appears to be the source of inaccurate Flood model concepts and has caused difficulty in accepting the Biblically consistent detailed analysis and modelling I have presented.

Conclusion

I am pleased that Mr Johnston did not cite one mathematical error or correct one of my quantitative evaluations. He did not identify any alternate quantitative values that I should have used in my modelling. He avoided all use of quantitative values in his critique of my analysis and in some cases confuses assumptions with conclusions. When his criticisms are quantitatively evaluated they are found to be without substance.

Mr Johnston seems to use his understanding of geology and belief in a pre-Permian Flood model to dictate his understanding and exegesis of Scripture. In doing so he misses important clues to understanding the Flood.

Unfortunately no attempt was made by Mr Johnston to test his own assumptions. No comparison with written records and ice core records was attempted. He provided no study of the climatic impact of the postulated post-Flood catastrophism required by a pre-Permian boundary. If he had tested his own hypothesis and assumptions he possibly would have realised the inadequacy of his assumptions and their incompatibility with the written and geophysical records. He also might have realised that his assumptions and explanations were either explicitly addressed or encompassed by the maximum plausible catastrophism modelled in my paper.

The remaining technical inaccuracies in the pre-Permian model and in Mr Johnston's letter could be addressed. However, I believe time would be better spent in working towards a rigorous comprehensive young-Earth Flood model that addresses the fossil record.

The fossil record is important, but it is the geophysical data that is the easiest to model and, I contend, provides us clues to unravel all the issues he mentioned. Most answers already exist, some published some time ago and others yet to be published. I believe I and others can answer the issues raised about the fossil record in a rigorous manner. It will take some time to complete the research and analysis, and prepare the findings for publication. If the Lord grants me the time and ability (and my family responsibility permitting) another detailed paper or two will be published in the coming years.

I am not infallible and I am sure my modelling and analysis could be improved. One could quibble at length over minor improvements that could be made. **However, it will take very large changes to substantially affect the conclusion and place the Flood/post-Flood boundary lower in the geologic column.**

Until **a quantitative and detailed critique of my analysis showing a multiplicity of errors orders of magnitude in size and in many of the independent evidences is provided,** I am compelled by the data to believe the Flood/post-Flood boundary is very late in the geologic column. I hope those that advocate a pre-Permian boundary will be able to look beyond their paradigm and see the data set before them. The thoughts of readers with insight into alternate interpretations **with quantitative assessments of the evidences,** rather than conjecture and untested 'explanations', are still invited.

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REFERENCES

1. Holt, R. D., 1996. Evidence for a Late Cainozoic Flood/post-Flood boundary. CEN Tech.J.,10(l):128-167.
2. Johnston, R. H., 1997. Letter to the Editor: The Flood/post-Flood Boundary. CEN **Tech. J.,ll(2):162-165.**
3. There were a few errata in my paper which are described elsewhere (p. 298 this issue). The single mathematical correction reinforces the conclusion that the Flood/post-Flood boundary is late in the Pleistocene.
4. Johnston, Ref. 2, p. 162.
5. Johnston, Ref. 2, p. 162.
6. Holt, Ref. 1, see for example, pp. 139 and 144.
7. Johnston, Ref. 2, p. 163.
8. Johnston, Ref. 2, p. 163.
9. For example, D. R. Humphreys, personal communication, 1996.
10. Johnston, Ref. 2, p. 163.
11. I thank Mr Johnston for pointing out that the relevance of Job 26:10 to this specific issue is not as clear as the King James Version suggests. I have therefore left Job 26:10 out of the list of relevant Scriptures.
12. Morris, H. M., 1996. The geologic column and the Flood of Genesis. **Creation Research Society Quarterly,** 33(l):49-57.
13. Johnston, Ref. 2, pp. 164-165.
14. Holt, Ref. l,p. 129.
15. Johnston, Ref. 2, p. 163.
16. Holt, Ref. l,p. 139.
17. In my paper I estimated the amount of Flood sediment that was reworked after the Flood assuming a Flood/post-Flood boundary at the end of the Palaeozoic, not at the beginning of the Permian as Mr Johnston advocates. This changes the ratio of reworked to original Flood sediment somewhat, but I chose to cite what was published as this was the number in my paper that Mr Johnston objected to.
18. Johnston, Ref. 2, p. 163.
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21. Johnston, Ref. 2, p. 163.
22. Johnston, Ref. 2, p. 163.
23. Harris, R. L., Archer, Jr, G. L. and Waitke, B. K. (eds), 1980. **Theological Wordbook of the Old Testament,** Moody Bible Institute, Chicago, Vol. 1, p. 498.

THOUGHTS ON FLOOD GEOLOGY

Dear Editor,

I wish to comment on some problems relating to Flood geology raised by the Editor,[1] and by Robinson.[2] The Editor is to be congratulated on inviting European and North American colleagues to present the evidence supporting their various views as to where the Flood/post-Flood boundary may lie in the rock record. Such open and frank discussion can only be beneficial to the creationist cause generally, as it encourages widespread debate and discussion on this most vital aspect of creationist thinking.

While it is accepted that the fossils are generally highly segregated, I have some doubts about the exactitude of biostratigraphy via correlation of various specific index fossils/ assemblages. As I understand it, biocorrelation is generally carried out at the species or generic level. However, species overwhelmingly display stasis over long (evolutionary) time periods — for up to eight million years or more, while the family taxon remains stable for anywhere between 20 and 100 million evolutionary years. Therefore if the 'family' is generally close to the basic created unit, does this not severely affect the exactitude of correlation carried out on the basis of species or genera? I understand that the level of resolution in the strata is rather coarse — in most cases several million years.

For instance, in the case of Permian brachiopods, most species of family *Spiriferella* were stable on average for about 4-5 million years, whereas the family itself exhibited stasis for the entire Permian period covering 55 million years.

The current division in our ranks about where the post-Flood boundary lies is in one way healthy, because only sustained critical examination of all views can help in arriving at a consistent scientific position.

It seems to me that the fundamental question is — what is the significance of the phenomenon described as the fossil succession? No creationist now would deny that a broad 'succession' (also known as the order of fossil deposition) really exists, but the question is — how did it come about? Historical geologists can claim that fossil and stratal succession is compatible with evolutionary geology. But is it also compatible with some form of diluvialism? Editor Andrew Snelling[3] is absolutely correct when he states that the post-Flood boundary is really a question of how one explains the fossil order.

Robinson raises the question of why do terrestrial fossils not occur beneath marine fossils if the Flood first deluged the dry (continental) land? If a worldwide transgression overwhelmed the Cambrian/Ordovician land surfaces, why no terrestrial animal fossils until further up the geologic column?

If one takes a diluvial view that the strata from the upper Archaean through the upper Proterozoic and thence right up into the Phanerozoic are all due to one continuous deposition of Flood deposits, then Robinson's question makes sense. However, there is another possibility.

Although few have taken up the Woodmorappe TAB (Technically Associated Biologic provinces) Flood model, I believe that despite some problems which still exist, a similar model with modifications can be of value to creationism. The TAB model still assumes a more or less continuous and global system of Flood deposition, but rather than assuming one single cause of such deposition whereby the **whole** of a pre-Flood land and marine system was submerged/buried simultaneously and globally, only certain **regions** of that land/marine system were flooded more or less at the same time.

Robinson has indeed (and justifiably) made some criticisms of certain aspects of a TAB model. He writes:

> *'A fundamental defect of this theory is the assumption that in most regions, Palaeozoic strata overlie what before the Flood was the floor of a sea."*[4]

He goes on to say that the Lower Palaeozoic fossilised marine animals in say, Iowa, hundreds of miles inland from the pre-Flood shore, must have been transported enormous distances. Because the whole Earth was under water well before the end of the Lower Palaeozoic, it is therefore impossible to explain post-Palaeozoic assemblages as originating from 'provinces' which had not yet been inundated.

This comment is fair enough, but he may be misunderstanding the full TAB picture. Robinson has assumed that the **only** way Lower Palaeozoic marine animals now found in Iowa, hundreds of miles from the shore, got where they are, must involve transportation over a great distance. But my belief[5] (and that of Woodmorappe),[6] that the dominant mode of sedimentation during the Flood involved little tendency for TAB constituents to be transported much beyond their boundaries, has much to recommend it. Is it not entirely possible that like some of today's continents and land masses, pre-Flood continents also contained many an inland sea or fresh and salt water lakes and channels?

If the pre-Flood site in Iowa was close to an inland sea (or **was** an inland sea), then transportation would not be an issue. Woodmorappe's TAB model allows for both land **and** marine biogeographical 'provinces'. The four 'units' into which Woodmorappe divided the geological record would still allow for a very great diversity of plant, animal and microscopic life-forms, given that the families which inhabited them were not all exactly the same, that is, families of biota would vary from province to province within the **same** TAB type, but could also contain different species combinations within each of the four units. (There could have been more than four basic TAB units of course.) If the family taxon is roughly equivalent to the created kind (or holobaramin), then there could be dozens of TAB 1 provinces all containing different species of the same and/or other families of plants and animals.

Robinson mainly includes only Phanerozoic strata in his paper, but we know that the Middle and even part of the Lower Precambrian strata exhibit a rich but sparse biota of microfossils, such as blue-green algae and various bacteria. Since much of the entire Precambrian is sedimentary, then all Flood models must include these ancient rocks.

As I understand the TAB concept,[7] the 'fountains of the deep' could have been located anywhere — whether under oceans, seas and lakes, or under any part of the land. As such underwater fountains broke through

and spewed water, gases and steam upwards, they would carry a great deal of detritus, particles, etc., which would have drowned and buried the benthic forms first, followed by free-swimming creatures, pelagic forms etc. On land surfaces much the same would have occurred. The TAB concept involved mainly a **pattern** of successive downwarpings or subsidences following the discharge of subterranean waters and gases, whether terrestrial or marine.

For example, if all TAB 1 provinces subsided more or less at the same time, due to some type of tectonic linkage, followed by TABs 2, 3 and 4, with all their infinite variety within each province, then we would have a very definite sequence of fossil burial, with various sorting/ecological zonation factors also coming into play at each particular site.

Under such a model the 'lower' provinces would be internally flooded/ buried via subsidence, followed in turn by 'higher' zones doing the same, and then overflowing into the 'lower' biogeographic provinces. Any particular zone could contain representatives of several families of say, mammals, insects, amphibians or reptiles and plant forms. With this type of burial pattern, we would therefore not expect to find many representatives of any Tertiary groups in what are now called upper Palaeozoic rocks. Some exceptions would occur, but this would be rare. Unless we invoke some sort of pre-Flood system of biogeographic provinces, it is difficult to think of any other system of Flood processes which could produce such a fossil/rock record as we now see.

The fossil 'succession', I believe, is heavily flawed by the fact that apart from one or two dubious cases (mammal-like reptiles/mammals, and crossopterygian fish/primitive amphibians), the required interfamilial fossil lineages connecting ancestral/descendant families are simply non-existent, thus making the entire fossil sequence more or less irrelevant in terms of naturalistic evolution.

Neither is the concept of increasing complexity of much value to the evolutionary view. When we compare like with like (because of no fossil evidence linking groups), we see there is **no** significant change in complexity as evolutionists maintain. When we compare *Homo erectus* with moderns, or any 'first' forms with 'later' forms, we see **no** increase in morphological intricacy. The, 'first' Tertiary bee **within its family** is no less complex than the 'last' member of that same family. We cannot compare complexity levels of Cambrian invertebrates with say Silurian or Carboniferous vertebrate forms unless we have sound evidence of phylogenetic relationship.

I think most of us are still unwittingly 'locked into' the evolutionary view of the geologic column whereby the strata are laid out pancake-style worldwide, instead of viewing the Flood as a much more complex affair with many factors coming into play to produce fossil sites in diverse places.

Robinson[8] is certainly correct when he points out that land areas were inundated not mainly because the sea levels rose, but because the land **downwarped** as the underground reservoirs were emptied, and the same happened in the oceans, seas and lakes too. The land areas must have been of great extent, because that is where we find most fossils today.

Talking about 'the waters not covering the land until the Permian' and so on is irrelevant. We seem to visualise vast areas of land gradually becoming inundated, system by system, until such time as the Flood process ceased.

A process such as the TAB concept could also account for both so-called long range forms and short range organisms known as index fossils, as Woodmorappe points out in his original treatise.[9]

Robinson also queries my concept of cat phylogeny.[10] In my view an original cat 'kind' was created by God, in whose gene pool most of the entire DNA information was contained in the original created felines. Before the Flood, speciation took place and by the time of the Ark there may have been several feline species in existence (all in the same family *Felinae).* The cats taken aboard the Ark possessed all the genetic information necessary for post-Flood speciation into the forms we have today (and many of the now extinct post-Flood [Plio/Pleistocene] specimens).

Robinson says that this concept is faulty because of the lack of cat fossils in Flood sediments. Firstly, we do not know how many individual cats existed before the Flood, but in any event a TAB-type system makes this also irrelevant. If cats (and dogs, and other mammalian forms) lived in certain biogeographic zones which were among the last to downwarp and become buried, then we simply would not expect to find such fossil forms in strata which had been buried **before** the mammalian TAB provinces were. Once again we are subconsciously regarding the geologic column in evolutionary terms.

Robinson[11] also says it is unlikely that the Miocene cat genus *Dinictus* was ancestral to later cats. Yet the felines found in what are described as Oligocene rocks are very similar to later and modern forms. Colbert[12] states that **all** cats are constructed pretty much to the Oligocene patterns. He also names the Oligocene form *Dinictus* as the ancestor of present-day cats, a view with which I find myself in agreement. Early Oligocene cats are: '*. . . not much different from their modern relatives',* says Colbert.[13] We find the same pattern in dogs, bears, viverrids, and all other mammalian family groups.

As for the rocks which represent the end of the main-phase of the Flood, I endorse (with minor reservations) the views of Roy Holt,[14] who believes the main-phase ended somewhere in the middle to upper Tertiary, according to local circumstances, that is, in one region a series called the Pliocene could be laid down at the same time as one called the Oligocene was being deposited somewhere else.

Some form of a revised and modified pre-Flood biogeographic province model is the most likely to get results. Such a model can explain fossil deserts, preserved shore-lines, most disconformities and other phenomena, and should certainly not be abandoned without further thorough research and investigation. Some difficulties still remain, such as the consistency with which the sequential burial of all TAB-type provinces occurs in the same order (with minor exceptions).

We would expect a genetic 'bottleneck' somewhere in the middle to upper Tertiary system (Oligocene-Miocene-Pliocene-Pleistocene) after various animals left the Ark. Depending on locality, there should be generally fewer fossil forms of an organism in the post-Flood deposits than in the main-phase rocks. Assuming a rather hostile environment which must have lasted several decades or centuries, the repopulation process would have been slow, and this is what we do find — every extant family, plant or animal, is represented in fossil form in greater numbers before the middle Tertiary system.

Representatives of 80 per cent of Tertiary families are still alive today, and 89 per cent of extant families are also found in Tertiary rocks, many of them being part of the so-called mammalian adaptive radiation in the lower part of that system.[15]

Some sort of fossil 'sequence' would occur anyway, regardless of whether such TAB provinces existed. Mish-mash mixing would be highly unlikely — factors such as hydrodynamic sorting, ecological zonation, elevation, etc. would see to that. Woodmorappe found that even the index fossils do not usually juxtapose even on a regional basis covering tens or hundreds of kilometres. We could be excused for expecting fast-evolving lines of animals or plants to be found reasonably close together, but the opposite is true. Again, Woodmorappe[16] found that less than five per cent of Tertiary index fossils overlie Triassic examples. Index and 'following' fossils exhibit a strong tendency to be incompatible with each other geographically. This is evidence for non-mixing opportunity — if certain organisms lived in segregated pre-Flood zones, hundreds of kilometres from others, then we would not expect much 'mixing' among fossils. In the case of the mammal-like reptiles, my own research 'has indicated that the key fossil sites are scattered hundreds and even thousands of kilometres apart geographically. How can we believe that a synapsid form in England is a descendant of a supposed ancestor located in South Africa or in the Argentine?

Finally, I have some doubts about the total thickness of the geologic column. The literature often mentions various strata as being so many 'thousands of feet' in thickness, which when added to all the other layers results in a column '20 km high', giving an impression of an immense 'pancake layer' all over the globe. Does not every grain of sand or mudstone or siltstone have its origin 'somewhere else'? Are not these sedimentary layers only an accumulation of deposits swept down from regions of immense areal extent, where the loss of soil or sand etc. would only amount to a few feet? Therefore, is not this 'thickness' of deposits illusory if thought of in the wider terms? If all the volcanic and sedimentary deposits were spread out evenly over the entire surface of the Earth, surely the average depth of such deposits would be no more than a mile or two?

Of course, no matter which Flood system we follow, we can never be quite sure as to the real events which brought about a particular deposit. We were not there to see and record the event in detail. All has to be interpreted and if possible integrated into a whole. Lengthy research may one day enable us to reconstruct local or regional deposits, but the task will be formidable.

CONCLUSIONS

All in all, I find myself much more in agreement with Woodmorappe and with Holt,[17] than with the views of Robinson and others who favour a Carboniferous Flood/post-Flood boundary. Holt[18] and Woodmorappe[19] have both addressed the problems of dinosaur 'nests', vertebrate trackways, and hardgrounds during the Flood, which I find at least partly satisfactory. The basic question which Holt addressed was the huge amount of deposits required by post-Flood activity, if the boundary lay below the Permian. There is simply far too much Mesozoic and Cainozoic sedimentary and volcanic material to be explained away if the boundary is so low in the stratigraphic record.

Among other problems facing creationists some of the most difficult can be addressed by a TAB-type zonation model. For example, the existence of numerous disconformities and paraconformities. A model which allows for segregated biogeographic 'provinces' can also explain rather well the 'progressive extinction' pattern of the fossils from bottom to top of the column, and the same phenomenon for the creatures which disembarked from the Ark. All life-forms were dependent on the vegetation of their particular pre-Flood zones, and the last to be buried had better access to that plant life as it too was buried towards the top of the column. Those forms which depended on lower-buried plant life found it harder to continue their existence.

Such a model can also account for both stratigraphically long-range and short-range forms,[20] and for the puzzling non-deposition of sedimentary material in many regions of the Earth — those places where Precambrian basement or a lower system lies exposed at the surface of the Earth. Under a TAB-type model, biocorrelation is made possible because the members of the same family involved (in the same TAB-type province, for example, TAB2a, 2b, 2c, etc.) give the illusion of evolutionary

change — they would be geographically and stratigraphically varied. Thus species 'x' of TAB 3d can be 'correlated' with species 'y' of the same TAB-type province some distance away.

The effects of hydrodynamic sorting, ecological zonation, preservation bias and simple chance can work for, against, or be neutral in respect to the TAB process. Thus factors which happen to work **with** a TAB process will result in highly segregated, generally short-range fossil patterns, while such factors working against the process, would result in fossils being 'smeared' across several stratigraphic horizons, giving the impression of being long-range (long-lived) organisms.

There are still a number of outstanding issues such as apparent *in situ* stromatolite structures which require further research and explanation.

It is hoped creationists will be encouraged to explore and examine **every** possibility regarding Flood geology. We cannot afford to overlook **any** potentially advantageous ideas.

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DID DINOSAURS LAY EGGS AND HATCH YOUNG DURING THE FLOOD?

Dear Editor,

In recent articles in the CEN **Technical Journal** Holt, Oard, and Woodmorappe have arrived at a consensus conclusion: the Flood/post-Flood boundary could **not** have been either at the end of the Cretaceous or at the end of the Carboniferous worldwide.[1-3] They also are agreed in stating that dinosaur nesting activities occurred during the first 150 days of the Flood, or approximately during the first half of the Flood. This latter conclusion they base upon Scripture. The question must rightly be raised, 'Does Scripture indeed allow up to 150 days for dinosaur nesting activity during the Flood event?' The answer to this question, as given below, allows for the Flood/post-Flood boundary to be either at the end of the Carboniferous or at the end of the Pliocene/Pleistocene, the latter option being proposed by Holt, Oard, and Woodmorappe. However, it does not allow a period of approximately 150 days for dinosaur nesting activity during the Flood.

The key to understanding the timing of various events in the Flood narrative *is* the discovery of the chiastic structure of the Flood. This has been accomplished by Biblical scholars, such as Umberto Cassuto and Bernhard W. Anderson. Their excellent studies have provided a foundation for William H. Shea's study,[4] who goes a step further and uncovers the chiastic arrangement for the chronology of the Flood as shown in Table 1. Similarly Old Testament scholars, Gordon J. Wenham,[5] and Victor P. Hamilton,[6] note this same chiastic structure, thus indicating that its validity has been widely accepted.[7]

We must pause to define a chiastic structure as an arranging of a Biblical or non-Biblical passage in reverse-order parallelism. If we designate each paragraph, verse, or smaller unit with alphabetic characters, then a chiastic arrangement would be as follows: A, B, C, D, E, etc. E', D', C', B', and A'. This means that the first and last units are in parallelism, the second and second to the last also in parallelism, the third and third to the last in parallelism, and so forth. The centre of the chiasm is often a pivotal turning point in the narrative. In the Biblical Flood account the chiastic centre is found at the end of the 150 days, when the waters begin to subside. This is the turning point in Flood history. It is also a theological running point. Just when it appears that God has abandoned the human race (Genesis 7), the statement is made, 'But God remembered Noah' (Genesis 8:1).

What follows is a further elaboration of the scholarly studies by Shea, Wenham, and Cassuto — a chiastic structure that I have developed

A.	Seven days until 40-day storm (Genesis 7:4)
B.	Seven days until the Flood (Genesis 7:10)
C.	40 days of the Flood (Genesis 7:12, 17)
D.	150 days waters prevail (Genesis 7:24)
E.	The Flood crests, the Ark rests, God remembers Noah (Genesis 8:1)
D'.	150 days the waters abate (Genesis 8:3)
C'.	40 days first birds sent out (Genesis 8:6)
B'.	Seven days next bird sent out (Genesis 8:10)
A'.	Seven days last bird sent out (Genesis 8:12)

Chiastic arrangement for the chronology of the Flood (after Shea[4]).