______________ 1904b. How the Batwa pygmies were brought to the St. Louis fair. *Harpers Weekly* 48:1618-1620.

______________ 1994c. Pioneering in central Africa. Book Review. *Nation* 78:357-358. [H. A. Coblentz, *Dial* 36:363-364; *Independent* 57:739].

______________ 1904d. The adventures of an explorer in Africa: how the Pygmies were brought to the St. Louis Fair. *Harper's Weekly* 22:1618-1620.

______________ 1905. African Pygmies. *Scientific American*. Supplement. 59:24,567-24,568.

______________ 1906a. The African Pygmies. *Popular Science 69:* 471-473.

______________ 1906b. The white man's zone in Africa. *World's Work* 13:8227-8236.

______________ 1907a. Africa fifty years hence. World's *Work 13:* 8727-8737.

______________ 1907b American invasion of the Congo. *Harper's Weekly* 51:644.

______________ 1907c. Belgian rule on the Congo. *World's Work* 13:8568-8575.

______________ 1908a. A trip through Africa. *World's Work* 16: 10768-10773.

______________ 1908b. The white race in the tropics. *World's Work* 16:10715-10720.

______________ 1916. The story of Ota Benga, the Pygmy. *Zoological Society Bulletin* 19(4):1377.

Ward, Geoffrey C. 1992. Ota Benga: the Pygmy in the zoo. *American Heritage* 43:12-14.

AN EVALUATION OF THE JOHN WOODMORAPPE FLOOD GEOLOGY MODEL—PART TWO

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Received 8 July 1992; Revised 2 February 1993

Abstract

The assumption of time-equivalence of index fossils is the basis of evolutionist geology. In this review of the Woodmorappe Flood Model it can be shown that there is a simpler and better explanation for the separation of fossils in a short time-frame. Rather than time itself being the determining factor in the positioning of fossils, geographical and tectonic causes provide the basis for a diluvial paradigm which is superior to the standard geologic framework.

Introduction

In Part One of this paper (Mehlert, 1993) attention was focused mainly on the deficiencies of the uniformitarian paradigm. We now turn to the positive side of flood geology and examine the mechanism of the Tectonically Associated Biologic Provinces concept (TAB). The relationship between the flora and fauna of a pre-Flood geographic area or province with the sedimentary deposits existing today is of utmost importance, and will be explored in detail.

The Origins of Ecological Zones and Biogeographic Zones: The Mechanics of TAB

To the uniformitarian, ecological zonation is caused by organisms evolving and matching their environment, while biogeographic zonation is the result of organisms evolving in a distinct and physically separate area from the mainstream.

Creationists are not bound by these preconceived ideas and are free to look for possible Divine causes behind these zonations. If God during the Creation Week formed ecological and geographic zones in order to create a far larger diversity of organisms, we might find evidence of these zones reflected by the fossils. All over the world He may have created numerous special niches and areas for different faunal populations. If we can link these niches with tectonics, we may well find a totally different reason for fossil differentiation.

According to Woodmorappe's TAB concept (1983, pp. 133-186) it is possible to theoretically link the fauna of a province or zone with tectonics—in this case, downwarping or subsidence (See Figures 1 and 2). We could visualize four types of provinces or geographic regions, each supporting its own special 'mix' of plants and animals, and further visualize similar provinces or zones repeating themselves around the earth. The area of these four types could range from very small to quite large—a few kilometers to hundreds of kilometers.

Zone 1 would, in a global Flood, subside or downwarp first, followed in order by Zones 2, 3 and 4, and this pattern could be repeated with Zone 4 always the last to downwarp (Figure 1). In this example, the zones are all terrigenous, but in fact they could also include marine areas. Also, there could be variation of life forms in the same numbered zones. There are two factors to be considered here: Because biotas within geologic periods exhibit biogeographic differentiation (i.e. 'epochs,' or 'stages'), tectonic differentiation may well play a lesser role than biogeographic differentiation. If there is greater biogeographic differentiation than tectonic differentiation, it is not special pleading to invoke the TAB concept as the major factor in total biostratigraphic differentiation.

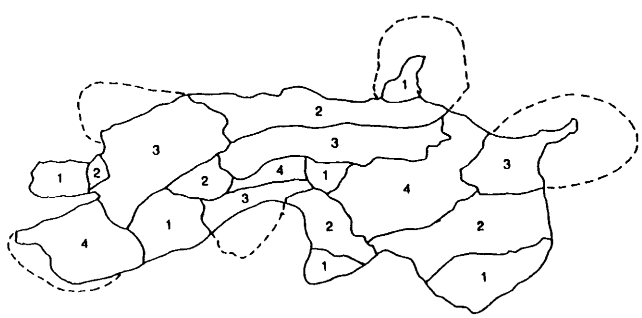

Figure 1. Possible locations of the four TAB provinces relative to each other on an imaginary land-mass. In this case, all are terrigenous for simplicity. The dotted lines extending into the sea indicate possible marine extensions of land TAB provinces. In real life, all TAB 1 provinces would be virtually exclusively marine, reflecting the actual marine fossil domination of that era.

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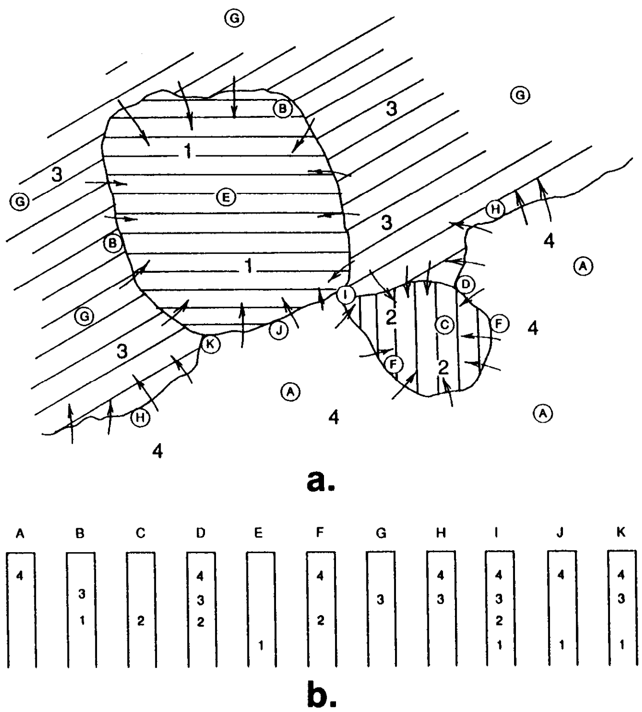

Figure 2. a. Schematic depiction of the four TAB provinces as numbered, 1, 2, 3, 4 (Lower Paleozoic, Upper Paleozoic, Mesozoic, Cenozoic). TAB 1 subsides first, followed in order by TABs 2, 3, 4. Arrows show Floodwater flow during the Deluge. Lettering in small circles represents the 'fossil succession' at those points as shown—e.g., the full geologic column is shown at Location I where all four TABs form a junction. At E only TAB 1 sediments and organisms are deposited. TAB 1 deposits are buried the deepest.

b. The columns A-K show the subsequent depositions of sediments corresponding to the locations in capital letters in (a) (Woodmorappe, 1983, Figure 4, p. 161).

We return to the matter of independent evidence for linkage between tectonics and biogeography: Are there possible reasons to link the two? According to Woodmorappe the answer is 'yes,' and he cites some examples. Oceanic current patterns can result in differentiation, the temperature of the water being a major factor. Salinity is another factor, and both can be controlled by submarine topography. Applied to TABs, a province could have had uniform water temperature (regulated by the topography), which in turn may have been a reflection of the tectonic stability of the region. Other causal factors on land could be the chemistry, the nutrients, and trace elements in the soils.

Evidence of Tectonics

It is obvious that in such a model as Woodmorappe's, if downwarping played a large role in biostratigraphic differentiation, there should be some evidence to support his contention. Tectonic activity should be more obvious in the lower rocks and less apparent as one proceeds stratigraphically upward. Indeed there is such evidence. Ronov (Woodmorappe, 1983, p. 158) in an exhaustive study found that geosynclines occupy 40 percent of the area of oldest geologic periods, but less than 20 percent of more recent periods. The Mesozoic-Cenozoic eras contain over 57 percent of the total volume of Phanerozoic platform sediments but only 41.3 percent of the total volume of geosynclinal sediments.

The ratio (volume) of geosynclines to platformal sediments of the entire Phanerozoic is 1:2. The following list shows the four eras or sub-eras, the ratio of geosynclines to platformal sediments, and Woodmorappe's TAB provinces:

Cenozoic (youngest)	1:6	TAB 4
Mesozoic	1:8	TAB 3
Upper Paleozoic	3:4	TAB 2
Lower Paleozoic (oldest)	3:1	TAB 1

TAB 1 provinces are the lowest (earliest) sediments to be laid down; TAB 4 provinces are the highest (latest).

It can be seen at once that there was much less tectonic activity in the Cenozoic and Mesozoic, and considerably more in the lower eras. This trend strongly supports Woodmorappe's concept as geosynclines are always regions of greatest tectonic activity—downwarp, subsidence, or uplift.

We have also seen that significantly, Lower Paleozoic fossils have a much greater tendency to superpose among themselves than is the case in the higher portion of the column. This is clearly shown in Woodmorappe's research (1983, pp. 152-153). This tendency is most noticeable in the Cambrian-Devonian periods, less so in the Carboniferous-Permian, and even less in the Triassic-Cretaceous. It is almost non-existent in the Tertiary. This data shows that Lower Paleozoic fossils were deposited in smaller geographic areas than is the case for 'higher' fossils, thus again supporting the TAB concept.

The Reason for the Four-way Breakup of TABs 1-4

Because adjacent periods share a great many fossil families between them, if we take these groupings; Cambrian-Devonian (Lower Paleozoic), Carboniferous-Permian (Upper Paleozoic), Triassic-Cretaceous (Mesozoic), and the Tertiary (Cenozoic), which seem to fall into natural discrete entities (Turek et al., 1988, p. 488), we can apply the tectonic activity to the four eras as shown in the previous list.

Woodmorappe cites Furnish et al. and Philips' definition of ancient (Paleozoic), medial (Mesozoic), and recent (Cenozoic). Every geologist knows the basic differences between the marine invertebrate faunas of these eras and the 'boundaries' between them which represent intervals of faunal crisis such as the K/T (end of Cretaceous) 'extinctions.'

As uniformitarians are not deterred from proposing various models of tectonic action, neither should creationists be. The reasons why such activity takes place is immaterial, whether they be natural or the work of Divinity ('providence').

TAB 1 *(Lower Paleozoic)*

TABs are not equivalently distributed over the earth and the reason why ocean floors are almost exclusively Mesozoic and Cenozoic is because they were overlain by sediments originating from TABs 3 and 4. Precambrian biotas can be assigned to the most tectonically affected TAB 1. In any case, Precambrian biotas are minute when compared with the rich diversity and numbers of Phanerozoic biotas. Precambrian fossils often range into the Lower Paleozoic (TAB 1) and despite the 'presence' of the Precambrian-Cambrian unconformity in some areas of the globe, in other places such as the Burgess Shales, the Precambrian deposits grade *conformably and continuously* into Cambrian formations.

The Lower Paleozoic or TAB 1 provinces contain almost exclusively marine fossils indicating that these regions were exclusively marine in nature. In fact, all geologic periods, even those containing terrigenous organisms, are still dominated by marine biotas. The conclusion is that the Upper Paleozoic, the Mesozoic and the Cenozoic TABs often were partly land and partly sea. If a particular fossil region such as the Gondawana Formation of South Africa was totally land in origin, then that TAB (3 in this case) was also of totally terrigenous geography before the Deluge. Sometimes a TAB will contain alternations of marine and non-marine biotas which suggest that the regional manifestation of that TAB originally contained both marine and land areas.

Most sediments are local or regional in origin. In Woodmorappe's model, each regional manifestation of a TAB is independent of other regional manifestations. There are no major global volumetric tendencies in respect of primary lithologies—every geologic period has shales, sandstones, limestones. While the percentages of each type of sediment fluctuate between geologic periods, there is no major trend in the Phanerozoic. My research indicates that although this is generally true, we find strong indications of a change in the Miocene Epoch of the Tertiary, and I will refer to this again.

The *Modus Operandi* of TABs

The actual mechanics of a global Flood have posed some problems for Diluvialists as we do not know exactly the origin of all the waters. A global water canopy could certainly have produced heavy rain for a period, but I suspect the majority of the water came from the 'fountains of the deep'—geothermal activity and volcanism on a large scale. Petersen (1981) wrote a very interesting paper on this subject and proposed that in the beginning an extensive layer of water separated two layers of earth's crust which he called 'The Deep.' These waters were ejected by tectonic activity and supplied the majority of the global Floodwaters.

Woodmorappe has, as we have seen, equated each of his TAB provinces with eras and sub-eras. We have noted the evidence of considerable tectonic activity in the Lower Palaeozoic to which TAB province number 1 has been allocated. All TAB 1 regions and their associated portions of antediluvian unconsolidated regolith would downwarp or subside simultaneously, taking with them the biota of each region. Thus the Lower Paleozoic was deposited first, followed by whatever other TAB provinces were nearest, the Floodwaters carrying the soils and organisms from TABs 2, 3, and 4 in that order. The water-transported sedimentary particles and organisms would always flow from an area of lesser tectonic proclivity into areas of higher activity, i.e. from TAB 4 provinces into TAB 3, 2 or 1 areas etc.

The sequence of TABs deposited would always follow the same relative order, whether or not all of the four TABs were actually present in a given region (Example: TABs present are shown in the right):

Cenozoic (highest)	4	4		4
Mesozoic			3	
Upper Paleozoic	2	2		2
Lower Paleozoic (lowest)	1	1	1	

We see from this how stratigraphic 'successions' of multiple TABs could have been generated at and/or near junctions of TABs (Figure 2). In a geographic center of large representatives of a specific TAB, only the biota of that TAB would be superposed, i.e. a TAB 2 would have only the fauna and flora of the Upper Paleozoic deposited. Such singular 'successions' are seen in the form of thick geosynclinal deposits containing a few mutually-adjacent geologic periods such as the Lower Paleozoic Caledonian geosynclinal accumulations. Also, platform deposits with singular geologic periods would occur. As we have seen, the 'higher' or younger geologic periods have more of this type of formation than earlier or 'lower' periods.

The arrows in Figure 2 indicate direction of flow from areas of lesser subsidence into areas of greater degree of downwarp, following a pattern which is the same irrespective of whether it is river and stream, or progressional intra-Flood or recessional. The skies dumped the rain, and the fountains of the deep poured forth all over the globe, more so in some areas than in others. The 'Cenozoid' or TAB 4 provinces would show the least activity, TABs 1 and 2 the most. In some cases such as ocean beaches we could expect them and their contained fossils to be preserved intact by the Flood waters and sea-level rises in a quiet manner. Around rivers and river mouths, most sedimentary material would be swept offshore and in these cases hydrodynamic sorting would come into play. Salt- and freshwater lakes sometimes would suffer fairly gentle deposition resulting in 'ancient' shore-lines but in many cases the picture would have been much more violent.

Woodmorappe (1983, p. 162) found that more than half of the earth's land surface has two or fewer of the four TABs (the four eras/sub-eras) superposed at any one locality. In view of this fact (established by the previously mentioned detailed listings and mapping of all fossil localities on the earth), one can safely conclude that the dominant mode of sedimentation during the Flood involved very little tendency for TAB constituents to be transported much beyond their boundaries. Otherwise we would expect to find much more than half the earth's land area containing more than two locally/regionally superposed TABs. If we include oceanic data applicable to TABs 3 (Mesozoic), and 4 (Cenozoic), the tendency increases so that only about one-sixth of the earth's entire surface has more than two locally superposed TABs. Oceanic sediments, mostly the upper half of the geologic column, tend to be more restricted in their Flood movement/transport than land sediments.

When we further note that the regions of greatest completeness of the geologic periods are also regions of greatest sedimentary thickness (geosynclines), and thus are also areas of the most superposed index fossils, we become more confident about the TAB concept as this would appear to be further independent support for the model. Most geosynclines would be areas of greatest (and earliest) downwarping caused probably by the region settling after the ejection of water, steam, etc. from below the old surface; and most would be found to be Paleozoic—TABs 1 and 2. Some of these massive deposits are up to 40,000 feet in thickness, up to 200 kilometers wide and over 1,000 kilometers in length. Often, these great sedimentary depressions became uplifted later to form plateaus and mountain ranges. In a few rare cases, material from all four TABs will find their way into these regions, and thus in occasional deposits we will find fossils from all four eras / sub-eras as can be seen in Figure 2. One can see from this how, at the margins of TABs, various different sequences of superposed / juxtaposed fossils could occur, but almost always in the same relative order.

Other factors such as sorting, preservation bias, chance or differential escape potential would account for some local sequences. In the Woodmorappe model, sedimentation is primarily controlled by tectonics sequentially downwarping various TAB provinces throughout the Flood with mass transport of sediments from one region to another and thus depositing great thicknesses in some cases, less in others.

Woodmorappe's diluvian interpretation is scientifically superior to the uniformitarian view because it explains fossil succession / separation with less multiplication of hypotheses and special pleading. The uniformitarian geologist has to resort to special pleading when he stresses the time value of index fossils while ignoring the so-called long-range forms. In other words, he is really assuming short time-frames for some fossils in a type of circular reasoning. We have already seen how the Woodmorappe model could have produced these stratigraphically restricted but widespread fossils and shortly we will go into more detail. This diluvian concept accounts consistently for both fossil types in one uniform model without the need for the proliferation of unobserved evolutionary processes. The uniformitarian must take into account all these factors plus vast amounts of geologic time in his explanation of the stratigraphic record. We will return to the subject of evolution and chronology at the conclusion of this work.

The Dominant Position of TABs

The TAB process according to Woodmorappe dominates in the process of fossil separation, especially in the 'dividing' of the Phanerozoic into four separate segments while ecology and biogeography supplement the concept by further influencing the differentiation, especially within and between the so-called geologic periods. In Figure 3, we see how sequences of 12 randomly chosen fossils would occur. The divisions are four-fold, with TAB 1 (Lower Paleozoic) at the bottom, then ascending to TAB 2, (Upper Paleozoic), TAB 3 (Mesozoic) and TAB 4 (Cenozoic) at the top. Twenty-one possible fossil locations (the vertical lines), randomly taken from the global surface, are shown in each grouping with three types of TAB influence: First, other factors such as ecological zonation, sorting etc. having little or no effect on the TAB process; Second, these factors working together with TABs in a synergistic fashion, and Third, the other factors working against the TAB process. It is stipulated for this example that sedimentation rates are identical and that all four TAB provinces are locally present. Fossils A, E, and I belong to TAB 1 (Lower Paleozoic), and tend to be restricted to the lowest stratigraphic levels, although obviously this would not always be the case because the mechanism would not be absolutely efficient, and exceptions will occur due to local factors such as gradational biogeographic boundaries—this is to be expected since most index fossils do not superpose locally.

Fossils B, F and J are TAB 2 biota and this is reflected in their general restriction to that stratigraphic zone. C, G and K are TAB 3, and D, H, and L are TAB 4 fossils. We see that in the neutral (TAB-only effect) first column, only occasionally do we find fossils ranging into other TAB areas e.g. fossil C of TAB 3 at locations 6, 13, 18 and 20 is 'outside' its expected zone, number 6 ranging up into TAB 4, number 13 into TAB 2, number 18 into TABs 2 and 1 and number 20 into TAB 4. In the second column where the other factors happen to be working with the TAB process, the fossil ranges are even more restricted but in the third column where other factors work against the TAB process thus 'smearing' its effect, the fossils tend to be all over the place, even though the majority are still restricted to their 'correct' stratigraphic levels.

Before examining this illustration more closely, I digress briefly to point out that in the 'real world' neither sedimentation rates nor volumes are constant, and all four TAB regions may not be locally present. Thus the amounts of sediment and number of organisms may vary from one TAB area to another, and between the types of TABs themselves, and therefore local regions of sediment and fossil content will vary in thickness and number of buried organisms. Further, if a particular TAB is not present in the region, neither its sediment nor its fossils will appear in the record there. Thus, if a pre-Flood area contained only TABs 2 and 4, we would not expect to find fossil-free deposits of rock where TABs 1 and 3 would have been.

Only TAB 4 rock superposed on TAB 2 deposits would be found, and depending on local tectonic dynamics and topography, there would be either a 'deceptive' conformity (paraconformity) or perhaps an angular unconformity between the two. A uniformitarian would study this sequence and conclude that the 'missing' fossils were either never deposited in time or had entirely eroded away. The vertical lines in Figure 3 represent stratigraphic 'ranges' of the fossils, the short ones being confined (to a uniformitarian, a short time-frame), and others representing long stratigraphic range which the orthodox geologist would interpret as having lived through several stages, periods and even eras.

In column two (synergistic), where other factors such as sorting, chance, differential escape etc. work in a way supportive to TAB deposition, thus accentuating its effects, the stratigraphic differentiation will be more acute than in the other columns. In fact all three types would occur to a greater or lesser degree—neutral (TAB alone), synergistic (supporting TAB process) and antagonistic (working against the TAB processes). For instance, in Column three (antagonistic), if a pre-Flood organism was benthic and would normally tend to be buried at a very low stratigraphic level, but it was dwelling in a TAB 3 or 4 environment, and would be 'higher' in the column, then we could say that ecological zonation worked against the TAB process in that case. Such a case could have produced a fossil like K or L (third column) which, although generally restricted to its 'expected' level, would sometimes be found smeared

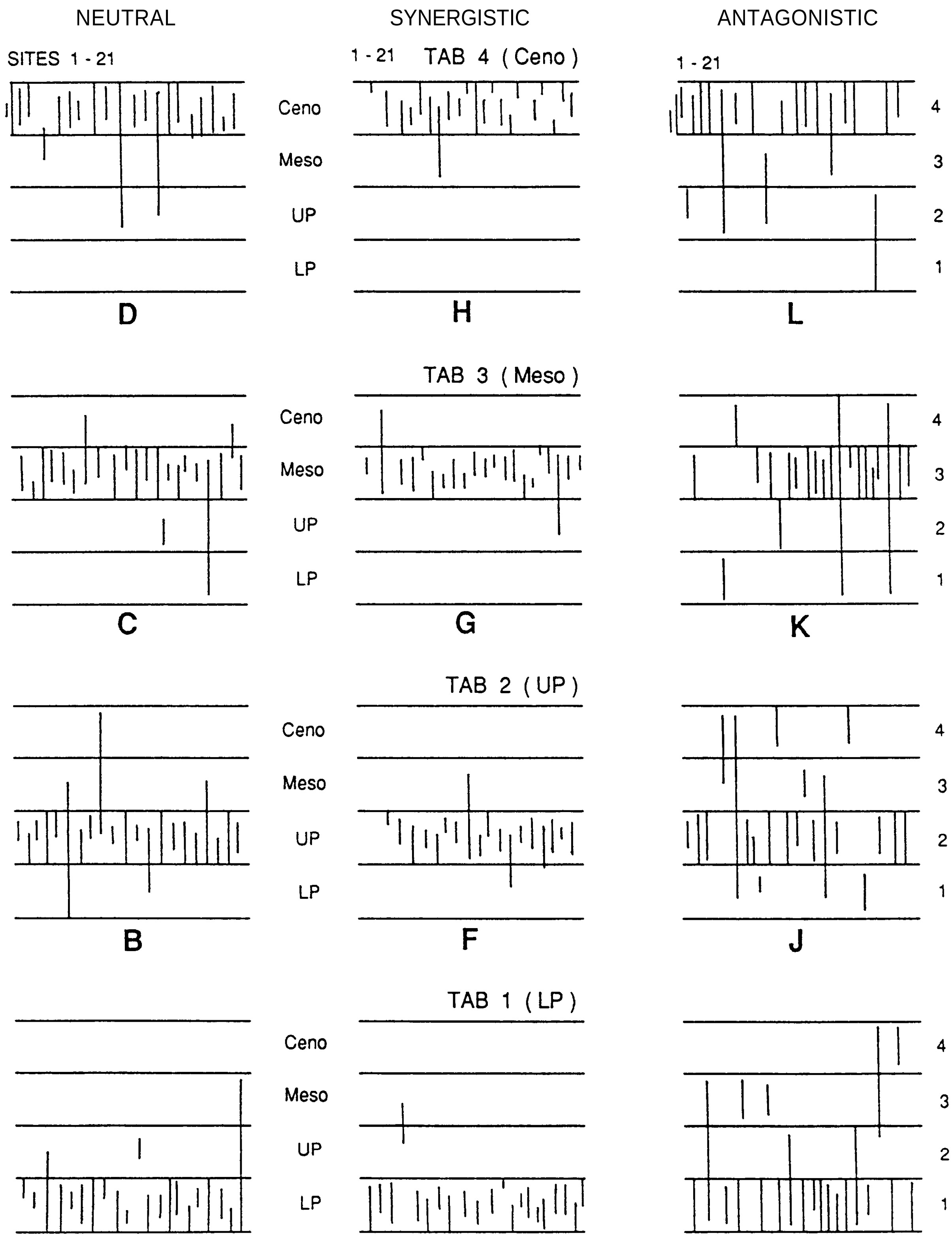

Figure 3. The three columns, each containing four groups of eras/suberas represent situation where other factors are working with, against, or neutrally in respect of the TAB process. For example, column two (synergistic) indicates how 21 fossils (vertical lines) might be positioned stratigraphically where other factors such as ecological zonation, chance, etc. are working with and supporting the TAB process. Note here how much more restricted are the fossils' stratigraphic ranges in column two as compared to those in column three where the other factors work against the TAB process. In column two only a very small number of fossils extend outside their range. These short-range fossils are, to the uniformitarian, index fossils. Each column is further divided into four groupings to indicate how fossils A-L relate to each other. These are shown in capital letters beneath each segment. See text (Woodmorappe, 1983, Fig. 7, p. 164).

into several TAB stratigraphic zones or even translocated right outside its expected zone. On the other hand where the other factors work together with the TAB process; say a plant fairly high in elevation and growing in a TAB 4 region, the converse would happen. Consider fossil H, second column. It would be almost entirely restricted stratigraphically to the upper rock layers and would be so confined even within that layer.

Where these multiple effects were synergistic, this acute stratigraphic restriction of the organism will increase its chances of never being found overlapping with a like organism confined to a different stratigraphic interval—both will then appear to the uniformitarian geologist as having lived only a short time and he would consider them as chosen or index fossils. The same would occur whether it was a single organism or a suite (assemblage) of fossil fauna—almost always they would be very restricted stratigraphically no matter where found in the world. With the 12 fossils and 21 random sites for each TAB type, there are 252 possible individual stratigraphic occurrences. Every site is geographically discrete and any occurrences can be juxtaposed with any other.

These juxtapositions will be either compatible (overlapping) or incompatible (non-overlapping). The long-range fossils C18 (18th vertical bar), B18, K12, L19 and so on which 'spread' into different geologic periods or eras would be ignored by the uniformitarian geologist as having no time significance. It can be seen from Figure 3 that the 'incompatible' juxtapositions (the very short-range) fossils or index fossils are generated most frequently from fossils E, F, G and H in the synergistic column.

The creation of index fossils is an interplay of actual TAB-generated stratigraphic restrictions of an organism with the limited number of opportunities for fossils to be juxtaposed. The fact that there are so few chances for any two fossils to juxtapose means that mixtures and overlaps will occur only when certain combinations of TAB-generated stratigraphic ranges simultaneously occur. Consider fossils F and H in locations F11 and H7 in Figure 3. The chance (in this diagram) of an occurrence of fossil F to be in any particular site (F11), is one in 21 and the same goes for fossil H at site H7. Taken together that means a one in 441 chance of them juxtaposing. Very limited opportunity therefore exists, but if they do occur. the uniformitarian geologist would ascribe some time significance to them.

The same principle of limited opportunity for juxtapositioning governs all fossils. This must be kept in mind in the following discussion. As seen from Figure 3, if we take as an example the fossils E, C, H and I, and note that they are persistently 'incompatible' (not juxtaposed) and further couple them into EC, IH, IC, HE and CH, we note that E is always stratigraphically below C and C is always below H (Figure 4). This would give an upward chronological trend E-C-H of these imagined index fossils. Other fossils would not be accepted as chosen fossils because they are partly or totally compatible stratigraphically with each other, i.e. fossil J is compatible with both C and E; I is incompatible with and below H but any imagined time relationship could be 'refined' by observing that I is also incompatible with and below C. As I is compatible with E it would be regarded as being time-equivalent with E but not ranging stratigraphically higher and 'younger' than E because like E, fossil I is incompatible with and stratigraphically below C. To summarize, E, C, and H would be main index fossils and I could be an 'auxiliary' one. Fossil J is a 'long-ranging' one and therefore useless as an index. In his Figure 8 (not reproduced here), Woodmorappe links a large number of fossil sites from around the globe showing how they relate to each other. His concept is applied to actual index fossils from 48 regions, the relationships previously mentioned appear in Figure 4.

When one notes that certain combinations are consistently incompatible, each fossil appears to denote a time horizon relative to the other and can be 'correlated' with other imagined time horizons. Although the examples are simplified, it can be seen how the TAB process would provide the main source of actual biostratigraphic differentiation, while the proven general non-superpositioning of fossils is the element which draws in the component of imagination to the whole concept of the differentiation—i.e. as stated earlier in this paper, the geologic column is *a mixture* of physical reality and evolutionary concept.

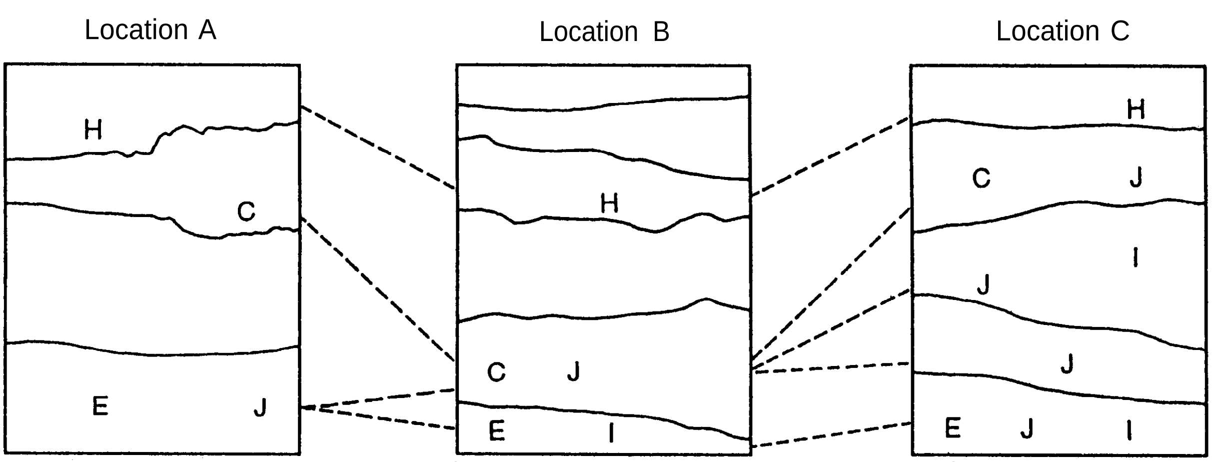

Figure 4. The letters H, C, E, I, and J denote the same fossils as in Figure 3. Illustrated is how these index fossils are placed in an imagined evolutionary time-stratigraphic relationship. Each fossil is imagined to represent a time horizon relative to other index fossils, i.e., any fossil H is of the same age as any other fossil H, no matter where it lies stratigraphically. Fossil H is always 'younger' than fossils C or E, giving a chronostratigraphic 'progression' E-C-H, earliest to latest. Since fossil J is compatible with C and E, it is useless as a time marker and is considered a long-ranging form. Fossil I is compatible with E but is incompatible with, and always below C (Woodmorappe, 1983, p. 166).

Difficulties to be Considered

The TAB concept provides a unified system for geology and biostratigraphy which accommodates a number of problems and puzzles faced by evolutionary geology and is applicable to all the sedimentary deposits from the upper Precambrian at least to the middle Tertiary. Before the upper Precambrian, only unicellular life-forms are found; presumably these lower layers represent a portion of the created pristine regolith which was placed there to water and provide the conditions for the pre-Flood tilling of the soil and for plant growth. These one-celled organisms are common throughout the whole geologic column and many are virtually identical to extant forms such as many algae and bacteria. Some of this regolith would have become saturated with single-celled forms from the Floodwaters, whereas multicellular animals and plants would not have been able to have penetrated below a certain depth. A much greater part of the pristine regolith became, during and after the Flood, the sedimentary rock systems of the Upper Precambrian to the middle Tertiary.

The TAB process, (with the additional factors of ecological zonation, hydrodynamic sorting, chance, preservation bias, biogeography etc.), not only supplied the mechanisms for fossil separation between eras and sub-eras but also between and within geologic periods, epochs, ages and biozones. It also solves problems such as paraconformities or deceptive conformities where a very 'young' formation may rest conformably on a very 'old' formation, with many millions of years of 'evolutionary time' missing between the two. There are thousands of these cases which could be considered as possible weaknesses in historical geology.

Sometimes geologists can legitimately point to signs of erosion in the understrata. An example is the presence of an occasional channel or small 'valley' in some of the Grand Canyon contacts such as those between the Esplanade Sandstones and the overlying Hermit Shales, and between the Temple Butte Limestone and the overlying Mississippian Redwall Limestones. These valleys and channels are usually filled with material which is the same as the overlying layer, but are these indications of erosion really pointers to great passages of time? Not at all; the TAB system can account for them in a short time frame. Such 'valleys' and channels could well be the result of strong scouring currents coming immediately afterwards and dumping the next lot of sediments in them as well as onto the preceding sediments. Depending on local tectonics and topography plus the other factors, such currents would be expected. Cross-bedding, plastic deformation or folding and other phenomena of geomorphology are also explicable in the TAB model.

The model also is the only diluvial theory which can account for those fossil sites where the floral and the faunal remains match—e.g. 'Devonian' plants juxtaposed with 'Devonian' insects, or say 'Cretaceous' dinosaurs and 'early' angiosperms. In all other diluvial models I have studied, there is little attempt to account for these sites where extinct animal fossils are found together with or close by the corresponding extinct flora. When one studies the geologic phenomena of past times one is struck by the immensity and scale of events such as volcanism, mountain-building, huge fossil graveyards and uplift, in proportions which literally dwarf present-day observed processes. The present is certainly not the key to the past—a past which shouts 'catastrophism.'

Radiometric Dating

Up to now I have not referred to the practice of dating certain non-sedimentary rocks by radiometric methods. This particular work by Woodmorappe deals only with sedimentation processes but in other places he has raised many serious objections to radiometric methods, and for readers who may wish to study this subject, his relevant works are listed in the references at the conclusion of this article. Woodmorappe is just as thorough in this field as he is in other aspects of earth history. Also, Snelling has published an article on radiometric dating which casts grave doubts upon its value (1992).

Extinctions

This question has been the subject of much debate—not only the animals and plants which seem to have disappeared gradually over apparently long ages, but the mass extinctions of the late Permian and the K/T events of the late Cretaceous when nearly 20 percent of all families around the globe 'disappeared' from the record. In the Permian extinction, half of all animal families went, and perhaps as many as 90 percent of all species. So far we have focused on why fossils differ from one rock horizon to another; but now we ask why is there 'progressive' extinction? Why are fewer and fewer extant taxa represented, the lower we go stratigraphically? For instance, only 2.5 percent of extant families are also found in Cambrian rocks. Why do the most recent geologic periods share more taxa with the present, and the older ones share less?

In the Lower Paleozoic we find that only 11-15 percent of fossil families are still represented today but the figure rises to 60-80 percent for more recent periods. Uniformitarians have advanced a number of suggestions for progressive extinctions, ranging from genetic exhaustion to failure to adapt. While the latter may have some limited value, it does not seem to be capable of accounting for more than a small proportion of cases. Macbeth (1971, p. 118) informs us that for every species in existence now about 99 have become extinct, but it remains unclear why any given species and more importantly, why any particular family has disappeared. Such phrases as 'not viable' or 'lost adaptation' are really meaningless. Overspecialization may have some bearing on the matter but it is also vague. The problem is compounded when we remember the considerable numbers of persistent types called living fossils, which have survived for allegedly up to hundreds of millions of years. During this time, if it ever existed, countless changes must have taken place in climate, salinity, environment, enemies and diseases.

The two main concepts, gradual extinction by environmental change and catastrophic change by asteroid impact, face the problem of explaining how they could be sufficiently efficient and global in extent to completely destroy so many forms. Woodmorappe shows that a global Flood explains them best as it was simultaneously global and pervasive in its effects. The global Flood is scientifically superior because it offers a single unified explanation compared to multiple causes throughout the geologic column for the uniformitarian side.

The answer to the problem of decreasing shared percentage of ancient families in progressively older rock is fairly mundane and once again the TAB process supplies that answer. The process governed how many organisms of each antediluvian biogeographical zone survived, whether TAB 1, 2, 3, or 4. The deeper the burial of a group of pre-Flood organisms (irrespective of whether they were buried *in situ*, nearby, or further away), the less the probability that any of them or any of the associated seeds, spores, eggs or larvae survived and therefore were available to repopulate the post-Flood earth. Where burial was shallow, less sediments were suspended in the Floodwaters and the deposition period was less. In these circumstances it is more than probable that some organisms did survive. Figure 5 shows how depth of burial and survival chances were controlled by the TAB mechanism. This differential survival of TAB faunas and floras is the key to understanding the mystery of progressive extinctions in relation to the current biosphere. There is no need to postulate long geologic ages and evolution.

It can be seen in Figure 5 that surviving organisms were numerically and taxonomically impoverished much more in the lower deposits (TABs 1 and 2), than those buried in the higher strata (TABs 3 and 4). Obviously the biota of TAB 4 had the best chance of survival, and as these representatives began to repopulate the post-Flood world they dominated it compared with the few survivors of the lower TABs. The organisms which were separated into the four TAB provinces before the Flood were now in direct competition with each other. Many of those from lower-buried equivalents were at a numerical (and ecological) disadvantage and many more of them were forced to extinction than were those of higher burial.

Another factor is that the higher TAB organisms, being more numerically abundant, received a reproductive advantage because the pre-Flood ecological 'webs'—animals, bacteria, vegetation etc., were more likely to have remained reasonably intact than was the case for those buried more deeply. The result is that the TAB 4 taxa (Cenozoic to middle Tertiary) have much more in common with today's taxa than those of (decreasingly) TABs 3, 2, and 1. We recall that only 2.5 percent of modern families are represented in Cambrian rocks, 24 percent in Permian deposits, 49 percent in Jurassic beds, and 82 percent are represented in the Cretaceous.

The so-called major 'sudden' mass extinctions of the late Permian, Cretaceous and other periods were certainly sudden, but in real time—due to the Flood. In the evolutionary context they are really an illusion. The fact is that a large number of Permian families (52 percent) can also be found in the 'next' period, the Triassic, and 70 percent of Cretaceous families are still represented in the Tertiary, despite the so-called mass extinctions. The main difference between Mesozoic rocks and those of the Tertiary is that the former was originally inhabited by various families or groups of dinosaurs and other reptiles plus other forms which occupied some TAB 3-type provinces. The latter con-

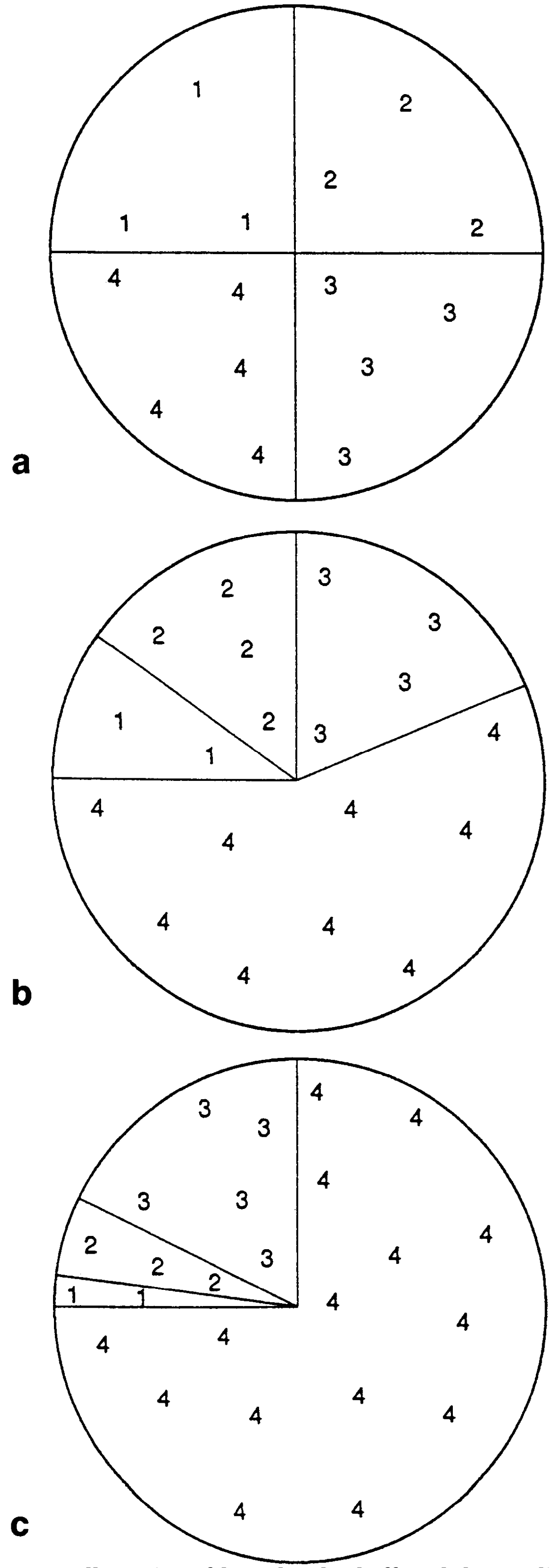

Figure 5. Illustration of how the Flood affected the pre-diluvial life-forms: a = pre-Flood biosphere with all four TABs approximately equally represented; b = Early post-Flood biosphere—TAB 4 organisms expand their percentage share of life-forms; c = extant biosphere—TAB 1 types being buried deepest are now much reduced as a percentage of total population (Woodmorappe, 1983, Figure 9, p. 168).

tained virtually none of these forms and many TAB 4 provinces (Cenozoic, Tertiary), were home to different animals and plants such as mammals and angiosperms (the flowering plants). There was no 'natural,' evolutionary extinction. The Flood produced such oddities as 'living' fossils. On the other hand, many creatures peculiar to just one or two sub-populations of TAB provinces (not all four provinces need have had exactly the same types as each of the others), were simply destroyed—it was a quirk of the Flood.

Animals on the Ark

Most creationists would accept that representatives of all avian, all land-dwelling reptilian and mammal families, and all terrestrial amphibian families were taken on the Ark. We may therefore ask the question: Why do these creatures follow the same progressive extinction pattern which applies to those not on the Ark? The short answer is that all these saved creatures were ecologically dependent on organisms which went through the Flood. Consider the food chain—the Lower Paleozoic reptiles ate TAB 1 vegetation: the Mesozoic dinosaurs and other reptiles primarily depended on TAB 3 vegetation, while mammals generally relied on TAB 4 vegetation. The dinosaur families of the Mesozoic (TAB 3, Triassic, Jurassic, Cretaceous) were apparently not sufficiently viable enough to cope with the new post-Flood conditions. As all vegetation, being exposed to the Flood, was subjected to immediate differential extinction, the animals released from the Ark were subjected to the same differential extinction which paralleled that of the vegetation on which they were dependent. As Woodmorappe says, the main reason why mammals proliferated at the expense of dinosaurs and other reptiles was due to the more favorable environment of TAB 4 vegetation as the remnants of the plant kingdom began regenerating on the earth.

Classification Matters

Two vital points must be remembered: When speaking of 'families' and 'geologic periods,' I am not giving any approval to these terms in an evolutionary context. In the TAB Flood model, a 'family' simply means a kind or type created by God, and within which, already-existing genetic variability is expressed according to environmental and other conditions. No approval is intended for a 'family' to mean an evolution-oriented idea of gradual naturalistic progression of forms which can be classified as being related in phylogenetic terms. Not all evolutionary 'families' are equatable with created kinds or types. Some members of these created groups were positioned in different TABs—some in all four, others in only two or three, and no doubt there were differences in provinces even within a particular TAB.

What about evolutionist claims that 27 new orders or mammals 'appeared' in the Eocene epoch of the Tertiary? What are we to make of the claim that no new animal families, apart from the alleged hominids, have appeared since the middle Tertiary (the Miocene epoch), no new orders since Mesozoic times, and no new classes since the mammals allegedly arose from certain reptiles in the middle Mesozoic? What about the 10 families of the order foraminifera all of which are still in existence, yet six of them date from Paleozoic times?

From the TAB-model viewpoint, these claims merely reflect the created make-up of the various TAB provinces and the varieties within them. Different dinosaur families represent various TAB 3 provinces, and various mammalian families are from various TAB 4 provinces. An entire family comprising 10 or 20 varieties which d not have been present in any single province; make up that family woulonly two or three varieties would be enough to establish that family's presence in the province. Obviously most mammals (including humans) inhabited areas which were the last to downwarp and become totally flooded. Of course it is now impossible to tell the degree of any changes which may have occurred in TAB populations between Creation and the Fall, and between the Fall and the Flood, but all changes would have been lateral and within each group's genetic boundaries.

Post-Flood Disturbances and Survival Factors

For hundreds or even thousands of years after the main phase of the Flood, intense geological activity would have been occurring as the earth gradually returned to equilibrium. Many of the extant inland lakes and seas are the remains of flooded areas which we know were much larger in the past. Raised shore lines around some of them indicate that they were much larger in area and depth after the Flood. Some good examples are Lake Bonneville (Utah), Lake Texaco (Mexico), Lake Lahontan (Nevada), the Dead Sea, and the Caspian Sea. Previous water levels in these lakes range from 175 feet higher in Texaco, 1,000 feet higher in Bonneville, 1,400 feet higher in the Dead Sea and 250 feet higher in the Caspian. Whether due to glaciation immediately after the Flood or the Deluge itself, the fact remains that these lakes and seas were much bigger not long ago, so perhaps the world is still 'drying.'

In any case the post-Flood world was very different from the antediluvian one and many of the 'family' representatives which left the Ark succumbed—some quickly, some over a longer time. However those representatives which did survive and repopulate the earth, contained within their DNA the genetic capability to speciate and fill the various niches around the globe. This is why, despite the continuing decrease of shared families and species from the Middle Tertiary until now, there is in most cases a high degree of similarity between modern forms and those of say the late Miocene epoch. For instance, the percentage of living species of mollusks represented in the Pliocene is around 60-80 percent as against less than 5 percent in the Eocene epoch in the earlier Tertiary. Of course if we use the family taxon, the percentage would be appreciably higher; almost all extant families are also found in the Pliocene.

Can we pick the rocks which reflect the final recessional stages of the main-phase Flood? I believe we can; there are a few clues and pointers. What is different about the Cambrian to middle Tertiary span (TABs 1-4) compared with the late-Miocene to Recent epochs? Glenn Morton (1985) explains that in every geologic period prior to the Tertiary, we find huge sedimentary deposits of various types on a continental or global scale. In the Cambrian we find the St. Peter sandstone which extends from Oklahoma to Canada. The Cambrian blanket of sand is found over nearly all of North America and similar deposits are located in Greenland, Scotland, England, Turkey, Arctic Russia, Middle Asia, Siberia, China, Australia, South Africa and South America. In the Ordovician, dolomites range over much of northeast America, and are found in Scotland, Greenland, England, Wales and China. Every geologic period seems to have continental and global-sized deposits of sandstone, shales, limestones including chalk, and coal.

In the Cretaceous rocks just 'below' the Tertiary, we find enormous deposits of chalk, sands, and shales; and in the lower Tertiary, rocks are found which contain huge deposits of greensands, coal, and shales which can be traced over large parts of the globe. However, when we come to the mid-Tertiary deposits we begin to see the end of these world-wide depositional systems, although lower Tertiary greensands are still widespread and Eocene deposits of nummulitic limestones are found widely. Morton informs us (1985, p. 102) that the final widespread deposits are found in the Miocene (Mid-Tertiary) —the diatomaceous rocks up to three kilometers thick in California, Mexico, Japan and much of Asia, Algeria, Italy and much of Europe. But, he explains—"For some reason, unexplained by (historical) geologists, the world-wide depositional systems ceased in the Tertiary strata." Morton believes that the pre-late-Miocene strata were formed by the action of a world-wide Flood and that younger rocks, i.e., later than the mid-Miocene, were formed by processes in operation today. We simply do not find these global-sized systems in the so-called Pliocene, Pleistocene and the Recent.

Whitcomb and Morris (1961) also believe that the final stages of the Flood equate with middle Tertiary deposits. The uplifts of the Pliocene epoch are well known and they cite von Engeln and Caster as stating that the Himalayas and the Alps acquired much of their height in this epoch, and that Pliocene and Pleistocene diastrophism is perhaps the greatest and most widespread that the earth has known since Precambrian times (p. 286). We know of the Pleistocene iceage which seems to follow the final Flood activity almost immediately. We thus seem to have reasonable grounds for believing that TAB 4 provinces (Lower to middle Tertiary) had no influence after Miocene times and therefore the interval from the late Miocene to the present represents normal depositional processes. If the present is the key to the past, then it applies *only* to the very recent past, and not to the systems prior to the middle Tertiary. Life today is remarkably similar to the life of the Pliocene and the Pleistocene, except for some extinctions.

What about Human Fossils?

Woodmorappe (1983, pp. 167-171) believes the pre-Flood human population may have been low—nerhaps only 10 million. We should remember that animals and plants were multiple creations whereas Adam and Eve were but a single created pair. He also cites other valid reasons for a low pre-Flood population. Apart from the TAB process, the most telling argument raised by Woodmorappe (1983, p. 169), is this—the volume of Phanerozoic rock is about 700 million cubic kilometers. If all human remains were distributed randomly by the Flood, the pre-Flood bones and artifacts would approximate one specimen per 70 cubic kilometers of rock. Even if 10 million human remains were concentrated in just one million cubic kilometers of Phanerozoic rocks, this is only 10 specimens per cubic kilometer and the chances of discovery would be very small.

Woodmorappe published a diagram (1983, p. 171), in which he visualizes the possible pattern of pre-Flood human settlement and this should be studied in detail by interested readers. The TAB processes, along with a much more influential differential escape factor, plus a probable low antediluvian human population, are sufficient to account for the lack of pre-Pleistocene human fossils. My own presupposition is that the 10 million people would probably not be distributed evenly on a global scale—most would be found within a few thousand kilometer radius with the Middle-East roughly at the center, and again mostly around rivers, seaways, estuaries and coastal areas.

Some Further Problems

Although I consider the TAB Flood model to be the most scientifically and Scripturally satisfying I have seen, there remain some problems and difficulties. Glenn Morton (1985, pp. 139-141) has reported possible large-scale time-consuming erosion in the Appalachians where Paleozoic strata are contorted in folds 10 to 20,000 feet high and with up to 10,000 feet eroded from the top folds. These flattened folds are covered by 2,500 feet of unfolded Cretaceous strata. Morton calculated the time required for the erosion alone on the order of 1.3 million years. The lithification, folding, and thrusting times are not estimated. This would appear to be a serious problem but there are other possibilities. If the Appalachian folded sediments were still soft, 10,000 feet may have been washed away as the Cretaceous (TAB 3) currents were operating. Neither lithification, folding nor erosion must necessarily take millions of years to occur; the whole process can be quite rapid.

Fossil Reefs

A great deal has been written about the alleged reefs now fossilized *in situ*, but both Woodmorappe (1980, pp. 213-214), and Austin (1975, pp. 16-59) have provided much evidence to the contrary—that these 'reefs' were chunks of coral reef washed into place by the Floodwaters, and their arguments are quite sound.

The Depth of Sediments

Some may object that the total thickness of the world's sedimentary strata is too thick to have been laid down in one year, such as the 40,000 feet in the Baltimore Basin. There are many such thick deposits around the world but they are not world-wide thicknesses. They only occur at certain spots and there is simply no need to add 25,000 feet of Cambrian, 30,000 feet of Ordovician, etc. to arrive at a fictitious pile 70 miles high.

Too Much Carbon for One Biosphere?

Morton (1985. pp. 144-146) raised the problem of the massive amount of organic fossil materials (coal, oil, limestone etc.), but there are two replies to this. First, much of the world's oil may be inorganic in origin and not derived from the remains of once-living organisms. Thomas Gold first espoused this theory (1986), and was ridiculed by some of his colleagues. However, to test his theory, deep drilling was begun about 1988 in granitic rock formation in Sweden—the last place one would expect to find oil. Gold has been vindicated—project manager Kenney announced that oil began to flow at a depth of 2,800 meters (about 10,000 feet). We now know that material containing carbon was included in the solids that contributed to the make-up of the earth—when the solids are heated in the high pressure interior of the globe, a variety of oil-like molecules is produced (Highfield, 1991, p. 1). This was a newspaper report and to date I have not seen any published material in the literature. Woodmorappe has published an excellent paper in which he argues compellingly for a pre-Flood biosphere which was quite capable of supplying the quantity of carbon required. With an inorganic origin for at least some oil, Woodmorappe's case is even more convincing (1986, pp. 205-218).

Finally we come to the question of the Precambrian-Cambrian unconformity. If there was a clear global separation it would be a setback for the TAB model. There are some fossils of interest in the upper Precambrian and some questionable unicellular ones before that, so the upper Precambrian must be a part of TAB 1 deposits. However, while the unconformity does exist in many places, in others the transition from Precambrian to Cambrian is not marked by any physical sign but is rather a discontinuity, the only evidence being fossiliferous. To prove the point I quote from McMenamin (1987)—". . . many regions are now known where Precambrian and Cambrian formations grade continuously into each other."

Whatever possible problems or objections may exist, there are other factors which tend to offset them as we have seen. If Flood models and hypotheses have apparent difficulties, so do all 'naturalistic' theories, and deciphering the events of past times is always fraught with questions because no trained observer was present to record what happened. There is no reason to deny the validity of Scriptural references to the Deluge, and when a powerful theoretical case such as that of Woodmorappe is proposed, it deserves close study by all geologists whether creationist or uniformitarian, especially when there is some supporting independent evidence in favor of it, and when it provides so many resolutions of previously considered problems.

Conclusions

The Woodmorappe TAB model is the first and only scientifically and theoretically satisfying paradigm of which I have knowledge. It was first published in 1983 and capped a series of previous studies of high quality by Woodmorappe on the unreliability of standard geological thinking. Although it does not eliminate all problems encountered by previous authors who had tried to establish a viable diluvian model, the TAB concept does cope very well with most of the major ones and almost all the minor difficulties.

In the nine years since it appeared in print, the TAB model has attracted very little comment or examination—this may be due to its complexity but I urge readers to make the effort to understand it and make constructive criticism. Unless creationists can counter uniformitarian geology as well as we have countered mechanistic organic evolution, we will fail to shake the evolutionist establishment, because the largely hypothetical geologic column is the real backbone of evolutionary theory. To dislodge evolution requires sound, scientific, creationist Deluge geology as well as the already powerful case against organic evolution itself.

I have not attempted to establish a time-scale for the Woodmorappe model but he does believe it to be very short. My own belief is that the time required is a little longer, based on what I have seen myself and / or studied, but not much longer—only thousands of years and certainly not the millions required by evolution. It is time that earth scientists changed their attitudes toward geochronology—there is nothing wrong in using age, epoch, period, era etc. as names as being descriptive of placement and / or type of fossils contained but not as time markers. I now hope that a full range of good quality discussion on the TAB model will ensue—it deserves far better than the general neglect it has so far received.

References

CRSQ—Creation Research Society Quarterly.

Austin S. 1975. Is the Capitan Limestone a fossil reef? in Howe, G. F. (editor). Speak to the earth: creation studies in geoscience. Creation Research Society Books. Kansas City, MO.

Brown, W. T. 1986. The fountains of the great deep. Proceedings. First International Conference on Creationism. Pittsburgh. 1:23-28.

Gentry. R. 1986. Creation's tiny mystery. Earth Science Associates. Knoxville, TN.

Gold, T. 1986. Oil from the center of the earth. *New Scientist* 110(1514):42.

Highfield. R. 1991. Oil find fuels fossil debate. *Brisbane Courier Mail.* October 14. p. 1.

McMenamin, M. A. 1987. The emergence of animals. *Scientific American.* 256(4):84-102.

Macbeth, N. 1971. Darwin retried. Garnstone Press. London.

Mehlert, A. W. 1993. An Evaluation of the John Woodmorappe Flood Geology—Part One. *CRSQ* 30:77-86.

Morton, G. 1985. Geology of the Flood. DMD Publishing. Dallas.

________ 1986. Geologic challenges to a young earth. Proceedings. First International Conference on Creationism. Pittsburgh. 2:137-143.

Petersen, E. H,. 1981. How the Flood altered the earth. *CRSQ* 18:118-126.

Snelling, A. A. 1992. Radioactive dating under fire. *Creation Ex Nihilo* 14(2):43-47.

Turek, V., J. Marek and J. Benes. 1984. Fossils of the world. Hamlyn. London.

Whitcomb, J. and H. Morris. 1961. The Genesis Flood. Baker Book House. Grand Rapids.

Woodmorappe, J. 1978. The cephalopods in the Creation and the universal Deluge. *CRSQ* 15:94-112.

________ 1979. Radiometric geochronology reappraised. *CRSQ* 16:102-.129.

________ 1980. An anthology of matters significant to creationism and diluviology. report 1. *CRSQ* 16:213-214.

________. 1981. The essential non-existence of the evolutionary-uniformitarian geologic column: a quantitative assessment. *CRSQ* 18:46-71.

________ 1982. An anthology of matters significant to creationism and diluviology. report 2. *CRSQ* 18:201-223.

________ 1983. A diluviological treatise on the stratigraphic separation of fossils. *CRSQ* 20:133-185.

________ 1986. The antediluvian biosphere and its capability of supplying the entire fossil record. Proceedings. First international Conference on Creationism. Pittsburgh. 2:205-218.

KEYWORD INDEX TO VOLUME 29

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*Glen W. Wolfrom, Ph.D., is Membership Secretary of the Society. For multi-page items, the reference is to the first page only. Letters following numbers indicate: a—article; L—letter; p—panorama; r—review; and n—note. CRS—Creation Research Society.