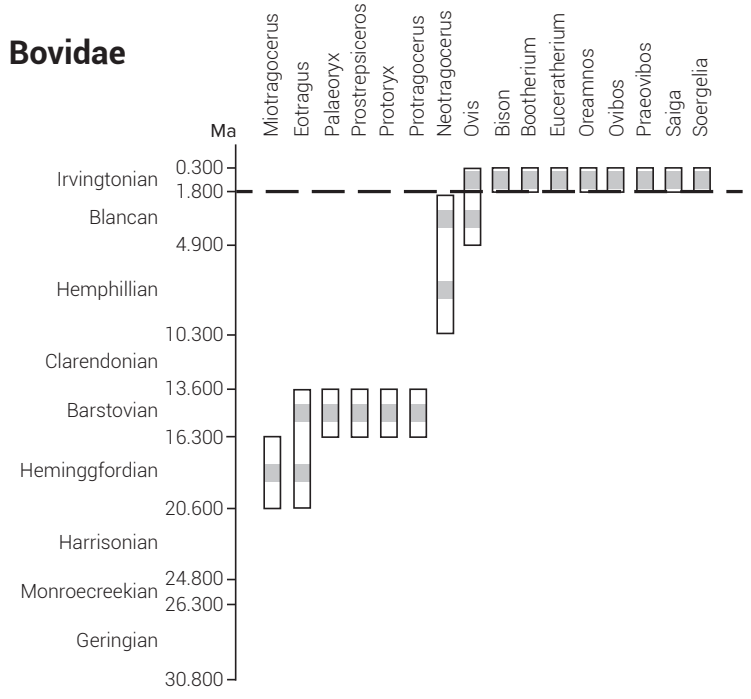

Figure 2. Biostratigraphic distribution of the North American Bovidae (cows, bison) from Ross[12].

long distances. He described how sediments containing mosasaur fossils from New Jersey, US, had similar features (e.g. fossils, shocked quartz due to impact, anomalous clay deposits, and elevated iridium levels) to sediments in the Netherlands in Europe. He claims this proves sediments can be correlated over long distances.

The features that Ross mentions (shocked quartz and iridium-rich clay) were part of the evidence Luis Alvarez presented in 1980 for his meteor-impact hypothesis for the extinction of the dinosaurs. Others have since noted that iridium enrichment can be caused by volcanic eruptions, and that iridium-rich layers are not such precise time markers as originally claimed. Further, there were many impacts during the Flood,[4] and so which impact or impacts contributed to which iridium layer? And the planar deformation features in quartz called 'shock lamellae' are not always caused by shock deformation but can be caused by volcanism, or by prolonged pressure from tectonic activity.[5] So, there are many issues to be addressed.

Even if we accept that a long-range correlation has been established, what does that mean? Were the sediments in the US and the Netherlands part of the same depositional basin? Were they deposited at exactly the same time? Long-age geologists decided that they were and assigned them both to the Maastrichtian of Late Cretaceous on the geological chart—72.1 to 66 Ma ago by their thinking.[6] But how does that translate into the events of Noah's Flood? Were they deposited on the same day or the same week during the Flood? Was it early or late during that year? Were the waters rising or falling? These sorts of issues illustrate the risks of using fossils classified into a secular database without critical examination of their geological setting.

Physical Flood sequence is crucial for geologic classification

Speaking of long-range correlation, I was happy to work with the secular correlations for the Cretaceous sediments of the Great Artesian Basin, Australia,[7] because they were largely based on continuity of physical properties on the one continent. Geological formations in this basin can be matched over thousands of kilometres. My analysis of the physical characteristics of the basin places its

deposition as the waters of Noah's Flood were rising on the earth, around the time they were reaching their peak.[7] On the other side of the continent, an analysis of the fault patterns on geological cross-sections in the Perth area, Western Australia, indicates that the mid Cretaceous marked the time during the Flood when the continents began to rise and cause the waters covering the continent to recede into the ocean.[8] The sediments in Western Australia and Queensland have both been classified as Cretaceous but they are not physically connected. However, they both appear to have been deposited as the floodwaters were peaking, but not at exactly the same time.

The mosasaur fossils that Ross researched were assigned to the Cretaceous, which, according to the analysis mentioned above,[7] is the general timing when the waters of Noah's Flood were peaking. After this, the waters receded from the continents eroding kilometres of previously deposited sediment.[9] This period of erosion on the continents during the Flood is well recognized by long-age geologists, but its Flood significance is not appreciated. It was highly energetic, beginning as a period of sheet flow and ending with a period of channelized flow.[10] The combination of receding water, changing flow patterns, falling sea level, rising continents and emerging landscapes created a complex situation of erosion and deposition during this time. Long-age geologists do not recognize these geological processes because they do not believe Noah's Flood happened. Consequently, their classification of Cenozoic sediments can be highly inconsistent with the timings of the Flood event.[11] In other words, the physical depositional processes for 'Cenozoic' sediments is different from those of the Mesozoic. That is why we cannot just take their fossil database and expect to reach a clear, unambiguous conclusion. We need to go back to the original data as I outlined in my first letter.

Paleontological graphs reveal areas to be researched further

Let's take a preliminary look at a couple of graphs Ross published with his paper. His figure for North American rhinos (his figure 12 reproduced here as figure 1) shows they range from 42 to 4.9 Ma,[12] when they supposedly became extinct in North America. As this graph stands, a Pliocene/Pleistocene post-Flood boundary (somewhere near the dashed line)[13] works well with this data. These fossils can be interpreted as Flood deposits (likely as the floodwaters were receding, if the Cenozoic represents the peaking of the Flood) leading to the idea that these rhinos perished during the Flood and were buried as the waters were receding. The absence of later fossils suggests that the rhino populations that dispersed from the Ark in the Middle East did not reach North America.

All this, of course, has paid no regard to the hidden assumptions in the paleontological data mentioned above, so, further research is needed to confirm whether or not these ideas are upheld by the evidence or need to be modified. Evolutionist Donald Prothero in his book *The Evolution of North American Rhinoceroses*[14] presents a quote from a mid-20th century worker to illustrate the sorts of problems that researchers face as they seek to make sense of the paleontological evidence:

> "The human factor in classification is nowhere more evident than in dealing with this superfamily [Rhinocerotoidea]. … what is 'known' about it is so inconsistent in places that much of it must be wrong."

We will look at another of Ross's figures, the family that includes cows and bison (his figure 4 reproduced as figure 2). Their fossil range extends from 20.6 to 0.3 Ma. If the dashed line at the Pliocene/Pleistocene boundary represents the post-Flood boundary,[13] then the seven genera to the left of the graph would represent animals buried during the Flood as the floodwaters were receding. The eight genera to the right of the graph above the dashed line would represent animals that migrated to North America after the Flood. In other words, these genera present no problem with the dotted line being the post-Flood boundary.

However, of particular note is the one genus (Ovis) that *crosses* the dashed line. Ross argues that such crossings make the boundary at the Pliocene/Pleistocene untenable. This is a premature conclusion. It simply indicates more investigation is needed in this area. Observe that there is a noticeable paleontological gap of between 13.6 and 1.8 Ma, with fossils from only two genera in that region. This gap is the sort of fossil discontinuity that would be expected around the post-Flood boundary.

One possibility with the 'boundary-crossing' genus, Ovis, is that the genus includes several different species, some of which are pre-Flood, and others that are post-Flood. That would still be a distinct discontinuity. A second possibility is that one particular species within the genera existed before and after the Flood. Some members were buried in that area during the Flood, while others returned to North America and were buried post-Flood. While we would not expect this situation to be common, we accept that it would happen occasionally. A third possibility, one that is likely, is that the long-age geological classification of the Cenozoic sediments to the geological column is inconsistent. A fourth possibility is that the identification of the fossils is faulty. All this demonstrates the need to thoroughly examine the basic data.

The other graphs in Ross's paper show many more 'boundary-crossing' genera, highlighting areas that need to be investigated in a similar way.

Summary and conclusion

In summary, Ross has provided a good service to the creation community with his biostratigraphical paper. When we examine his graph for the rhino family we find it is entirely consistent, as presented, with a late-Flood boundary. The graph for the family that includes cows and bison is also, apart from one genus, consistent with such a boundary. The one 'boundary-crossing' genus indicates the area where further research is needed to determine which, of multiple possibilities, applies in this case. His graphs for other families show other genera that cross the hypothetical dashed line, highlighting other areas that need research. Ross's dismissal of a post-Flood boundary near the Pliocene/Pleistocene is not supported by the research he presented because 1) the post-Flood boundary likely cannot be represented by a single line on the column as he shows, and 2) the relevant 'hidden' detail of the paleontological data has not been properly assessed.

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Reliable data disconfirm a late Cenozoic post-Flood boundary

Marcus R. Ross

Once again I thank Tas Walker and *Journal of Creation* for engaging in and facilitating this discussion. What began as a critique on my paper on the Flood/post-Flood boundary has expanded to many other issues. This is fitting, as the methods by which young-earth creationists seek to understand the geological history of our planet vary significantly between two distinct camps, and as such evaluations done using one set of parameters (e.g. using the Paleobiology Database) invite discussions on the background assumptions and methods behind those parameters (such as the acceptance of the geological column and reliability of fossil identifications).

Since Walker's second letter[1] covers a wide array of topics, I will divide my response into several units. The reader should not take my silence on unaddressed issues to indicate either their acceptance or dismissal; it simply reflects constraints on space and the need to address what I believe are the most salient points.

Mishandling of the literature

One of the most troublesome issues I find with Walker's response is his handling of paleontological writings to support his arguments. Walker presses two ancient quotes into service, neither of which reflects current paleontology nor supports his arguments. The first is a 41-year-old quote about subjectivity in paleontological classification. Aside from the fact that Derek Ager would never have agreed with Walker's application of his quote[2], reread Walker's section and ask, what relevance do these concerns about invertebrate paleontology have to do with Cenozoic North American mammalian fossils? In contrast with invertebrates, North American mammals have no differences in a) the Phanerozoic eras under investigation, b) anatomical terminology, c) classification variances between phyla and/or classes, or d) language between countries (US and Canada). The quote was abducted from original context and misapplied to the issues at hand.

The second quote is worse. Here Walker quotes G.G. Simpson (via Donald Prothero), who laments the poor status of rhinoceros fossil taxonomy in 1945, some *69 years ago*! Yet if Walker continued reading the two paragraphs following his lifted quote, he would have learned how this has changed to the point that Prothero states, *on the same page*, "the

huge number of unidentified rhino bones in collections all over the world can now be identified."[3] Walker's misleading arrogation of these writers' works is infuriating, because *it leads readers away from the truth*. It sadly but unreservedly warrants the charge of quote-mining, and I take no pleasure in stating this.

The K-Pg boundary

Regarding Walker's assertions that the K-Pg impact materials may have separate (or even non-impact) sources, these issues have been thoroughly addressed in the geological literature. The unity of the debris is confirmed by many lines of evidence (e.g. shared unique geochemical signatures in the clay layers, specific impact-derived [not volcanic] features of the shocked quartz, lack of appropriate volcanism to distribute iridium on a global scale, etc.). Prominent evolutionist critics of impact-driven extinction scenarios no longer make these arguments.[4]

Walker then asks, if the trans-Atlantic correlations are correct, "Were the sediments in the US and the Netherlands part of the same depositional basin? Were they deposited at exactly the same time?"[5] To which my answers are no, and yes. By the time of the impact (during the latest phase of the Flood), North America and Europe had already split and were not depositionally linked,[6] while the impact materials and near-identical fossil assemblages are independent data that confirm the event was synchronous on both continents. So we have evidence of a single event during the Flood with preserved evidence on multiple continents. This should be *exciting* to creationists!

Evaluation of boundary-crossing genera

Like his handling of the literature, Walker's evaluation of the fossil data I presented is frustrating. He discusses the Bovidae and Rhinoceratidae, two of the most obvious outliers in the data sets I analyzed, as if their fossil distributions are normative and therefore the mammal record affirms a high post-Flood boundary. In my original analysis,[7] I found that among 28 families, 23% of genera crossed a post-Flood boundary selected at the Pliocene/Pleistocene boundary (roughly equivalent to Walker's 'late Cenozoic'[8]). In contrast to the average, Walker chose two families whose crossing rates are 6.3% and 0%, then submits four possible scenarios for how the lone boundary-crossing bovid (*Ovis*) might be explained. Before evaluating these two scenarios, let us consider two other groups from my paper: the Canidae and Felidae.[7] In contrast to Walker selections, these families lie above and below the average crossing rate, respectively.

Of the 25 North American canid genera, three (12%) cross the boundary: *Canis*, *Vulpes* and *Urocyon*. These are familiar genera with extant species, representing the dogs-wolves-coyotes, 'true' foxes, and gray foxes, respectively. Among the felids, nine of 15 genera (60%) cross a high post-Flood boundary, including the extant genera *Felis* and *Lynx*. According to Walker's argument, the identification of literally thousands of these fossils must be systematically in error. Yet we are looking here at fossils of *living genera* known throughout the North American continent and beyond.

Does Walker really believe that an evolutionary worldview prevents paleontologists from distinguishing fossils of a red fox (*Vulpes vulpes*) from a dire wolf (*Canis dirus*)? Or a cougar (*Felis concolor*) from a bobcat (*Lynx rufus*)? If so, then he is mistaken. I was trained how to distinguish among these very same genera, and their identifications are based on skeletal and dental characters, not bias or worldview. Given that these are genera with living species, many non-paleontologists[9] could also confirm the identity of these fossils.

Walker's discussion of *Ovis* runs aground on these same problems. *Ovis* includes some of the most familiar mammals to all of mankind: sheep, goats and rams. Domesticated since Abel (and again after Noah), their anatomy is easily distinguished as different from other bovid genera, and among various *Ovis* species by even the untrained eye. Walker's claims of mistaken identification are nullified by the evidence on display in the museums, pastures, and barnyards of the world.

To avoid the problem of boundary-crossing genera, Walker provides four possible scenarios. The first two potentially define the created kind at the genus or even species level. The former is problematic and the latter is unacceptable. The third and fourth scenarios require us to believe that highly trained and observant geologists and paleontologists are either incompetent or too agenda-driven to recognize real geological relationships or proper fossil identifications. As shown above, this is a non-starter.

Fossils are real data

This leads to an overarching problem with Walker's treatment of fossils. He seems to think of them as constructs of evolutionary theory, not data. Yet fossils are recognizable physical objects every bit as informative to geologists as the minerals and structures of a rock. Walker would not (I hope!) challenge every instance of ooids or garnet in the rock record. Why chafe at all the rhinos?

If Walker had read any one of the dozens of morphological descriptions in the book by Prothero he quoted,[3] he would have discovered that fossil genera are diagnosed by highly specific physical characters that are distinct from even closely related taxa from the same baramin. There is always some subjectivity in classification (it is, after all, a human endeavour), but the question is one of reliability. Can fossils

be consistently identified to certain taxonomic levels given diagnostic preserved material? That answer is an unqualified 'yes'. This is why Walker's plea for 'further investigation' rings hollow, since in practice this means that he claims the right to call into question the identification and/or provenance of thousands upon thousands of fossils.[10]

And so I ask: On what basis should we trust Walker's dismissal of fossils he has not observed, and for which he has no expertise in identifying? My own experiences with fossil collections and evolutionary paleontologists over the past 20 years provide no sympathy for Walker's unrestrained skepticism of their work. So unless and until Walker can provide specific, character-based, morphological reasons for his assertions of gross fossil misidentification, the multitude of fossil occurrences incongruent with his proposed geological model should make us reassess the model, not the fossils.

How to move forward

Each day that I was in secular university geology classes, I came home with a multitude of questions on my mind. What was fact? What was reasonable inference? What was speculation? What was error? But most important was: How would I integrate the information I learned that day with my understanding of God, Creation, and the Flood? This is the question that both excites and terrifies me to this very day. Sometimes it is easy to see the relationship of geological and fossil data to the Flood, while in other instances it is much more difficult. Yet this is the only path forward.

In analyzing the fossil data, this is what we know:

1. North America has an abundant record of mammal fossils in Cenozoic deposits.
2. These fossils are accurately identified and documented. Those researchers, such as myself, who have spent time in collections, can verify that this work has been done (and done well).
3. Patterns of fossils in the sedimentary record allow us to make correlations between units that are not physically connected, allowing long-range correlations to be constructed and compared.
4. These patterns indicate that the distribution of mammal genera does not display the 'clean break' in the late Cenozoic expected if this was the Flood/post-Flood boundary. Instead, 23% of the mammal genera surveyed crossed this proposed boundary.
5. In other continents, the same pattern is repeated with very different mammal fossils.

The natural conclusion drawn from these facts, namely that mammal distributions reflect post-Flood diversification, is but one of many reasons why a 'late Cenozoic' placement of the Flood/post-Flood boundary is untenable. In order to avoid this conclusion, one must argue that these North American (and Australian, and African, etc.) mammals left the continent to board the Ark, then returned to their continent of origin despite radical changes in geography, climate, vegetation, and continental location. Either that, or, as Walker claims, the taxonomic and geologic assignment of fossils is mistaken in all of the thousands of cases where the fossil record disconfirms his position. I conclude instead that fossil record is reliably understood and that the post-Flood boundary lies deeper, likely at or near the K-Pg boundary.

References

1. Walker, T., Research needed to resolve questions with late Cenozoic post-Flood boundary, *J. Creation* **28**(2):26–29, 2014.
2. As Walker notes in his letter, Ager was a contributor to the authoritative series, *Treatise on Invertebrate Paleontology*. No doubt Ager believed that the vast majority of fossil taxa described therein (including the brachiopod data he contributed) were identified properly.
3. Prothero, D.R., *The Evolution of North American Rhinoceroses*, Cambridge University Press, Cambridge, UK, p. 2, 2005.
4. See Archibald, J.D. and Fastovsky, D.E., Dinosaur Extinction; in: *The Dinosauria*, 2nd edn, University of California Press, Berkeley, CA, 2004. These co-authors are on opposite sides of the extinction debate, and Archibald (gradualist) makes no use of the arguments that Walker presents.
5. Walker, ref. 1, pp. 62–65.
6. Easily recognized by their sedimentary character: clastic (USA) vs carbonate (The Netherlands).
7. See table 1 from Ross, M.R., Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary, *J. Creation* **26**(2):82–87, 2012; creation.com/biostratigraphy-post-flood-boundary. See especially supplimental figures 6 and 7 at creation.com/pliocene-pleistocene-boundary.
8. But as noted in my first response, Walker's use of this term is self-defeating.
9. Including hunters, farmers, park rangers, veterinarians, and amateur naturalists, etc.
10. Note that Walker's second letter includes only suppositions; it does not evaluate any *actual* collection records of *Ovis* fossils.