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Haec credimus:

For in six days the Lord made heaven and earth, the sea, and
all that in them is and rested on the seventh. — Exodus 20:11

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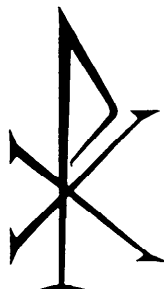
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COVER ILLUSTRATION

The picture on the front cover shows a stage in the excavation of fossils of dinosaurs, near Drumheller, Alberta, Canada. The picture was furnished by Travel Alberta, Edmonton, Alberta, Canada, and is used here by permission.

Much has been made of the geological column, and the fossils in it, in the uniformitarian theory. But, as is shown in the article by Woodmorappe, elsewhere in this issue of the *Quarterly*, the fossils are usually not stacked according to the alleged order of evolution. Fossils of dinosaurs, for instance, are found in one place, fossils of horses in another; and they are arranged in an alleged order of time according to evolutionary presuppositions. The danger of falling into a circular argument in any such process is apparent.

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QUOTABLE QUOTE

"... Sherlock Holmes was able, by winding up the dead man's watch, to prove that it had been wound up two hours ago, and that therefore the deceased had gone to bed within that time — a deduction which was of the greatest importance in clearing up the case."

Dr. John Watson, in the story
The Five Orange Pips.

Is this not a good illustration of how people try to date things by radioactivity, and of the pitfalls? For there is a natural starting-point for a watch: when it is fully wound. But for radioactivity, in many cases there is no such readily determinable starting-point, or initial amount.



PLACEMENT SERVICE

Do you know of academic vacancies to which Creationists might be directed? The Creation Research Society would like to be in a position to be able to inform Creation scientists of such vacancies. If you know of such positions, will you please inform Dr. John W. Klotz, 5 Seminary Terrace North, St. Louis, Missouri 63105, describing the position and the academic requirements and training required, and giving any other information which might be available?

Graduate students who are interested in placement may write to Dr. Klotz for information about any available positions which are known to the C.R.S.

CONVECTION CURRENTS IN THE EARTH'S MANTLE: A MECHANISM FOR CONTINENTAL DRIFT?

CHRISTOPH BLUTH*

Received 1 October 1982.

The first to postulate the existence of convection currents underneath the earth's crust — and hence to formulate some of the basic ideas still used to explain the mechanism of continental drift — was the Austrian geologist Otto Ampferer. He saw convection currents mainly as a mechanism for mountain building. The first to formulate continental drift in terms of convection currents was Arthur Holmes. The concept was later expanded into the sea-floor-spreading hypothesis by Hess, Dietz, Wilson and others, and still the most widely used model to explain continental drift.

What is Convection?

Convection is quite easily observable in a pot of boiling water. Density differences within a fluid cause the heavier portion to sink and the lighter portion to rise. This phenomenon is thermal convection because it is caused by a density difference in the water which is created by a temperature difference. If water is heated from below, the heated portion expands, becomes light and thus rises to the surface, where it is cooled and sinks down again. This circulation of water has the effect of heating the water throughout and convection is well known as one of the classical methods of heat transfer.

The phenomenon of convection was first investigated in depth by H. Bénard. In his famous experiment (1906) he placed a thin film of paraffin on top of an iron cylinder and heated the cylinder from below. Bénard found that convection did not occur until the cylinder had reached a certain temperature. After convection had set in for a while, a regular hexagonal pattern appeared on the surface. The explanation is that heated fluid rises to the surface at the centre of each hexagon, and cooled liquid on the top descends at the sides. The interesting fact about this phenomenon is that stirring cannot disturb this pattern for long, i.e. the convection cells form a *stable* pattern. These cells are known as Bénard cells. Another interesting fact is that the ratio between the thickness of the layer and the horizontal size of the hexagonal cells is close to one. Bénard's findings were theoretically analyzed by Lord Rayleigh in 1916, who developed the necessary conditions for convection to occur. These conditions are a relationship between the depth of the liquid layer, the coefficient of thermal expansion, the temperature gradient, the force of gravity, the thermal diffusivity and the viscosity. If the viscosity is large compared to the other factors, convection is inhibited. These numbers are combined in a ratio to form a dimensionless number called *R* (Rayleigh's number), and if *R* reaches 1000, convection begins to occur.

Convection Currents in the Earth's Mantle

Arthur Holmes¹ ventured the idea that such convection currents occur in the earth's mantle. This appears

at first sight to be a peculiar idea because the mantle is a solid body. However, geophysicists argue that no matter how solid, no substance can permanently withstand the prolonged action of forces. Thus, a tall iron pillar will ultimately bend under the force of gravity and collapse after a long time. Even a crystalline substance like ice will eventually flow, even if very slowly. One interesting indication of the earth's fluidity is its shape—it has an ellipsoid shape. It is not completely spherical because its rotations cause it to bulge at the equator. This simple fact seems to show that the earth can act as a fluid body.

Arthur Holmes developed the following concept of convection currents in the earth's mantle: basaltic magma rises with the ascending convection currents at the mid-ocean ridges and forms the ocean crust. The convection currents descend back into the mantle at the deep ocean trenches. Convection currents rising up underneath the continents (without penetrating the crust necessarily) would transport the continents conveyor belt-like and hence produce continental drift. Different variations of Holmes' scheme are still current among geophysicists today.

A number of objections have been voiced about such models. First of all I want to describe briefly some of the objections to the theoretical model of the mechanism, and then review some of the empirical evidence quoted against the convection current hypothesis.

The Earth's Mantle as a Fluid, and the Convection Current Theory

There are a number of factors which complicate the model of convection in the earth's mantle very considerably. The most obvious one from a physical point of view is that it is very hard to know what kind of fluid the mantle is. 'Ordinary fluid dynamics' deals with fluids known as Newtonian fluids. If the mantle behaves as a non-Newtonian fluid, it may be difficult even to define such important variables as the viscosity, and to solve the equations of motion of non-Newtonian fluids around a spherical shell is a formidable task indeed. (Geophysicists are working on it!) Another complication has already been mentioned in passing: we are dealing with a viscous fluid layer which exists in the form of a spherical shell, and not a horizontal layer heated from below. The famous astrophysicist S. Chandrasekhar extended Rayleigh's theory of thermal convection to spherical bodies and he also studied spheres like the earth which contain another spherical body (the core) inside.^{2, 3} The results of his research indicates that large-scale convection with a flow that encircles the entire earth can occur only if the core is small. With the core increasing, the pattern of convection is disrupted and the cells decrease considerably in size.

At this point we might consider another controversy: how deep do the convection currents reach into the mantle? Geophysicists have long argued about the

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question whether convection currents are confined to the upper seismically 'soft' layer of the mantle (i.e. the upper 250 km) or reach deep down into the mantle. One could argue against the latter model on the grounds that the pressures of the mantle are so high in these regions that the rocks are four times harder than steel and harder in fact than diamond, and that it seems implausible that the currents can be maintained in these regions. If the objections against convection in the deep regions of the mantle prove to be justified, then Chandrasekhar's theory might be used to question the whole feasibility of the convection current model. This is an interesting area of research to be pursued.

S. K. Runcorn⁴ tried to use Chandrasekhar's arguments to explain the break-up of continents due to the instability of convection currents caused by a growing core. This elegant hypothesis was not very widely accepted. Physically it can be argued: (a) The actual state of the earth's interior is remote from the model to which the Rayleigh-Chandrasekhar theory was applied, and since the Rayleigh number in the mantle may be far greater than the critical Rayleigh number, such a simple convection pattern cannot exist. (b) Such a simple model is not applicable to the actual mantle in which the viscosity varies. Other complications arise out of the fact that the heating of the liquid is not only from below, but there are radioactive heat sources within the mantle. Moreover, various properties, which in the Rayleigh theory were considered constant, are actually functions of temperature and pressure, such as the viscosity.

It is an interesting fact which was discovered by Myron Block⁵ in 1956 that Bénard convection is not actually a thermal effect, as Bénard himself thought and is still widely believed. The motion is not induced by changes in density due to heating, but rather through differences in surface tension. Bénard's experiment in the end has little bearing on thermal convection. Some scientists have argued that Block's discovery effectively destroys the convection cell theory of continental drift. The light silica and silicate crust on top of the mantle will counteract the surface tension effects of convection cell formation. Egon Orwan⁶ argued in the *Scientific American* that no geophysicist would have accepted the convection current hypothesis of Holmes and Hess if Block's results had been known before 1956. Other geophysicists have replied, however, that Rayleigh's thermal convection theory remains valid provided the layers are thick enough. It ought to be said that it is by no means certain that thermal convection can occur in the earth's mantle on the scale envisaged.

Another problem that arises if we accept that the convection currents are limited to the soft asthenosphere in the upper mantle is that the cells are too small. It is a conclusion of the theory of Rayleigh convection, and of all more complicated versions, that the ratio of the horizontal size of the cells to the vertical depth should be close to one. Consequently, this limits the horizontal scale of convection cells to a few hundred kilometers. The kind of movements this mechanism is supposed to explain, however, are on a scale of several thousand kilometers. Some respected

researchers see this as a grave problem for the theory.

Many geologists have assumed that given enough time the earth can act as an ideal or Newtonian fluid. Nobody knows for certain, however, that this is actually the case. We do not even know exactly what the mantle consists of, and so we have little idea about the fluid dynamics of the mantle. Newtonian fluids obey equations of motion in which the rate of strain of a substance is proportional to the stress. The limited experimental evidence that exists seems to indicate that the mantle does not behave like a Newtonian fluid at all; the rate of strain seems to increase exponentially by many powers proportionate to the stress. The conclusion that some geophysicists have drawn from these experiments is that flow in the mantle may be localized like a jet current. In most areas the flow will be very slow, but in some local areas it will be largely accelerated. Again, here is a very fruitful area for more research.

Empirical Objections to the Convection Current Theory

A devastating argument against mantle convection was published by the Soviet geophysicist E. Artyushkov⁷ in 1973. Previously, geophysicists had been greatly influenced by estimates of the mantle viscosity calculated by "postglacial rebound" in Scandinavia. This method was based on the principle of isostasy: the great mountain ranges are floating on the mantle and are subject to the principle of buoyancy. Scandinavia is believed to have been covered by a glacier; and after the ice melted at the end of the Ice Age the Scandinavian peninsula was relieved of a great weight. This in turn caused the Scandinavian peninsula to rise in order to regain isostatic equilibrium. The rate at which it is still rising was used to calculate the viscosity.

The result thus obtained was thought to be compatible with mantle convection, but Artyushkov argued convincingly that particularly under oceanic areas the viscosity of the asthenosphere should be one or two orders of magnitude smaller. The consequence would be that the force exerted at the bottom of the lithosphere due to flows in the asthenosphere would be too insignificant to drive the motion of the plates.

The interpretation of the mid-ocean ridges as the points where the convection current rises to the surface is in conflict with a number of empirical data. Peter Kaiser⁸ observes that the convection current model implies that the rate of transport of the continents should depend on the size of the continents. Since North America is considerably smaller than Eurasia, the Mid-Atlantic Ridge ought to be much closer to Europe. In fact, however, it is fairly close to the centre, especially at places where the width of the continents is larger and these effects would be more noticeable. Another interesting observation is that on the west side of the Mid-Atlantic Ridge, close to America, the sea floor was dated at 160 million years old, whereas on the east side, close to Africa, it was dated at only 110 million years. This is difficult to explain if the sea floor spreads from the ridge.

More devastating to the theory are the so-called "fracture zones" at the mid-ocean ridges. J. T. Wilson⁹

(Continued on page 193)

A DILUVIOLOGICAL TREATISE ON THE STRATIGRAPHIC SEPARATION OF FOSSILS[†]

JOHN WOODMORAPPE*

The author and the editor have been discussing and planning this work for nearly two years. It was received 4 October 1982, and with revisions 1 June 1983.

Calculations performed on the stratigraphic separational tendencies of fossil families show that one-third of them span 3 or more geologic periods. Also, geologic periods with 4 intervening periods between them still show double-digit percentages of familial faunal similarity.

A total of over 9500 global occurrences of major index fossils have been plotted on 34 world maps for the purpose of determining superpositional tendencies. 479 juxtapositional determinations have shown that only small percentages of index fossils are juxtaposed one with another. Very rarely are more than one-third (and never more than half) of all 34 index fossils simultaneously present in any 200 mile (320 kilometer) diameter region on earth.

Flood mechanisms (pure chance, selective preservation, differential escape and hydrodynamic selectivity, and ecological zonation) are evaluated. Independent evidence is presented to demonstrate that Phanerozoic fossils were deposited under tectonically-differentiated conditions, thus justifying the concept of TABs (Tectonically-Associated Biological Provinces) as the main cause of biostratigraphic differentiation. The TAB concept is placed in an integrated study of fossil separation, and it is shown that it explains extinction trends relative to the extant biosphere. The (near) absence of pre-latest-Phanerozoic human remains is explained through low antediluvian population (primarily); preservation factors are also scrutinized.

Plan of This Article

Introduction

I. DETERMINING TRUE STRATIGRAPHIC AND SUCCESSIONAL TENDENCIES OF FOSSILS

- A. A Measurement of the Actual Stratigraphic Tendencies of Fossils
- B. The Study of Juxtapositional Tendencies of Index Fossils: A Global Geographic Approach

II. THE SEPARATION OF ORGANISMS DURING BURIAL BY THE FLOOD: PROCESSES AND MECHANISMS

- A. Indeterministic Factors leading to Stratigraphic Differentiation of Fossils
- B. Deterministic Factors leading to Stratigraphic Differentiation of Fossils: the Primacy of TABs (Tectonically-Associated Biological Provinces)
- C. The Stratigraphic Separation and Succession of Fossils: a Diluvial Synthesis
- D. Biostratigraphically-Progressive Extinctions with Respect to the Extant Biosphere: An Explanation in the Light of the TAB Concept
- E. Causes for the (Near) Absence of Pre-Pleistocene Human Fossils

Introduction

The geologic column, specifically the order of appearing and disappearing fossils, is a pivotal point in both the evolutionary-uniformitarian and Creationist-Diluvialist paradigms. Evolutionists have long cited the order of fossils as evidence for evolution, but Creationists have offered alternate explanations in terms of the Universal Deluge. Whitcomb and Morris⁶⁴³ noted the role of hydrodynamic sorting as well as differential escape, while Clark⁶⁴⁵ (and many other Creationist-Diluvialists) emphasized ecological zonation. Price⁶⁴⁴ and Burdick⁶⁴⁶ tended to downplay the need for any specific mechanism to account for the stratigraphic separation of fossils, pointing out that many fossils overlap large parts of the geologic column and that few different types of fossils can usually be seen to superpose at any one given locality.

This work is a rigorous study of: 1) the actual stratigraphic tendencies of fossils, 2) the actual successional

tendencies of fossils, and 3) models of Flood action directly bearing on these two tendencies. The term "actual stratigraphic tendency" used herein (and throughout this work) refers to the statistical tendency of fossils to be confined within a single geologic period versus the tendency to span a large part of the geologic column. The term "actual successional tendency" means the tendency for many index fossils to be found superposed at any one given locality versus the tendency for few index fossils to be locally superposed.

There is a need to clarify the relationship between organic evolution and the geologic column because Creationists have commonly been accused of misunderstanding the relationship between the two. This issue has importance not only in relation to the Flood, but also increasingly (as pointed out by Creationists Morris and Parker⁶⁴⁷) in relation to the basic Creation/evolution issue. It goes without saying that evolution is based on the geologic column. McLaren⁶⁴⁸ wrote: "All historical inference in geology comes from the positional relationships of rock and mineral bodies. Stratigraphy is a special case of this general law, and our sole knowledge of the orderly evolution of life as represented by fossils, comes from their mutual rela-

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†This work is dedicated to the observance of the 20th anniversary of the founding of the Creation Research Society.

tions in stratified bodies. *The only proof that one fossil is younger than another lies in the relative position of the two in a sequence of rock. . . .* Hypotheses of evolution of a lineage must depend on the fact of positional relationship.” (italics added)

Gingerich⁶⁴⁹ said: “Without fossils and stratigraphic ordering, evolution itself would be little more than a speculative conjecture.” (Since—as will be shown—most fossils are not superposed at any one spot, evolution is nothing more than a speculative conjecture.) It is also worth noting that the study of stratigraphy is not only colored by evolutionist’s presuppositions, but also uniformitarian ones. This latter fact is evident in the following statement of Watson⁶⁵⁰: “Stratigraphy is the senior branch of historical geology . . .”

Evolutionists and uniformitarians, however, commonly claim that: 1) the geologic column is totally independent of organic evolution, and 2) that it was Creationists who had founded the geologic column. The first point is now addressed, while the second depends on definition of the word Creationists, a point to be considered later. First of all, it goes without saying that horizons of fossils (as well as lithologies themselves) have a regional character to them that enables their use in correlation (independent of any mode of origin) locally and regionally. McKerrow⁶⁵¹ wrote: “Some fossils can be used as a rough working basis for stratigraphy without considering them as much more than formed stones. William Smith discovered the stratigraphical application of fossils long before the publication of Darwin’s *Origin of Species* in 1859; and, during the second half of the nineteenth century, palaeontologists were applying their efforts to the description of new fossils and to the establishment of a stratigraphical framework based on their new discoveries. Sedgwick, Lapworth, Murchison, and John Phillips (to put them in stratigraphic order) were all concerned with the use of fossils as indicators of geological time. Looking back, it now seems amazing that none of these early giants demonstrated much in the way of evolution in fossils.”

An important distinction must be made between local and regional correlations (as exemplified by William Smith), and global correlation (as exemplified by Murchison). As one moves from local all the way to global correlation by fossils, correlations become increasingly less empirical and more conceptual. This is because there are progressively greater differences (such as lithology, local fossil succession, and overall faunal character) as one moves ever further geographically from a reference section in the type area. Accordingly, global correlation cannot rest entirely (or even primarily) upon empirically-derived superpositions but must depend upon a *conceptual* foundation linking index fossils as being time-equivalent.

The oft-repeated evolutionary-uniformitarian claim that global correlations by fossils are strictly empirical and independent of any other concept can be refuted merely by pointing to the history of geology. The Wernerians believed that basic lithologies could be correlated; hence a granite could be correlated with any other granite on earth. Note that the correlation was not purely empirical but was dependent upon the *concept of time-equivalence* and/or genetic relation-

ships of primary lithologies. Once the concept of such equivalence among primary lithologies fell into disfavor, so did the entire Wernerian system.

An analogous situation exists for correlation by fossils, as pointed out by Price.⁶⁴⁴ Some conceptual basis is needed for assuming a time-equivalence between fossils: this conceptual basis is organic evolution. Correlation by fossils has meaning *only* when they are believed to have arisen at a *definite time* and become extinct at a definite time more or less contemporaneously all over the earth.

The fact that the concept of time-equivalence of index fossils depends upon acceptance of organic evolution is proved by the following discussion concerning global correlations of Lower Cambrian cited by Cowie, *et al.*⁶⁵² “Dr. W. S. McKerrow asked the authors if they considered the three Lower Cambrian zones to be satisfactory time indicators. Could these changes be due to some environmental factor like increase in depth of water? If so, the same sequence of environments might produce the same sequence of faunas at different times in different areas. In particular, would the authors state why the faunal changes between the ‘non-trilobite zone’ and the succeeding ‘olenellid zone’ should represent a time horizon rather than a change in environment?” It is evident that the stratigraphic appearance of olenellid trilobites has meaning in global correlations *only* if this appearance is the result of an isochronous *evolutionary* outburst. If this appearance is due to an ecological as opposed to evolutionary change, then there is no conceptual basis for believing that the appearance is time-equivalent all over the earth, and the mere fact that this stratigraphic appearance of olenellid trilobites is empirical in no way validates it as a time horizon for global correlations.

Attention is now focused on the question of whether or not it was Creationists who founded the geologic column. Individuals such as Cuvier and Lyell (in his earlier years) accepted special creation *only* in the organic realm, but were always evolutionistic with regard to geology. Recall that evolution is not only considered to be operative in the organic realm, but at all these five realms: 1) cosmic, 2) geologic, 3) organic, 4) organic-human, and 5) human-cultural. Total evolution repudiates all forms of Divine action and attempts to explain the origin of existence, complexity, structure, and diversity in these five realms through materialistic processes that allegedly result in innovation, usually (though not inevitably necessarily) over immense periods of time. Special Creation in these five realms not only explains mere existence, complexity, etc., in terms of Divine action, but stresses the fact that all natural changes since then have been conservative or degenerative (as opposed to innovative).

To be a consistent (or full, or true) Creationist, one must accept special creation in all five realms, and a parallel definition exists for being a consistent evolutionist. Contemporary compromising positions such as deistic evolution, theistic evolution, so-called progressive creation, the “gap” (or ruin-reconstruction) theory, and the pre-world position are thus neither consistently Creationistic nor consistently evolutionistic. These hybrid positions mix evolutionistic with Creationistic concepts and allow both special creation and evolution to

split roles among (and/or within) the five realms of origins discussed previously.

Cuvier, Lyell, and other originators of the geologic column also held to hybrid positions, so it is fallacious to say that they were really Creationists. Fossils were used for global correlation and special creation was used as the basis for their alleged time equivalence, but this whole notion of multiple repopulations is purely the result of special creation (in the organic realm only) being unequally yoked with evolution (in the geologic realm).

It has been already demonstrated that global correlation by fossils requires some concept of time-equivalence of fossils to be operative. While Cuvier and Lyell used special creation as the concept for time-equivalence, their hybrid position of multiple creations of life over immense amounts of time has been long since repudiated (in fact, Lyell himself became a total evolutionist towards the end of his life). Nowadays, it is the concept of organic evolution which provides the basis for alleged time-equivalence of index fossils. Since the distorted concept of special creation used by the originators of the geologic column was never truly Creationistic, and organic evolution has long since become the conceptual basis for time-equivalence of index fossils, modern Creationists can justifiably point out that organic evolution is the basis for the geologic column.

I. DETERMINING TRUE STRATIGRAPHIC AND SUCCESSIONAL TENDENCIES OF FOSSILS

A. A Measurement of the Actual Stratigraphic Tendencies of Fossils

It is a well-known fact that not all fossils are believed to have time significance, and many range through several geologic periods. In evaluating tendencies for fossils to be stratigraphically differentiated, one must first evaluate the credibility of the taxonomy involved. In my work⁶⁵³ on cephalopods, I had advocated that fossil species and genera (as well as their stratigraphic ranges) not be recognized. It was extensively documented that; 1) fossil species and genera are highly subjective—even to such an extent that the number of fossil species and genera identified in a given collection often varies by more than a factor of two, 2) there is an artificially high diversity of short-range taxa, 3) the taxonomy is deliberately biased to produce short-ranged "species" and "genera," 4) the same taxa are given different names in different stratigraphic positions.

Some additional evidence is now presented. In setting up Lyellian curves for progressive extinction of marine faunas in Late Tertiary (stated to be circa 20 million years ago), a large scatter of 4 to 5 million years was noted by Stanley, *et al.*,⁶⁵⁴ who wrote: "It is possible that at least part of the apparent disparity between the gastropods and bivalves is an *artifact of taxonomy.*" (*italics added*). If fossil species that often (or usually) have actual living representatives are subjective, how much more so ancient forms with no living representatives even at higher taxa! Elsewhere, Chaloner and Lacey⁶⁵⁵ wrote: "It is the nature of palaeontology that as knowledge of material increases,

particularly from a wide range of localities, concepts of generic limits change. This makes any attempt to collate records from all over the world, involving data published over a considerable amount of years, considerably vulnerable." Though they were speaking of biogeographic differentiation, the same applies for stratigraphy. The (implied) proclivity to multiply taxonomic names at different stratigraphic horizons is evident in this use of foraminifers with respect to Cretaceous stages, described by Bartenstein and Bolli⁶⁵⁶: "A Middle to Upper Albian assignment in Rumania by Costea (1974) is stratigraphically so young that the species determination should be checked again." In another situation, Windle⁶⁵⁷ advocated that Carboniferous spores had been reworked into the Triassic; the spores erroneously having been given two different names by others depending on which geologic period they were in although they were nearly identical. Ethington and Schumacher⁶⁵⁸ wrote: "We are reluctant to extend its range downward into Middle Ordovician rocks without evidence of its concurrence in Upper Ordovician strata as well as in rocks representing almost the entire Silurian System." They wanted to invoke different names for look-alike conodonts just because they were in different strata! (so-called homeomorphy).

The family level of taxonomy was taken as the basic unit for calculating the overlap of all fossils with respect to the geologic column, and the results are shown in Figure 1. The data for fossil families came from the volume by Harland.⁶⁵⁹ He listed 2,617 fossil families (with a small admixture of slightly higher and lower taxa where necessary for approximate equivalence). They were shown as lines spanning part or all of the geologic column. The present author manually counted all 2,617 lines in terms of how many geologic periods they span and the results were thus graphed in Figure 1. Although fossil genera are not recognized as valid entities, they were included in Figure 1 be-

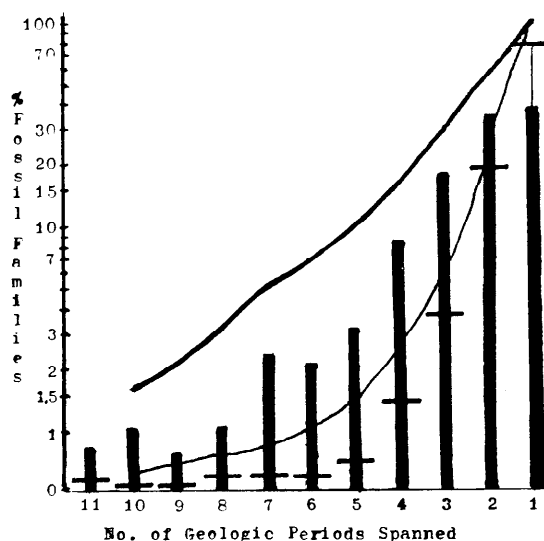


Figure 1. A Quantitative Breakdown of the Stratigraphic Overlap of Fossils with Respect to the Geologic Column. The horizontal line segments and thin cumulative-frequency curve refer to fossil genera; the thick vertical bars and thick cumulative frequency curve refer to fossil families.

cause they were already available from the work of Raup⁶⁶⁰ in direct numerical form (in contrast to the stratigraphic lines for fossil families). The total number of fossil genera is 19,805.

Caution must be used in interpreting the data because of the following reason given by Cutbill and Funnel⁶⁶¹ concerning all such quantitative manipulations of bulk taxonomic data: "Moreover, we are not at all convinced that there is any real equivalence in rank even between nominally equivalent taxa." Thus one is in the proverbial situation of mixing apples with oranges. Nevertheless, the data in Figure 1 do give an idea of the degree of stratigraphic overlap of fossils. It can be seen that fossils are highly differentiated stratigraphically, but on the other hand there is significant overlap of many geologic periods. One-third of all fossil families span 3 or more of the 10 geologic periods (the present is listed in Figure 1 as an 11th geologic period). The number of all fossil families spanning the entire geologic column, while a very small minority, is still measureable on the percentage scale. At the same time, only one-third of all fossil families are stratigraphically confined to only one geologic period. The net result of the data shown in Figure 1 is that, while the Creationist-Diluvialist must account for the stratigraphic differentiation of fossils, the evolutionist-uniformitarian must resort to special pleading in using fossils as time markers because of the fact that he must ignore many fossils that span a large portion of the geologic column.

It must be realized that even the stratigraphic confinement of families is self-fulfilling to a considerable extent because circular reasoning plays a major role in biostratigraphy and because most index fossils do not actually overlie one another; both points are extensively discussed in subsequent chapters. Even taking Figure 1 just at face value, one must note many reasons for shifting both the histograms and curves leftwards (towards increasing stratigraphic overlap of fossils). First of all, the subjectivities discussed in conjunction with the rejection of fossil species and genera apply to a certain extent to fossil families. Koch⁶⁶² showed that there is an artificially low diversity of long-range taxa because they, having little or no stratigraphical utility, have not been as well studied as short-range taxa. He concluded: "The published fossil record has significant bias in favor of common and biostratigraphically important taxa . . ." Simultaneously, there is an artificially high diversity of short-range taxa caused by taxonomic oversplitting by stratigraphers. This was amply demonstrated in this author's work⁶⁵³ on the cephalopods. Elsewhere, in a study of Archaeocyathids, Sepkoski⁶⁶³ noted an "excess of families" probably caused by their "biostratigraphical value."

Even when taxa are accepted as valid there is a noteworthy trend for stratigraphic ranges to increase with further collecting. As a matter of historical interest, Kielan-Jaworska⁶⁶⁴ wrote: "Not until 1925 were remains of the placental mammals found in pre-Tertiary deposits, specifically from the Cretaceous." There are numerous recent instances of significant stratigraphic-range increases, and some of these are summarized by the Creationist Lubenow⁶⁶⁵ and also by the present author in his work on cephalopods,⁶⁵³ his

first Anthology,⁶⁶⁶ and his second Anthology,⁶⁶⁷ not to mention over 200 stratigraphically-anomalous fossils tabulated in his second Anthology⁶⁶⁷ (and explained away by uniformitarians as being reworked). In just the last few years there have been interesting developments in the area of extension of stratigraphic ranges. Shu said:⁶⁶⁸ "It is still necessary to explain why so many Paleozoic plants persisted into earliest Triassic time in South China." Bengston⁶⁶⁹ wrote: "In all the investigated characteristics, *Atractosella* is indistinguishable from a modern soft coral of the family Alcyoniidae. It is interpreted as the earliest known representative of the octocoral order Alcyonaceae, extending the range of this group from the Lower Jurassic to the Lower Silurian." Collins and Rudkin⁶⁷⁰ reported a find of barnacles that extends their range downward from "the Upper Silurian to the Middle Cambrian" and they also noted that it is ". . . a barnacle of such modern aspect."

Such stratigraphic-range extensions are not exceptional, and one can never be certain that a sufficiently large number of stratigraphic observations of a taxon have been made, for the following reason given by Crick:¹⁹⁸ "Chances of fragmenting the fossil record and truncating stratigraphic ranges are increased if small geographic areas are sampled." Cutbill and Funnel⁶⁶¹ wrote: ". . . collection failure usually tends to produce bunched and shortened ranges." In his work on fossil genera (here graphed in Figure 1), Raup⁶⁶⁰ said: "If the early members of a genus are not preserved . . . then that genus may be placed in a later cohort in ignorance of its earlier history. Another general effect of non-preservation is to truncate geologic ranges . . ." There is thus no way of knowing whether the stratigraphic ranges of taxa shown in Figure 1 are reasonably final. At the same time, there is evidence presented by Raup⁶⁷¹ and by Simpson⁶⁷² that most fossil lower taxa have already been discovered, so it is unlikely that future discoveries of short-range taxa will statistically offset the continual increase of stratigraphic ranges exhibited by currently-known taxa.

The factor of circular reasoning will be discussed in a later chapter; but some of its employment is mentioned here because of its bearing in terms of the artificial exaggeration of the number of short-range taxa in relation to long-range ones; again justifying a leftward shift in Figure 1. Cutbill and Funnel⁶⁶¹ wrote: "It seems to us that the number of taxa shown in our figures as commencing or ending their ranges at major Era or System boundaries may well be influenced at least in part by preconceptions on the part of systematists on the limiting effect of these boundaries." The consequences of such circular reasoning were well described by Maheshwari:⁶⁷³ "Fossils are relied on to provide an indication of geologic age; if age is accepted as a criterion for taxonomic distinction, a perfect circularity of reasoning results that would nullify one of the important purposes of paleontologic work." When considering the implications of Figure 1, one should keep in mind that there is a significantly greater share of long-range taxa than shown because of the factors just discussed.

										RECENT —
										TERTIARY — 80,* 89
										CRETACEOUS — 70, 51 60,* 82
										JURASSIC — 83, 52 64, 29 57, 49
										TRIASSIC — 67, 49 61, 27 50, 16 48, 30
										PERMIAN — 52,* 65 40, 36 37, 21 32, 13 31, 24
										CARBONIFEROUS — 72, 71 39,* 48 31, 27 29, 16 25, 10 25, 19
										DEVONIAN — 58, 54 42, 38 24,* 28 18, 15 18, 9.1 15, 5.8 15, 10
										SILURIAN — 85, 59 52, 33 39, 25 26, 20 19, 11 19, 6.9 16, 4.2 15, 7.5
										ORDOVICIAN — 70, 68 61, 41 39, 25 31, 19 21, 16 17, 9.3 17, 5.8 14, 3.5 11, 6.1
										CAMBRIAN — 55, 20 37, 13 36, 8.7 27, 6.1 24, 5.4 20, 5.6 18, 3.7 18, 2.3 17, 1.5 15, 2.5

Table 1. The Tendencies for Sharing of Fossil Families Between Geologic Periods. The numbers are percentages of fossil families reciprocally shared between Geologic Periods. For example, 29% of all families that cross at least part of the Carboniferous also cross at least part of the Cretaceous; 16% of all families crossing Cretaceous also cross Carboniferous. The asterisks (*) indicate exceptional situations in which a younger geologic period has more families in common with an older period than vice versa.

Figure 1 gives only degree of stratigraphic overlap but does not specify the actual geologic periods where the taxa occur. Table 1 was constructed to show quantitatively how fossil families spread stratigraphically across geologic periods with respect to specific geologic periods versus each other. Each geologic period has a definite number of fossil families that cross it stratigraphically; irrespective of whether they originate, terminate, or totally span the period. Two percentages are given in Table 1: the former is the total number of families in common between two periods divided by the total number of families crossing the older geologic period (times 100), the latter is the total number of families in common with the two periods divided by the total number of families crossing the younger geologic period (times 100).

The raw data are from the Harland⁶⁵⁹ volume, and the percentages were computed by manually reducing all 2,617 families to a numerical abundance relative to all possible stratigraphic ranges: Cambrian-Cambrian, Cambrian-Ordovician, . . . Cambrian-Recent, Ordovician-Ordovician, . . . Ordovician-Recent, . . . Recent-Recent. The total number of possible Phanerozoic ranges is 66 (= 11 + 10 + 9 + . . . 1). An example is now presented to show how the entries in Table 1 were computed: Silurian vs. Triassic. The first term is given by: $S+T+(100x)/(S+T+ \text{ plus } S+T-)$ whereas the latter term is given by: $S-T+(100x)/(S+T+ \text{ plus } S-T+)$. The S and T stand for Silurian and Triassic, whereas a (+) sign to the right of the letter denotes that a family crosses it and the opposite is the case for a (-) sign. Thus $S+T+$ means families common to both Silurian and Triassic. $S+T+$ equals: $\Sigma(\text{Cambrian-Triassic} + \dots \text{Cambrian-Recent}) + (\text{Ordovician-Triassic} + \dots \text{Ordovician-Recent}) + (\text{Silurian-Triassic} + \dots \text{Silurian-Recent})$. $S+T-$ means families crossing Silurian but not Triassic and equals: $\Sigma(\text{Cambrian-Silurian} + \dots \text{Cambrian-Permian}) + (\text{Ordovician-Silurian} + \dots \text{Ordovician-Permian}) + (\text{Silurian-Silurian} + \dots \text{Silurian-Permian})$. $S-T+$ denotes families not present in Silurian but present in Triassic and equals: $\Sigma(\text{Devo-$

nian-Triassic + . . . Devonian-Recent) + (Carboniferous-Triassic + . . . Carboniferous-Recent) + (Permian-Triassic + . . . Permian-Recent) + (Triassic-Triassic + . . . Triassic-Recent).

Probably the most interesting result of Table 1 is the fact that, in all but 5 out of 55 cross-comparisons, the per cent value at left is greater than the right. This means that, in all but the few exceptional cases, older geologic periods have more of their families in common with younger periods than younger ones have their families in common with older ones. In other words, the main trend going stratigraphically upwards is not as much the disappearance of old forms as the addition of brand new forms. If this trend in Table 1 had been shown as a Venn Diagram, the older geologic period would be represented with a smaller circle than the younger and thus the area of overlap of the circles would be a smaller share of the larger circle than of the smaller.

The trend shown in Table 1 may be primarily an artifact of biostratigraphic methods, and reveal in its own way how the fossil record is artificially made to appear more stratigraphically differentiated than it really is. This takes place because stratigraphic conflicts are resolved by allowing old taxa stratigraphically to range into younger strata in preference to allowing younger taxa to range downward into the older strata. Thus stratigraphic differentiation is made to appear more compelling by having as many groups as possible not appearing until late in the geologic column. A concrete example of this was provided by Karamlov,⁶⁷⁴ who observed an anomalous stratigraphic coexistence of Riphean-Cambrian algae with Devonian Brachiopods, Corals, and Crinoids. He commented: "Since it is quite impossible for the host strata here to be Riphean or Riphean-Cambrian age, the conclusion that the range of the above forms is limited to the Riphean and early Cambrian can be queried." Karamlov did not even consider the possibility that the conflict could be resolved by allowing the Devonian forms to range downward into the

Riphean-Cambrian! How the trends seen in both Table 1 and Figure 1 relate to the Flood will be discussed in a later chapter, taking into consideration both stratigraphic differentiation and overlap.

B. The Study of Juxtapositional Tendencies of Index Fossils: A Global Geographic Approach

Whenever one considers biostratigraphic differentiation (Figure 1, Table 1), one is saddled with the tacit assumption that the fossils actually overlaid each other on earth. When the Diluvialist is challenged by the

question, for example, why Cambrian Trilobites never are in stratigraphic coexistence with Tertiary mammals, the question has meaning only if Cambrian trilobites and Tertiary mammals have a chance ever to have become mixed; a situation true only if the two fossils actually overlaid one another somewhere on earth. Even after it is shown that there are such locations, the fact that they are few in number makes biostratigraphic differentiation largely vacuous or at least highly amenable to nonevolutionary, nontemporal explanations.

Table 2. Summary of data used in constructing Maps 1-34. The "No. of Localities" refers to the number of fossil localities plotted on a given map; whereas the "Data-Base References" denotes the reference nos. of the articles used in compiling global fossil occurrence data for each map.

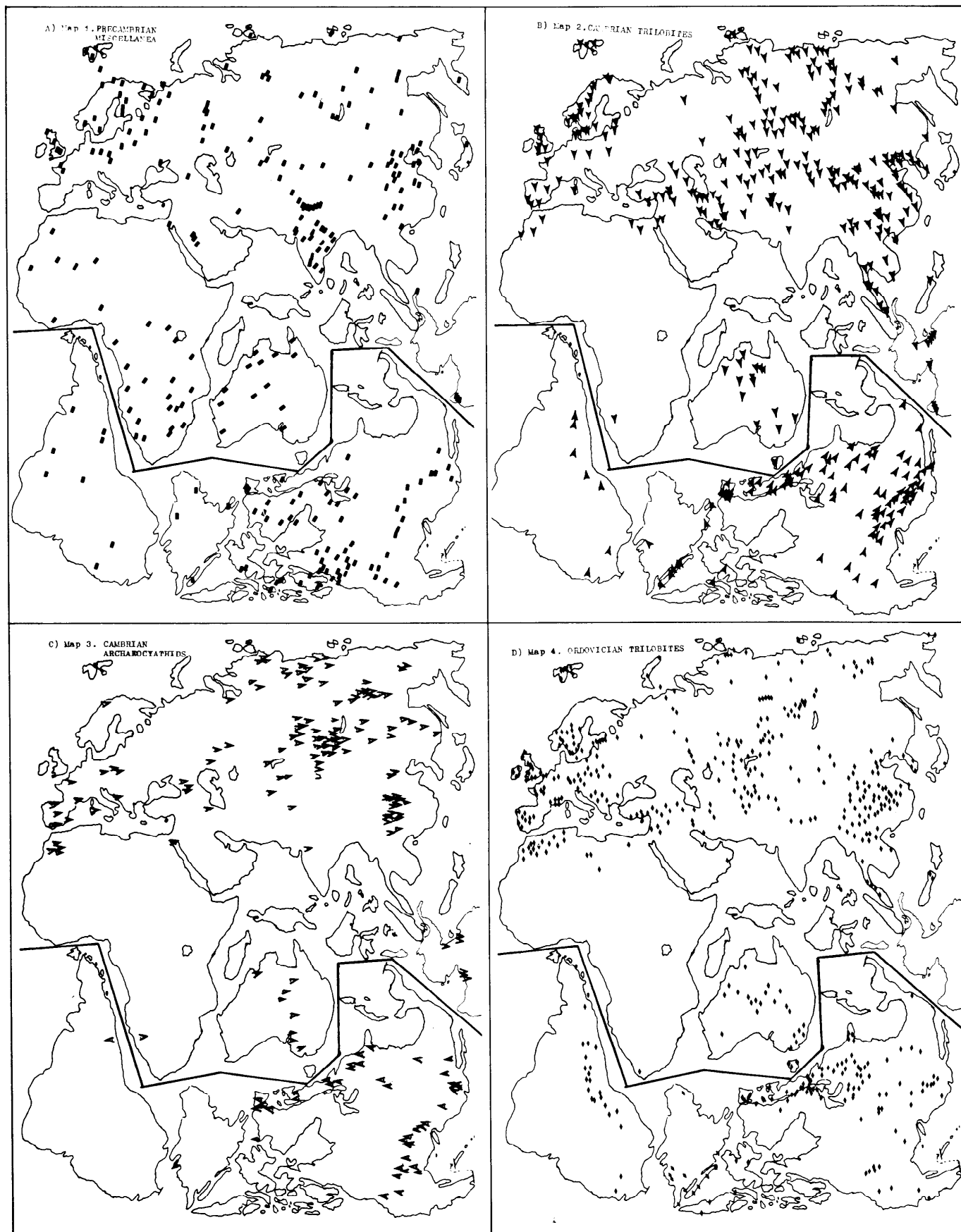
Map No.	Age and Fossil	Some Prominent Representatives of Fauna/Flora	No. of Localities	Data-Base Reference No.
1	Precambrian	<i>Eosphaera</i> , <i>Kababekia</i> , <i>Stratifera</i> , <i>Eostion</i> , <i>Eomycetopsis</i> , <i>Conophyton</i>	250	2-28, 549-51, 731-4
2	Miscellanea			
3	Cambrian Trilobites	<i>Olenellus</i> , <i>Paradoxides</i> , <i>Redlichia</i> , <i>Conaspis</i> , <i>Geragnostus</i>	354	29-58, 110, 552-3, 731-2, 735-6
4	Cambrian Archaeocyathids	<i>Archaeocyathus</i> , <i>Zonocyathus</i> , <i>Aldanocyathus</i> , <i>Coscinocyathus</i> , <i>Radiocyathus</i>	174	4, 30-1, 33, 36-8, 59-70, 555-7, 732, 736-7
5	Ordovician Trilobites	<i>Selenopeltis</i> , <i>Chasmops</i> , <i>Bathyporellus</i> , <i>Iliaenus</i> , <i>Cyclopyge</i> , <i>Symphysurina</i>	482	31-2, 34, 71-128, 134-6, 175, 203, 341, 552, 554, 570, 572
6	Ordovician Graptolites	<i>Monograptus</i> , <i>Dictyonema</i> , <i>Tetragraptus</i> , <i>Clonograptus</i> , <i>Climacograptus</i> , <i>Nemagraptus</i>	319	31-2, 35, 97-109, 111, 122, 126, 130, 132-3, 137-62, 175, 203, 558-61, 571, 738
7	Ordovician Brachiopods	<i>Spirigerina</i> , <i>Zygospira</i> , <i>Platystrophia</i> , <i>Leptaena</i> , <i>Christiania</i>	262	31-2, 34, 98-117, 122-4, 130, 163-8, 175, 203, 400, 570-2, 739-41
8	Ordovician Conodonts	<i>Cordylodus</i> , <i>Periodon</i> , <i>Amorphognathus</i> , <i>Belodina</i> , <i>Pygodus</i> , <i>Oistodus</i>	279	31, 53, 104-6, 123-33, 169-89, 562, 570, 572, 742
9	Ordovician Nautiloids	<i>Ellesmeroceras</i> , <i>Endoceras</i> , <i>Discoceras</i> , <i>Actinoceras</i> , <i>Tarphyceras</i> , <i>Baltoceras</i>	218	31, 34-5, 101-8, 113-22, 127-9, 131, 139, 190-203, 563-5, 570-2, 742-3
10	Siluro-Ordovician Echinoderms	<i>Mitrocystella</i> , <i>Pemphocystis</i> , <i>Pisocrinus</i> , <i>Petalocrinus</i> , <i>Scyphocrinites</i>	205	31, 175, 204-12, 226, 228, 566, 570, 741
11	Silurian Brachiopods	<i>Stricklandia</i> , <i>Atrypoides</i> , <i>Pentamerus</i> , <i>Eocoelia</i> , <i>Clarkeia</i>	303	31, 98, 106, 180, 209-28, 567-9, 740
12	Siluro-Devonian Graptolites	<i>Glyptograptus</i> , <i>Linograptus</i> , <i>Monograptus hercynicus</i> , <i>M. turriculatus</i> , <i>M. thomasi</i>	287	31-2, 98, 137-8, 175, 210-1, 228-36, 272, 568-70
13	Siluro-Devonian Fish	<i>Bothriolepis</i> , <i>Cephalaspis</i> , <i>Psammosteus</i> , <i>Thelodus</i> , <i>Logania</i>	188	175, 237-56, 270, 573-6, 744-50
14	Siluro-Devonian Trilobites	<i>Acernaspis</i> , <i>Dalmanites</i> , <i>Encrinurus</i> , <i>Warburgella</i> , <i>Acastella</i> , <i>Coniproetus</i>	314	31, 140, 175, 209-11, 217, 226-8, 257-75, 568-70, 577-80, 746, 751-3
15	Devonian Floras	<i>Zosterophyllum</i> , <i>Callixylon</i> , <i>Dawsonites</i> , <i>Phacophyton</i> , <i>Cooksonia</i>	137	32, 140, 272, 276-89, 578, 581-4, 746, 754-9
16	Devonian Ammonoids	<i>Cabrieroceras</i> , <i>Imitoceras</i> , <i>Manticoceras</i> , <i>Foordites</i> , <i>Cheiloceras</i>	161	200-1, 217, 270-2, 290-7, 570, 577-8, 585-8, 751, 759-63
17	Devonian Coelenterates	<i>Heliohyllum</i> , <i>Moravohyllum</i> , <i>Hexagonaria</i> , <i>Salaiophyllum</i> , <i>Favosites</i>	305	31, 175, 270-2, 298-306, 577, 589

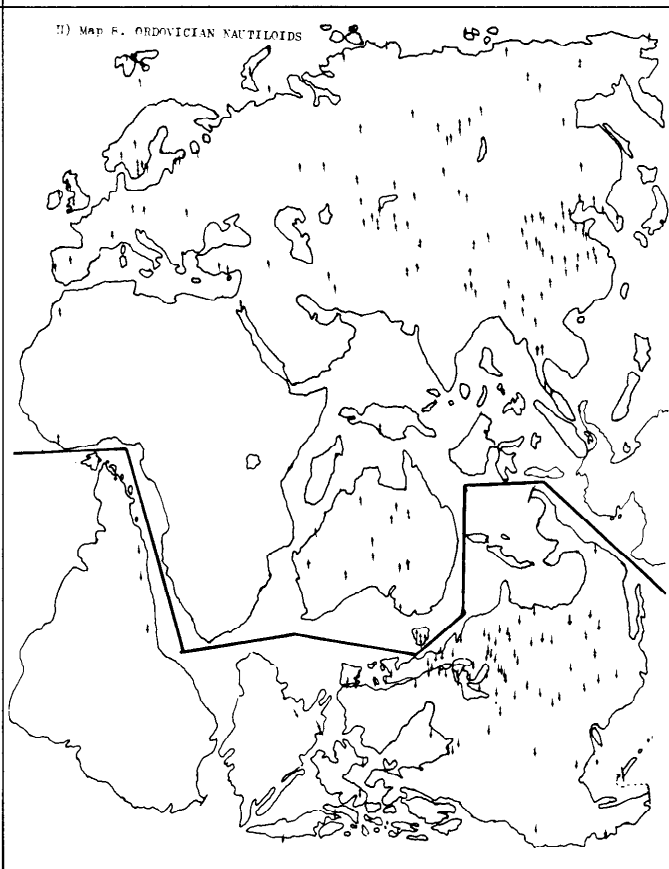
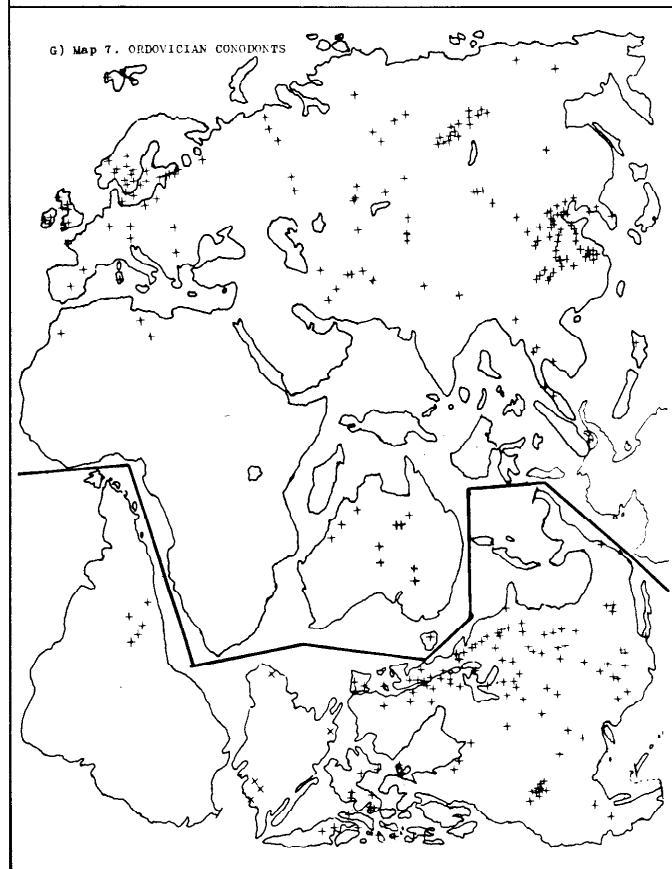
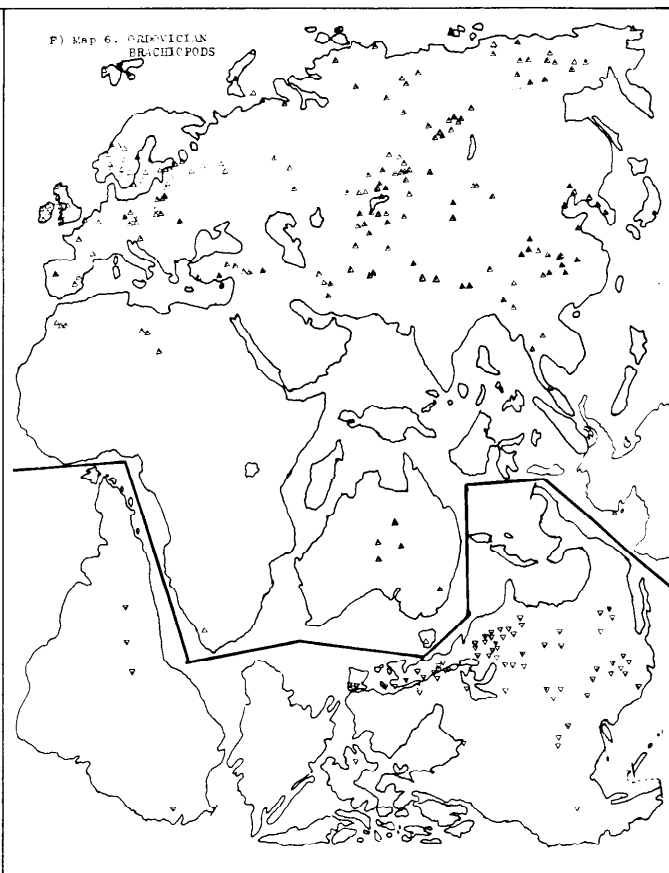
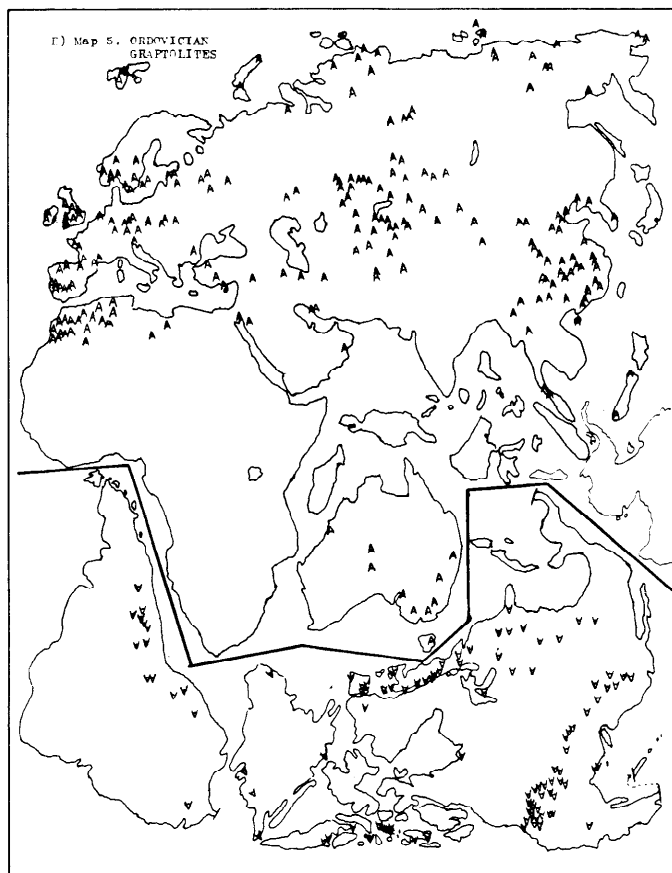
Map No.	Age and Fossil	Some Prominent Representatives of Fauna/Flora	No. of Localities	Data-Base Reference No.
17	Devonian Brachiopods	<i>Isorthis</i> , <i>Stringocephalus</i> , <i>Howellella</i> , <i>Strophochonetes</i> , <i>Basilicorhynchus</i>	307	140, 175, 217, 227, 270-2, 297, 307-18, 570-1, 578, 590-4, 740, 746, 748, 751-3, 759-60, 764-6
18	Carboniferous Ammonoids	<i>Orthoceras</i> , <i>Protocanites</i> , <i>Eoasianites</i> , <i>Muensteroceras</i> , <i>Reticuloceras</i>	183	140, 175, 200, 217, 230, 305, 319-40, 462, 570, 587, 595-603, 767-9
19	Carboniferous Fusulinaceans	<i>Wedekindellina</i> , <i>Eostaffella</i> , <i>Triticites</i> , <i>Schubertella</i> , <i>Beedeina</i> , <i>Eofusulina</i>	238	324, 341-50, 601, 604-10, 770
20	Permo-Carboniferous Floras	<i>Lepidodendron</i> , <i>Cordaite</i> , <i>Glossopteris</i> , <i>Pecopteris</i> , <i>Sphenophyllum</i>	505	175, 285, 351-64, 741, 754, 771
21	Permo-Carboniferous Corals	<i>Kueichouphyllum</i> , <i>Cyathaxonia</i> , <i>Syringopora</i> , <i>Parawentzellella</i> , <i>Waagenophyllum</i>	262	301, 325, 365-77
22	Permian Fusulinaceans	<i>Veerbeekina</i> , <i>Neoschwagerina</i> , <i>Codonofusiella</i> , <i>Reichelina</i> , <i>Palaeofusulina</i>	236	348-50, 375, 378-86, 570, 612, 772
23	Permian Brachiopods	<i>Cryptospirifer</i> , <i>Meekella</i> , <i>Richthofenia</i> , <i>Urushthenia</i> , <i>Linoproductus</i>	356	325, 354, 375, 387-93, 611, 741, 773
24	Permian Ammonoids	<i>Xenodiscus</i> , <i>Cibolites</i> , <i>Uraloceras</i> , <i>Timorites</i> , <i>Cyclolobus</i>	145	140, 217, 305, 325, 375, 394-410, 602-3, 611-8, 741, 774
25	Permian Ectoprocts	<i>Fenestella</i> , <i>Hexagonella</i> , <i>Streblascopora</i> , <i>Polypora</i> , <i>Fistulipora</i>	147	325, 375, 411-4, 570, 612, 775
26	Permo-Triassic Reptiles	<i>Dimetrodon</i> , <i>Cynognathus</i> , <i>Rutiodon</i> , <i>Lystrosaurus</i> , <i>Kannemeyeria</i> , <i>Mesosaurus</i>	255	200, 415-38, 619-23, 776-9
27	Triassic Fish	<i>Semionotus</i> , <i>Redfieldius</i> , <i>Palaeolimnadiopsis</i> , <i>Boreosomus</i> , <i>Dictopyge</i>	147	200, 417-20, 439-50, 623-30, 780-3
28	Triassic Ammonoids	<i>Owenites</i> , <i>Tirolites</i> , <i>Cochloceras</i> , <i>Proavites</i> , <i>Otoceras</i>	157	200, 341, 401, 442, 451-60, 631-3, 784-5
29	Triassic-Jurassic Floras	<i>Sagenopteris</i> , <i>Araucaria</i> , <i>Nilssoniopteris</i> , <i>Gingko</i> , <i>Marattia</i> , <i>Cycadeoidea</i>	244	461-71, 733, 754, 786-9
30	Jurassic Ammonoids-Belemnites	<i>Ameoboceras</i> , <i>Phylloceras</i> , <i>Epipeltocheras</i> , <i>Amaltheus</i> , <i>Cylindroteuthis</i>	440	472-81, 638, 741, 790-5
31	Jurassic-Cretaceous Dinosaurs	<i>Ankylosaurus</i> , <i>Iguanodon</i> , <i>Brachiosaurus</i> , <i>Stegosaurus</i> , <i>Pteranodon</i> , <i>Titanosaurus</i>	188	438, 482-500, 634-7, 796-9
32	Cretaceous Ammonoids-Belemnites	<i>Turritiles</i> , <i>Protexanites</i> , <i>Hoplites</i> , <i>Clisocaphites</i> , <i>Actinocamax</i>	499	480, 501-4, 63, 794-5, 800-3
33	Tertiary Mammals	<i>Unitatherium</i> , <i>Coryphodon</i> , <i>Bathyopsoides</i> , <i>Eumys</i> , <i>Hipparion</i>	535	505-28, 640-2, 804-6
34	Tertiary Foraminifers	<i>Globigerina</i> , <i>Globorotalia</i> , <i>Lepidoclina</i> , <i>Cycloclypeus</i> , <i>Fabiania</i> , <i>Miogypsina</i>	478	529-48, 807
			TOTAL:	9,560

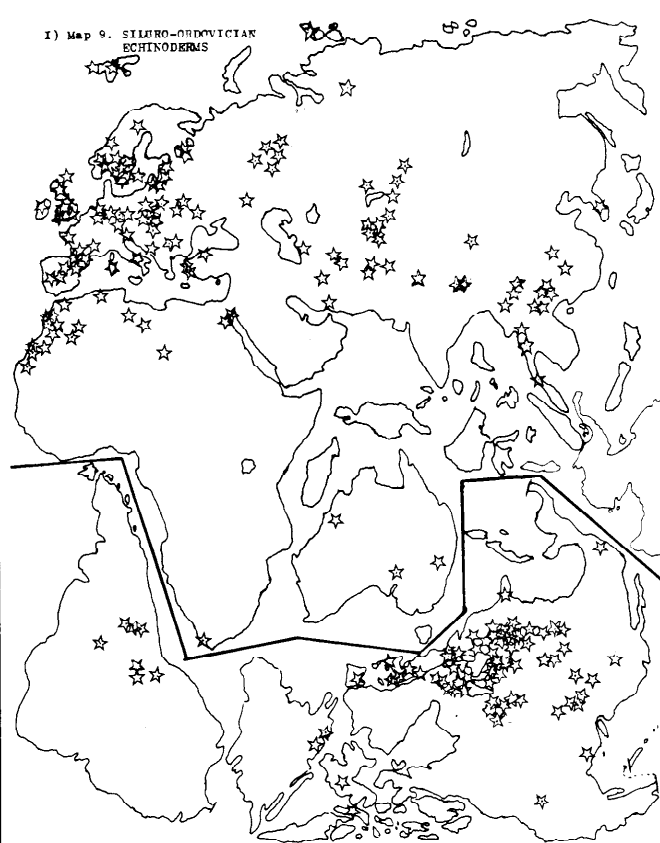
The only method for determining how index fossils of different geologic periods actually overlie one another is to construct locality maps for each type of fossil and then superimpose such maps, e.g., over a light table, to determine superpositions of fossils. This has been done (Table 2, Maps 1-34). Data were meticulously gathered from hundreds of sources; the sources including individual (particularly recent) fossil discoveries, sources yielding mapped fossiliferous regions or provinces, and sources already providing global fossil occurrence data. All 34 fossil occurrence maps had all three types of sources utilized; but the preponderance of references for Paleozoic fossils (Table 2) reflects the fact that fewer comprehensive fossil-occurrence sources had been available for that part of the

geologic column. All data were pre-screened for accuracy; authors who used many small and overlapping symbols on either regional or world maps were used, because usage of many small symbols indicated that the cited authors were concerned with accurate representation of fossil-bearing localities, while overlapping symbols indicate that the symbols represent true localities and thus are not merely crude schematic representations of fossil occurrence. A latitude-longitude grid map was made (shown as Map 35 for any reader wishing to make a transparency of it to determine the

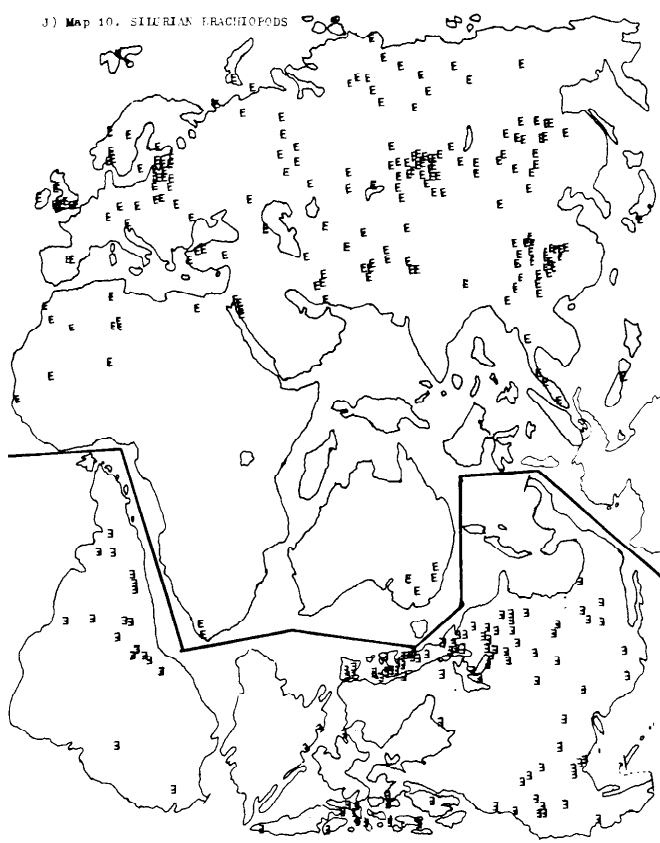
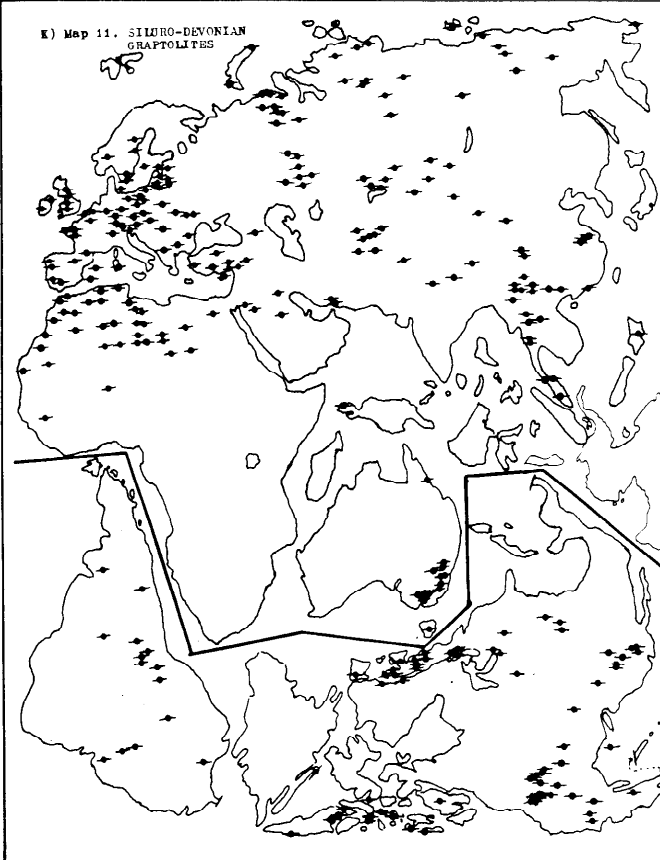
Maps 1-37. These maps, on the next few pages, show where the fossils have actually been found, as is explained in the text. Note that the small region shown at the middle right is that part of Antarctica for which data are available.



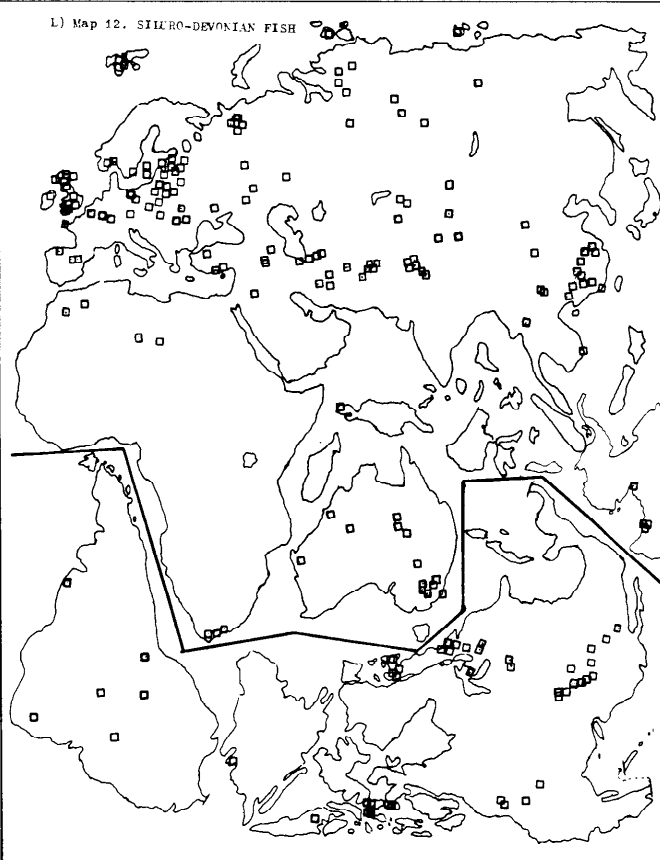


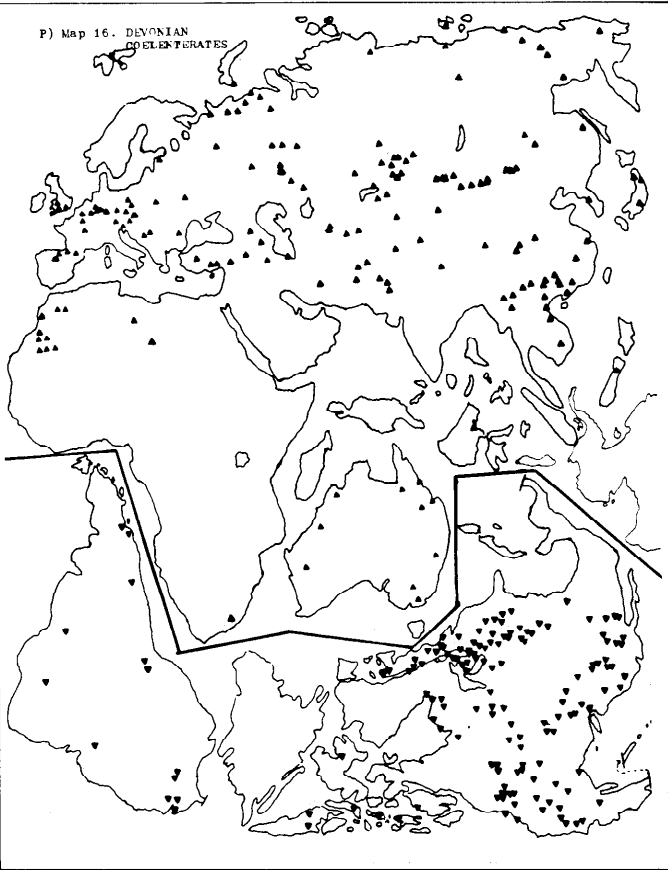
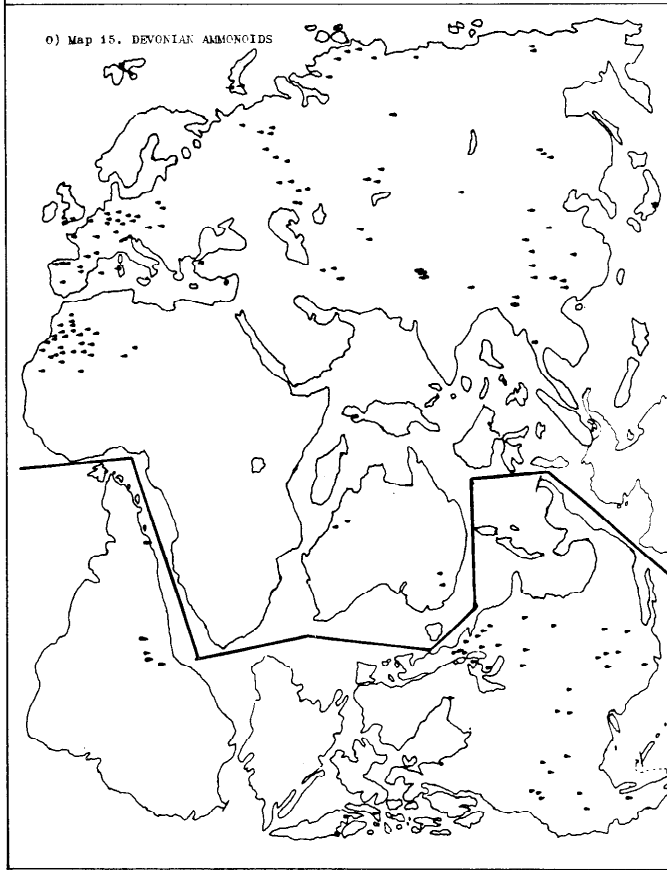
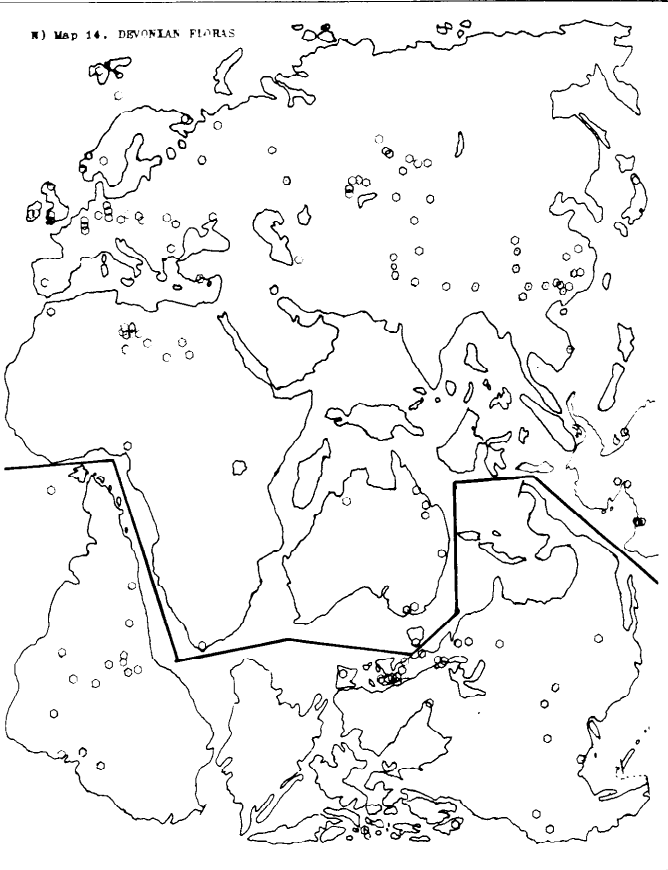
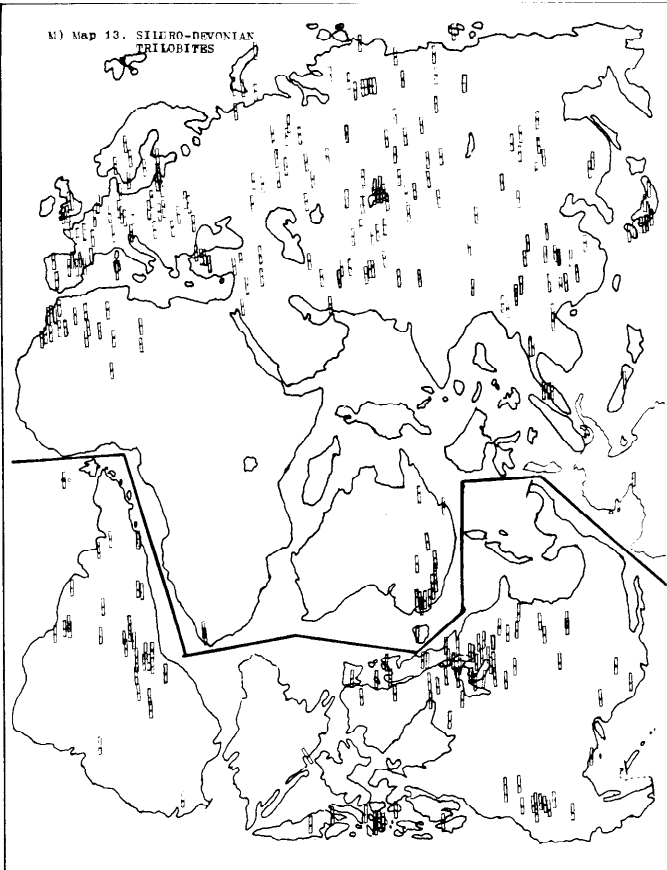
I) Map 9. SILURO-ORDOVICIAN
ECHINODERMS

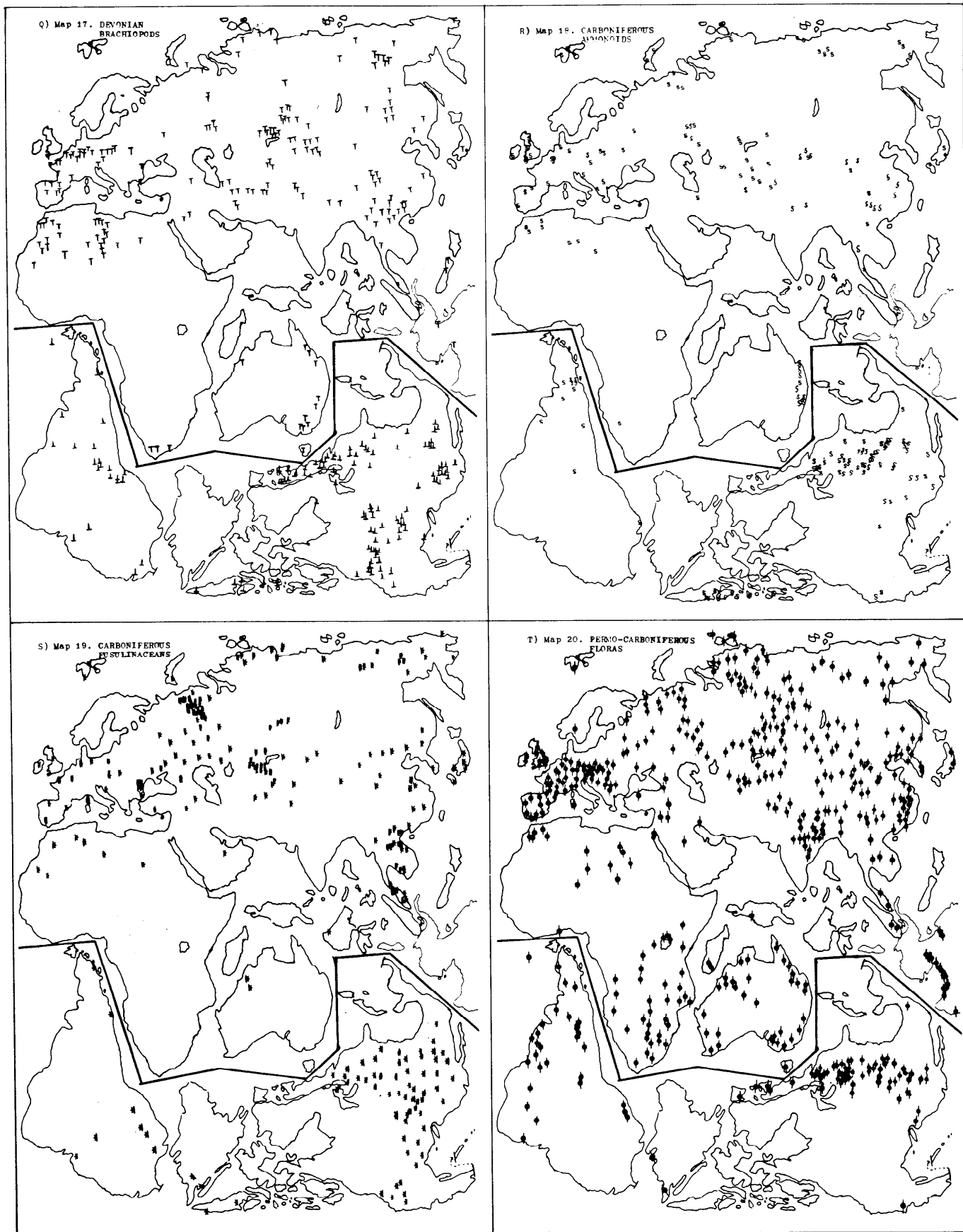
J) Map 10. SILURIAN BRACHIOPODS

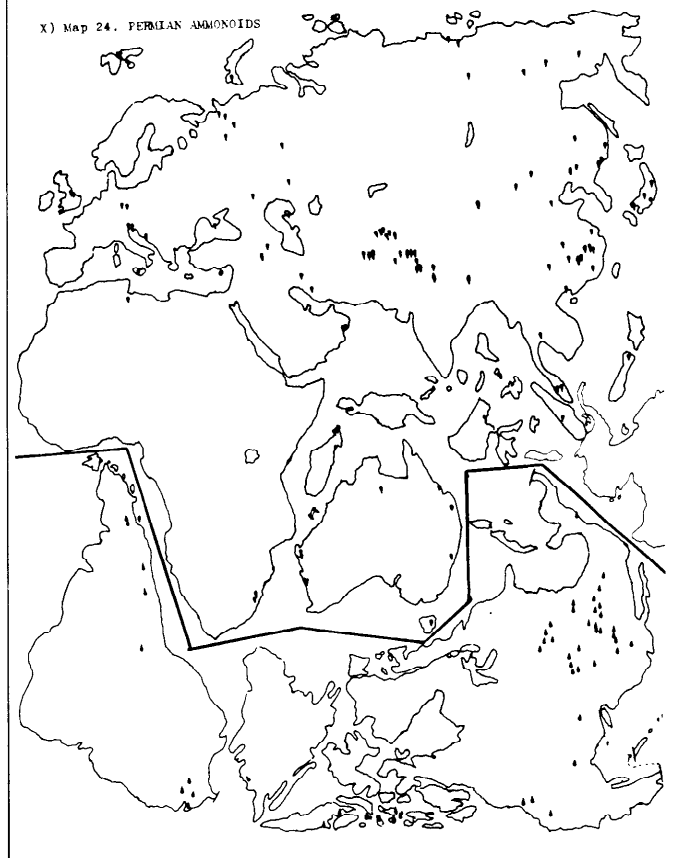
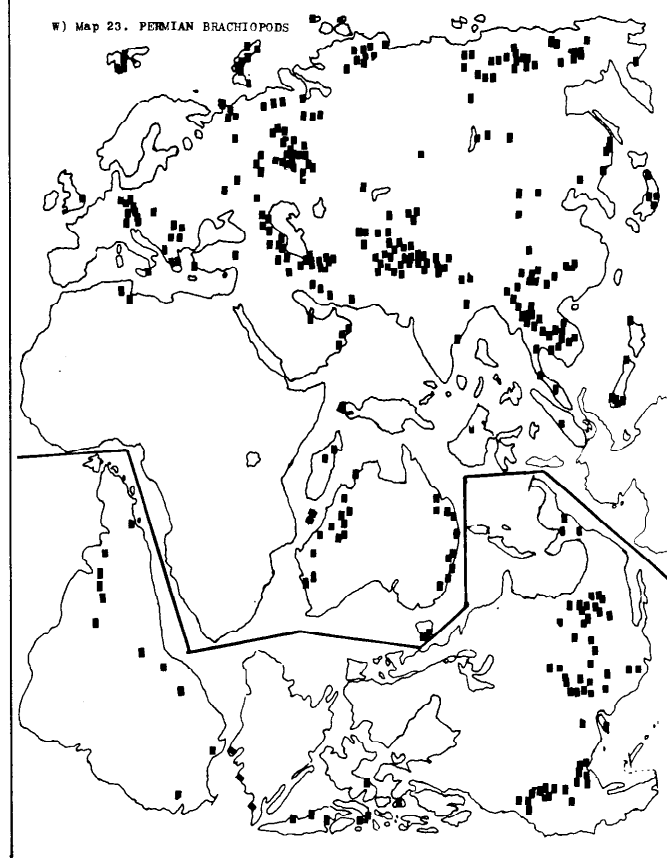
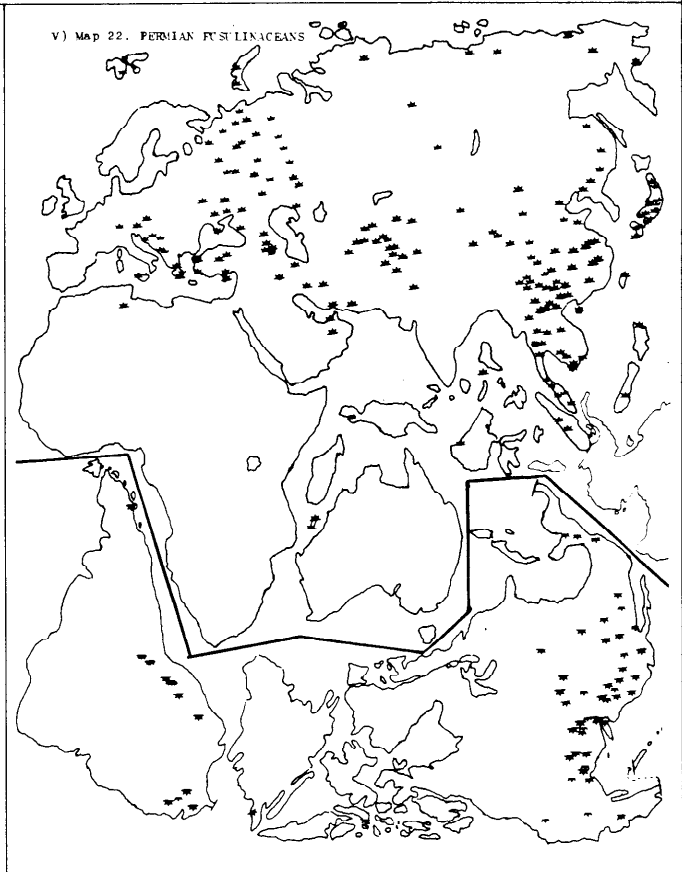
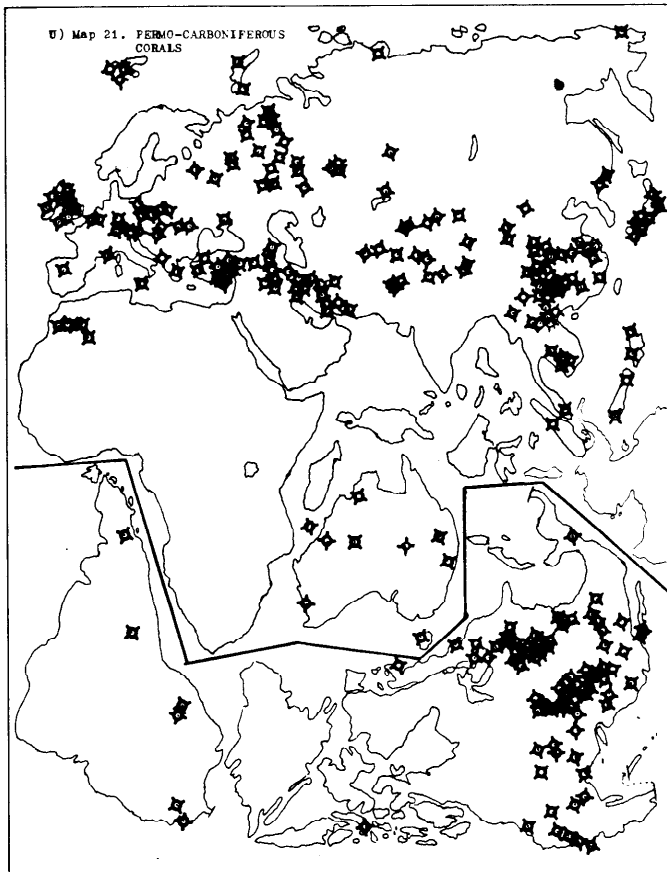
K) Map 11. SILURO-DEVONIAN
GRAPTOLITES

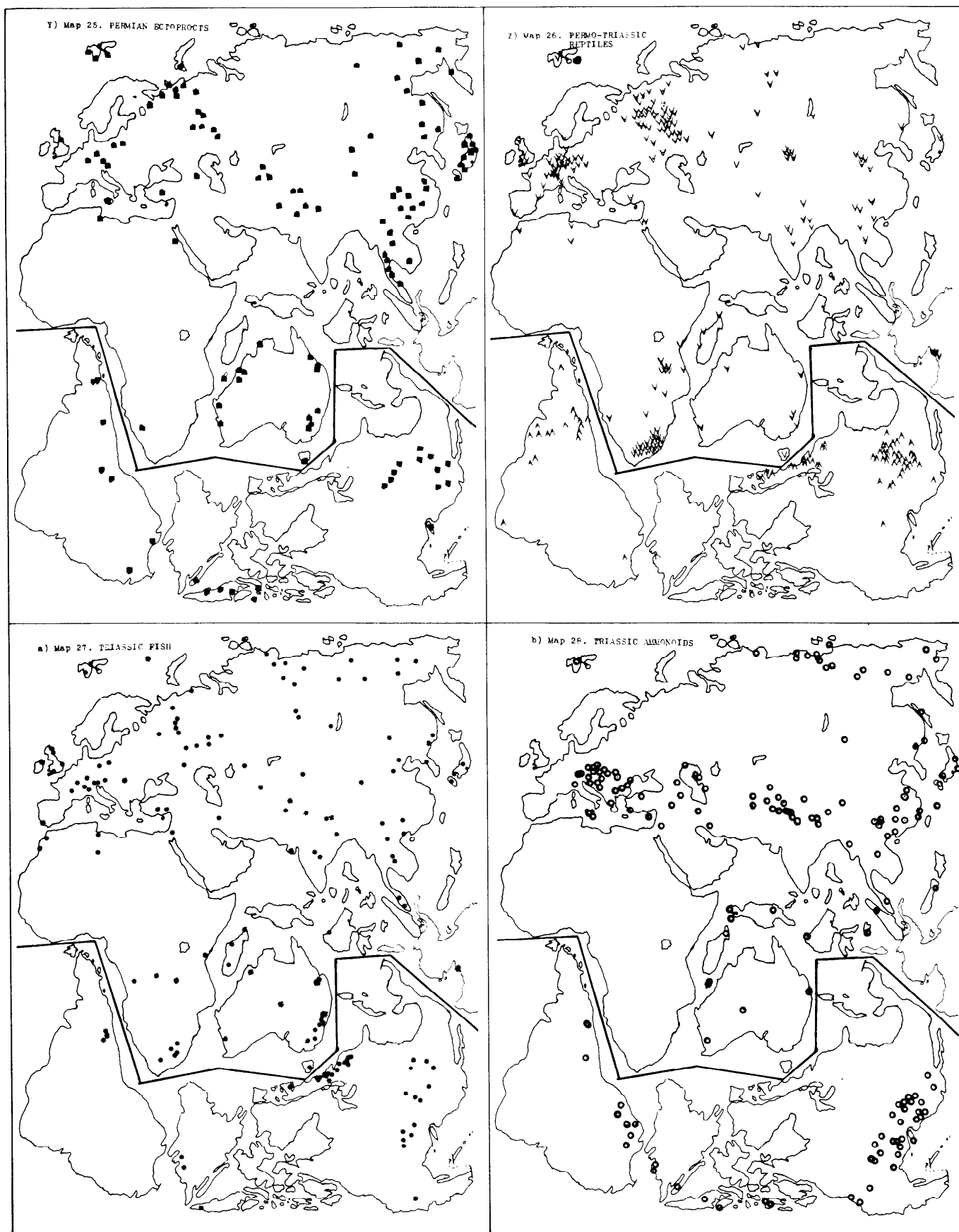
L) Map 12. SILURO-DEVONIAN FISH

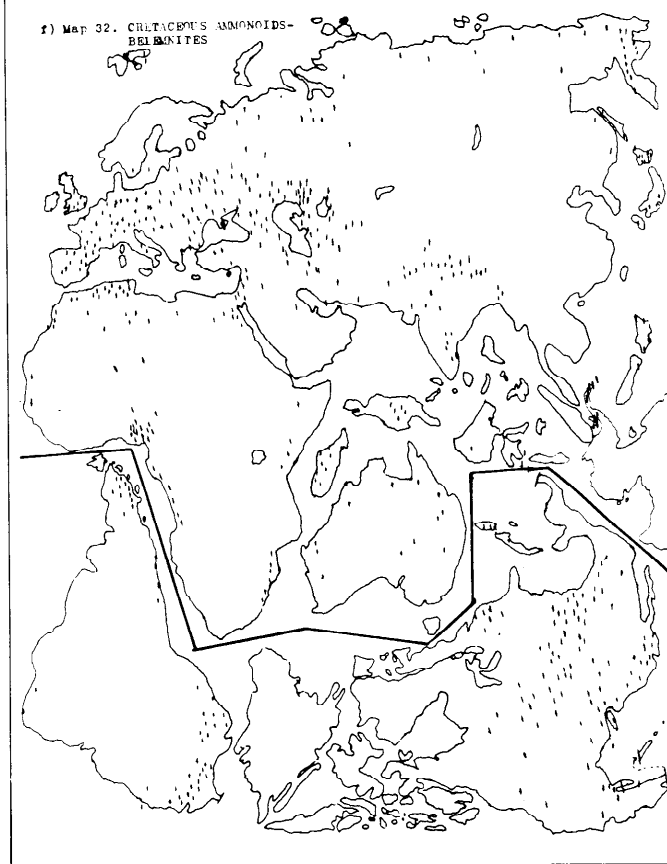
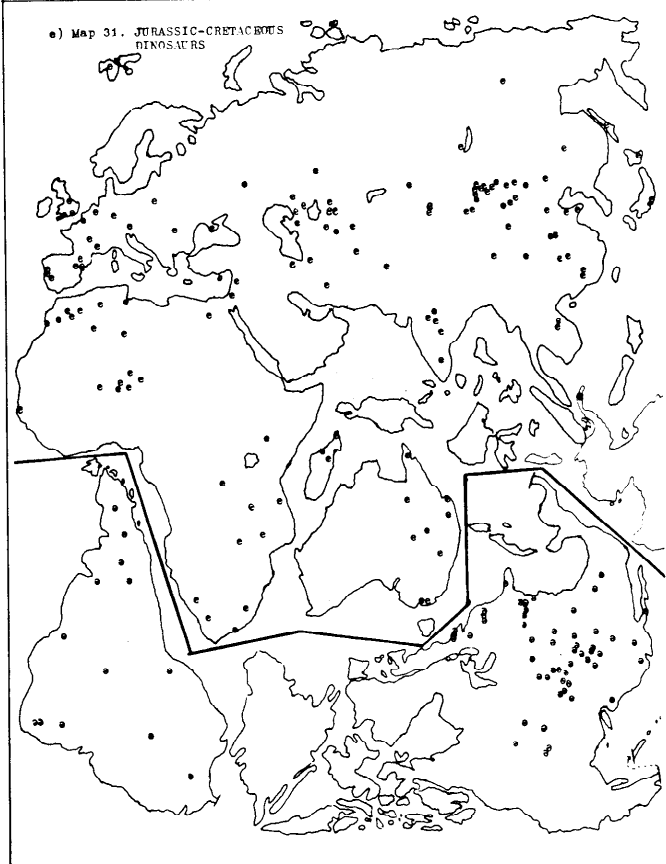
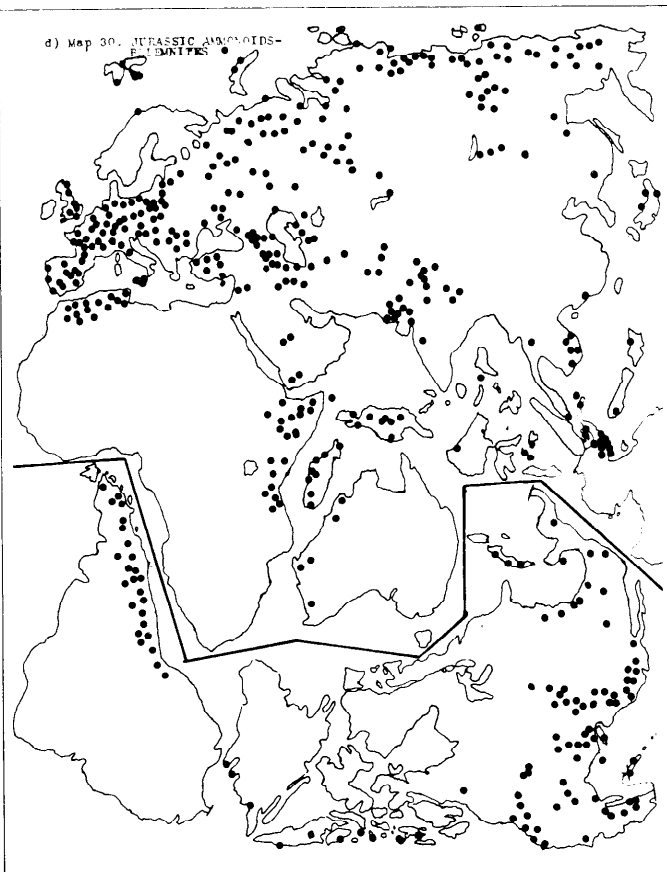
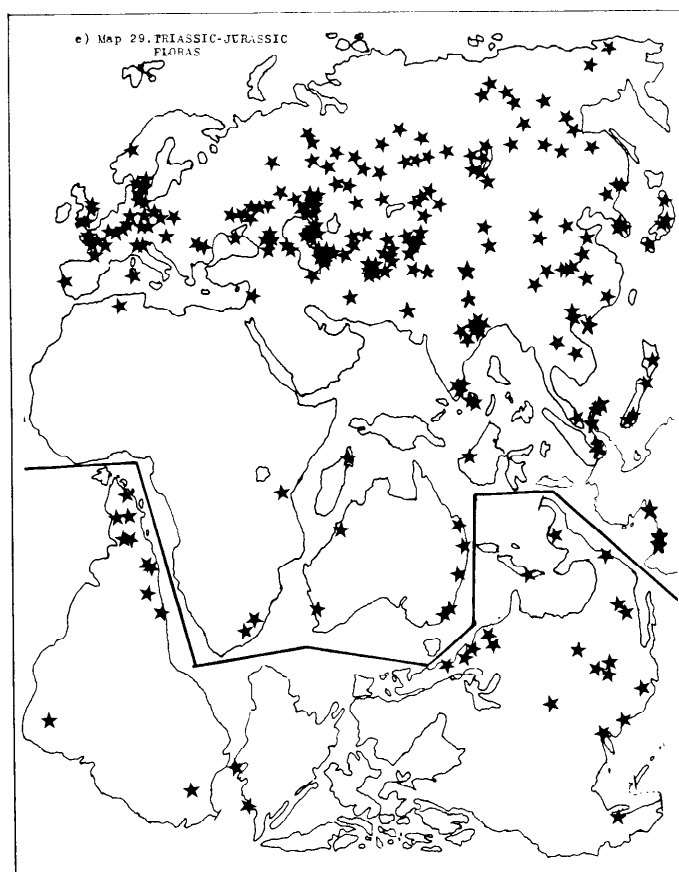


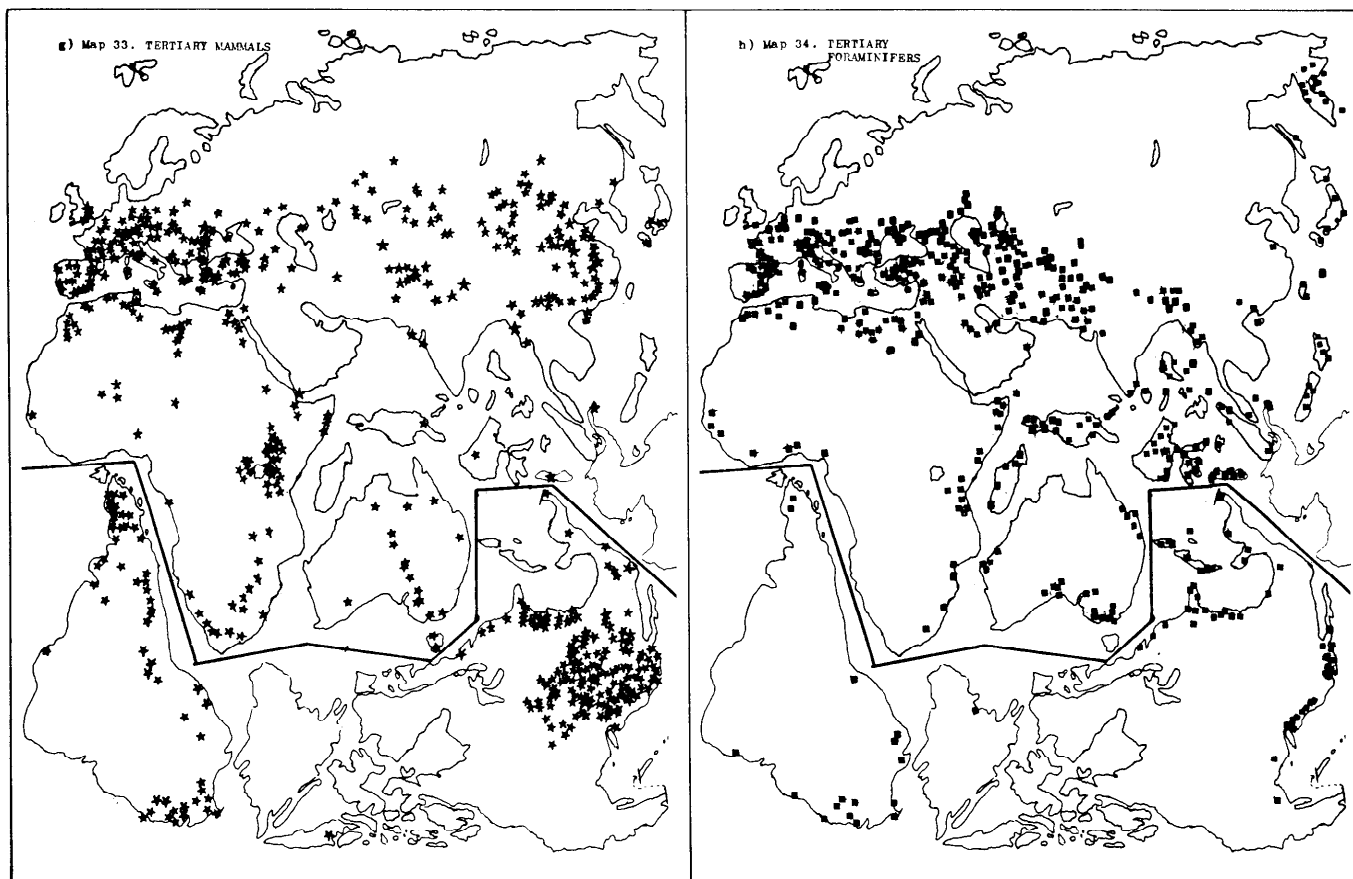












exact location of any fossil or juxtaposition) in order to plot fossil localities accurately. The Winkel's Triple Projection was used as the world base map in order to synchronize all data with the world maps already available from the *Atlas of Palaeobiogeography*.¹ However, the continents were repositioned to eliminate ocean space so that continents could be shown at the largest possible scale. (Each map originally covered an entire page when made and when juxtapositional determinations were performed, but the maps had to be drastically reduced here as a result of space limitations. A Winkel Map in its natural form can be seen ahead in Figure 8).

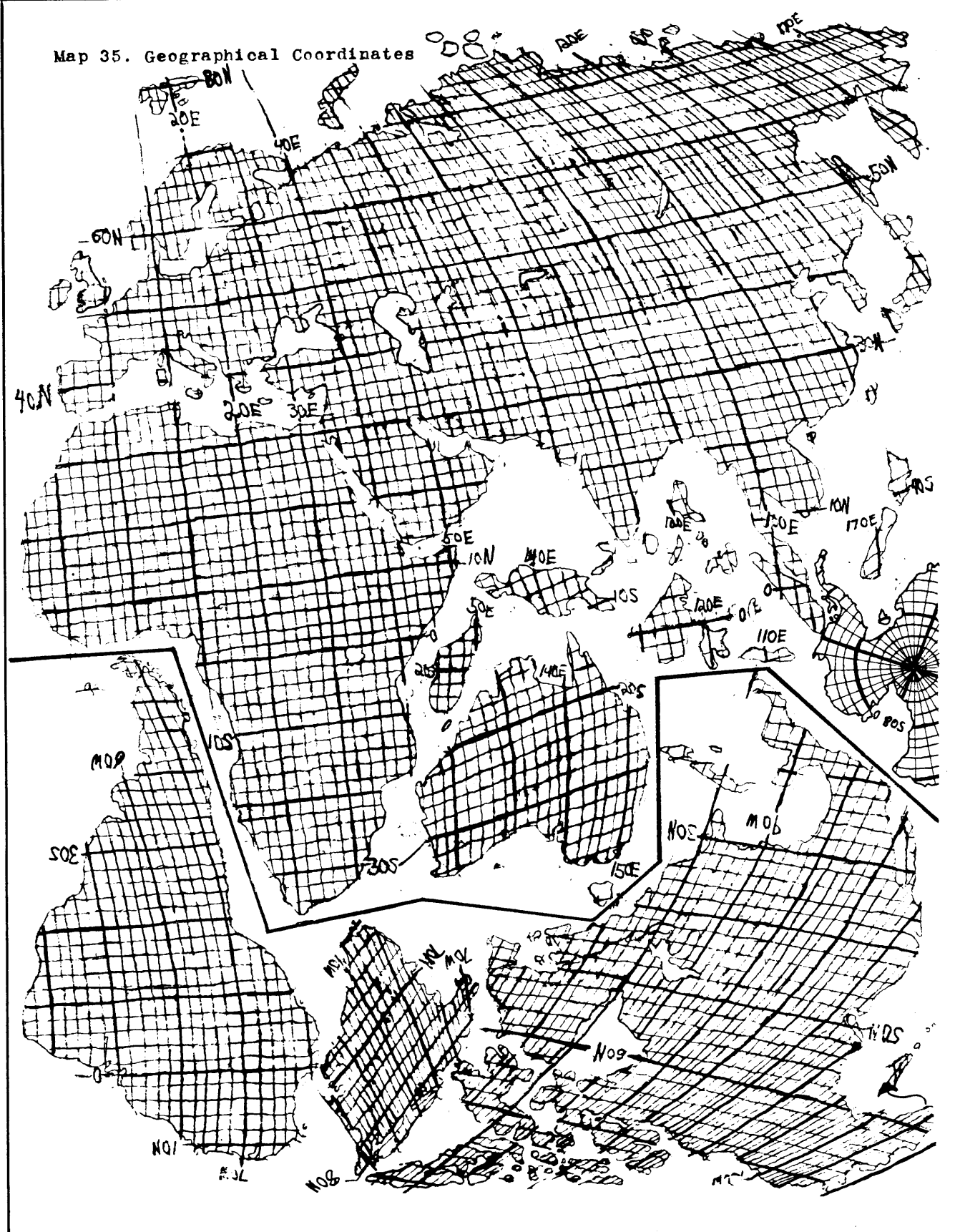
It is necessary to define what is meant by juxtaposition. Obviously fossils that can be seen superposed in an outcrop face or drill core are juxtaposed; but fossiliferous beds (and sedimentary strata generally) have a regional character to them, so fossils occurring several tens of kilometers apart but in different strata levels must also be recognized as superposed (provided that the region is tectonically uncomplicated). However, such extrapolation can not be extended much beyond this. In speaking of the discovery of Jurassic Corals on Sakhalin Island, Krasnov and Savitskiy⁶⁷⁵ wrote: "The age of this series was thought to be late Paleozoic, but this dating was based only on its lithological similarity to the Paleozoic of Japan and the continental part of the Far East." Clearly, lithological similarity did not agree with the stratigraphic order of fossils. At the other end of the spectrum, the character of fossil assemblages changes over short dis-

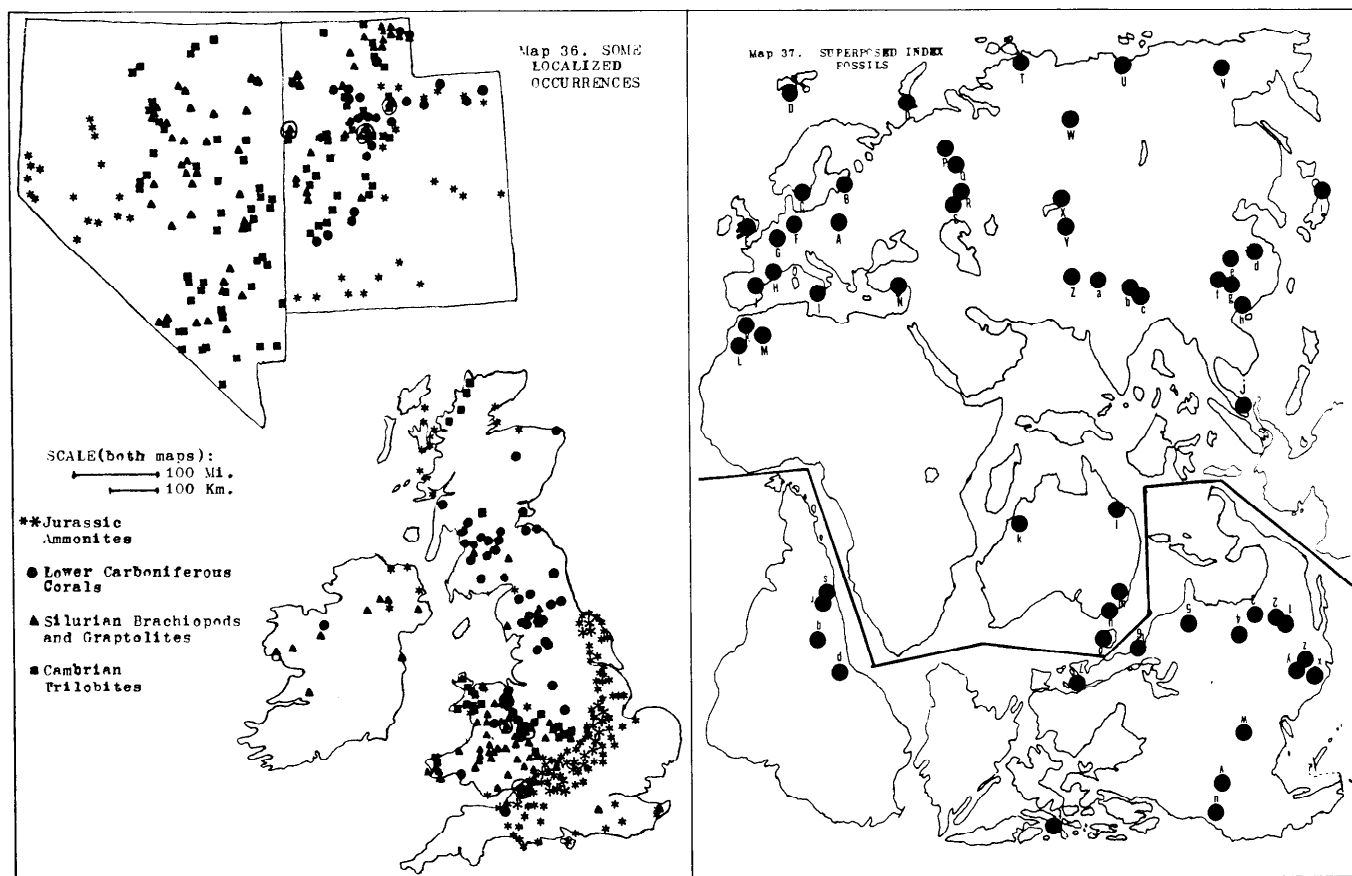
tances. In discussing fossil succession, Harper⁶⁷⁶ commented: "Owing to facie changes, the principle is best restricted, where possible, to individual sites where superpositional order can be seen in outcrop or when it is obvious as in a borehole in a structurally uncomplicated area."

Since strata have a (however justifiably limited) regional character to them, the level of resolution of Maps 1-34 is sufficient for juxtapositional determinations to have been made (bear in mind that there must be allowed a margin of error of several tens of kilometers for each fossil locality plotted. Incidentally, the fossil-occurrence symbols on all maps are unequal in significance. One symbol may denote a locality where a solitary questionable fragment was found, while another may indicate a cluster of outcrops yielding thousands of specimens of wide taxonomic diversity). While the level of resolution of fossil localities in Maps 1-34 is several tens of kilometers, it is worthwhile to consider juxtapositions of index fossils on a regional level—so that fossil occurrences only several kilometers apart could be resolved. Map 36 was constructed especially for this purpose; showing fossil localities in Utah-Nevada and the British Isles. The fossils and the respective reference numbers for sources of data are: Cambrian Trilobites (42, 677-9), Silurian Brachiopods and Graptolites (211, 220, 680), Lower Carboniferous Corals (365, 370, 681-2), Jurassic Ammonites (683-6).

It is difficult to say which method (world Maps 1-34 or the regional one-Map 36) offers a "truer" picture of fossil juxtaposition. The high resolution of Map 36 ob-

Map 35. Geographical Coordinates





viously offers great detail, but because of this, detail is more vulnerable to outcrop availability bias and the exaggeration of other local factors. However, Map 36 shows that very seldom are 3 of the 4 cited fossils within a few tens of miles of each other (encircled areas show those locations). Juxtapositions of two fossils at a time are more common, but this is offset by the fact that all fossils shown are actually a single regional occurrence and so every individual fossil-locality manifestation on Map 36 should not really count as a separate candidate for juxtaposition.

It thus appears best to judge juxtapositions on a global scale. Table 3 has been drafted to show the results of superposing Maps 1-34 against each other. There are 479 cross-comparisons: every fossil versus every other that belongs to another geologic period. It can be seen that only small percentages of all localities of any given fossil overlie, or are overlain by, any other single fossil of another geologic period. Thus fossils of different geologic periods invariably tend to shun each other geographically, and this in itself may be taken as *prima facie* evidence that all fossils are ecological and/or biogeographic equivalents of each other—negating all concepts of evolution, geologic periods, and geologic time. To the Diluviologist, this tendency of any two different-“age” fossils to be geographically incompatible not only allows an understanding of fossils in light of the Universal Deluge, but also makes mechanisms of fossil separation (discussed extensively in the next two chapters), for the juxtapositions that do occur, workable without any need of un-

realistic efficiency on their part.

From Table 3 it is evident that fossils which are closer in biostratigraphic “age” tend to have more geographic juxtapositions in common with each other. But the apparent significance of this is offset by the fact that fossils of close biostratigraphic age (Figure 1, Table 1) have a considerable number of other fossils in common. Viewed in the opposite direction, the smallness of the number of fossil families in common between geologic periods at opposite ends of the geologic column is made vacuous by the very small number of opportunities for those fossils ever to have had a chance to become mixed during the Flood (note the preponderance of bar symbols—denoting very small percentages of juxtaposition—at the lower right of Table 3).

Whereas Table 3 only shows the juxtapositions of two fossils at a time, Table 4 shows regions on earth where many index fossils are possibly juxtaposed. “Possibly juxtaposed” is used here because the circles shown on Map 37 cover large areas (they have a diameter of over 200 miles or 320 kilometers): the largeness of the encircled areas being made necessary to allow a large margin of propagated error resulting from multiple juxtapositions. The numbers of juxtaposed fossils portrayed in Table 4 are thus an exaggeration. The 59 regions of juxtaposition shown are those where at least 7 of the 34 index fossils occur in the same encircled area though not all 7-occurrence localities have been shown due to space limitations. Note that there are only singular instances on earth where over 10 of

the 34 index fossils are possibly juxtaposed, and no case at all where half of all index fossils are possibly juxtaposed.

There does not appear to be any trend for individual fossils to be exceptionally commonly juxtaposed or non-juxtaposed with others. A positive correlation exists between the number of fossils present on a given map and the commonness of that fossil's presence among the 59 biostratigraphic columns of Table 4. In Table 3, fossils which have relatively few numbers of occurrence have either exceptionally high or exceptionally low rates of juxtapositions with other fossils, indicating the somewhat erratic effects of relatively small numbers of occurrences. The number of occurrences of a given fossil (Table 2) are primarily a function of their abundance in their respective ancient faunas. For example, ammonoids are rare constituents of Paleozoic marine faunas, but very abundant constituents of Mesozoic marine faunas.

II. THE SEPARATION OF ORGANISMS DURING BURIAL BY THE FLOOD: PROCESSES AND MECHANISMS

A. Indeterministic Factors Leading to Stratigraphic Differentiation of Fossils

This work thus far measured the degree of stratigraphic differentiation and local succession of fossils; the remainder, commencing with this section, concerns itself with causes of these phenomena in terms of the Flood. Let it be noted, first of all, that there is nothing particularly "natural" about an evolutionary-uniformitarian explanation for the stratigraphic differentiation of fossils. In describing interpretations of faunal lists from two fossil populations, Raup and Crick⁶⁸⁷ wrote: "If two lists have no taxa in common, it can be assumed that *something* was different. The possible causes vary from ecological differences (marine vs. fresh water; shallow vs. deep water, etc.) to temporal differences (complete evolutionary turnover) to biogeographic differences (provinciality, separation by geographic barriers, etc.)." (italics theirs) It is thus clear that, even within the evolutionary-uniformitarian paradigm, evolutionary turnover is only one of several potential lines of evidence for interpretation of differentiated fossils, so there is nothing exotic about the Creationist-Diluvialist Paradigm considering non-evolutionary, non-temporal explanations for fossil separation.

The most mundane cause for stratigraphic separation of fossils is pure chance. It would be odd indeed if, even with all other causes eliminated, organisms buried by the Flood were equally present at all stratigraphic horizons. At the same time, the fact that most index fossils do not actually overlie each other (Table 3) allows chance to have a significant role in generating biostratigraphic differentiation.

Figure 2 has been drawn to illustrate this principle. Note that there are few cases where fossils N, P, and/or S occur in the same stratigraphic section. The only possible combinations (two at a time, with or without overlap) are: N/P and P/N, N/S and S/N, P/S and S/P. If there were many mutual juxtapositions of these fossils, then all six combinations would occur and hence there would be no global biostratigraphic dif-

ferentiation. But since actual juxtapositions are few, one or more of these six combinations may never occur; solely by chance. This follows from a well-known principle in statistics that artifactual (i.e., apparently significant) trends can occur when the population sampled is sufficiently small. For example, it would be highly significant if 500 out of 600 coin tosses were "heads" but not so if 5 out of 6 were "heads" because of the small population in the latter case. The Founder Effect in Population Genetics is another example.

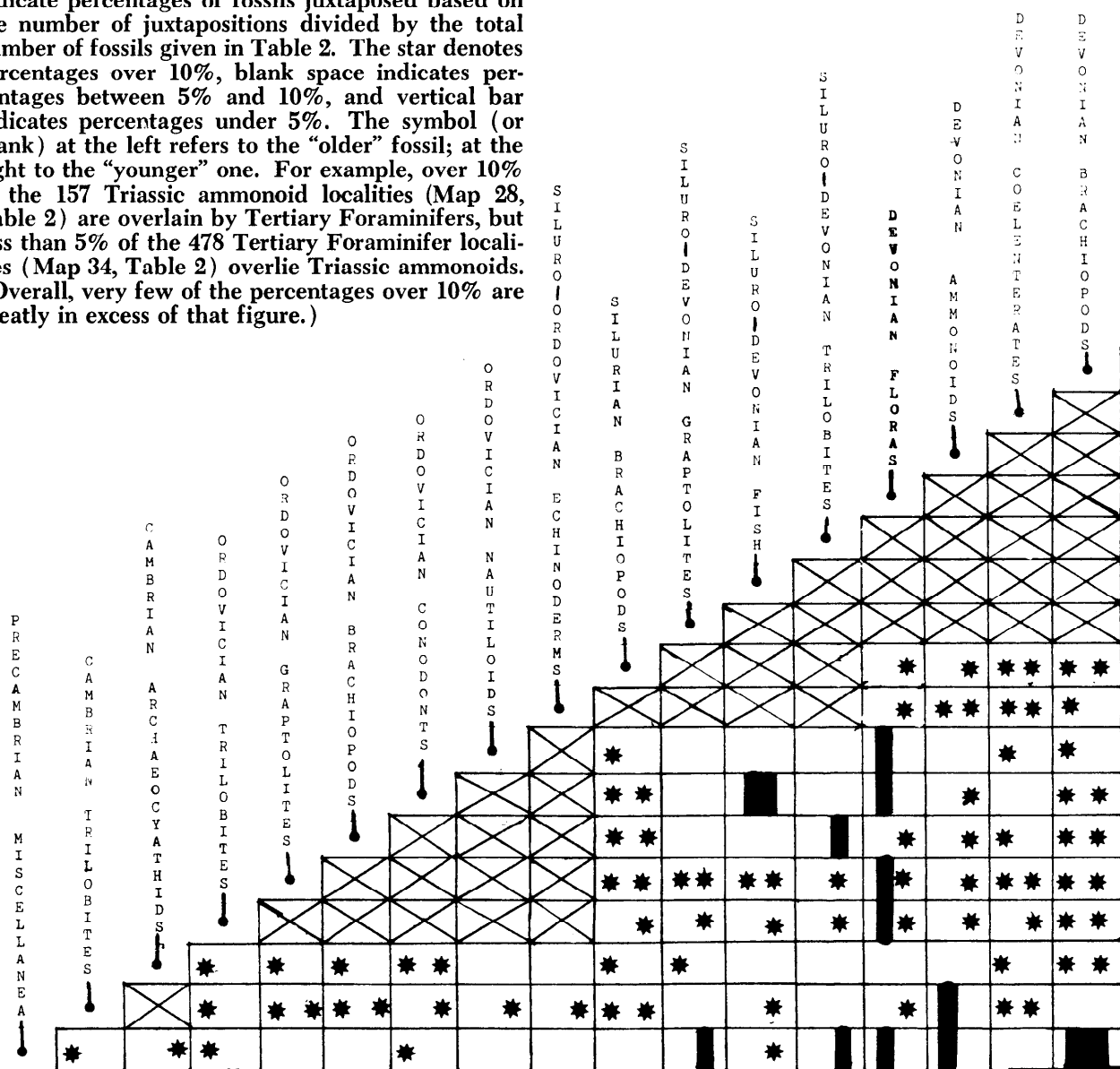
Applying this principle to biostratigraphy, one should note that in Case 1 of Figure 2 the combination N/S never occurs. In Case 2, the Flood is hypothetically allowed to happen all over again. This time, it is the combination P/S that never occurs. Keeping in mind that index fossils shun each other geographically (Table 3), one can see a directly comparable situation with Figure 2; in both cases there are few opportunities for any two index fossils of different "ages" to mix with each other, so many non-mixings can occur by chance. Since in Case 1 S/N is the only way fossils S and N are stratigraphically related to each other (since N/S never occurs, by chance, due to the rarity of instances where fossils N and S occur in the same location), then uniformitarians imagine that S and N are index fossils relative to each other and thus delineate different spans of geologic time. The time horizon has been drawn in to show how the sections are time-correlated according to this "knowledge." The boundary is firm (and thus drawn as a solid line where both N and S occur in the same section) but indeterminate (as in stratigraphic section no. 4) when neither occur. Where one of the two index fossils is present, then the boundary is capable of being placed under S or above N but not with exactness. In Case 2, it is S and P that are index fossils and it is N that has no time significance.

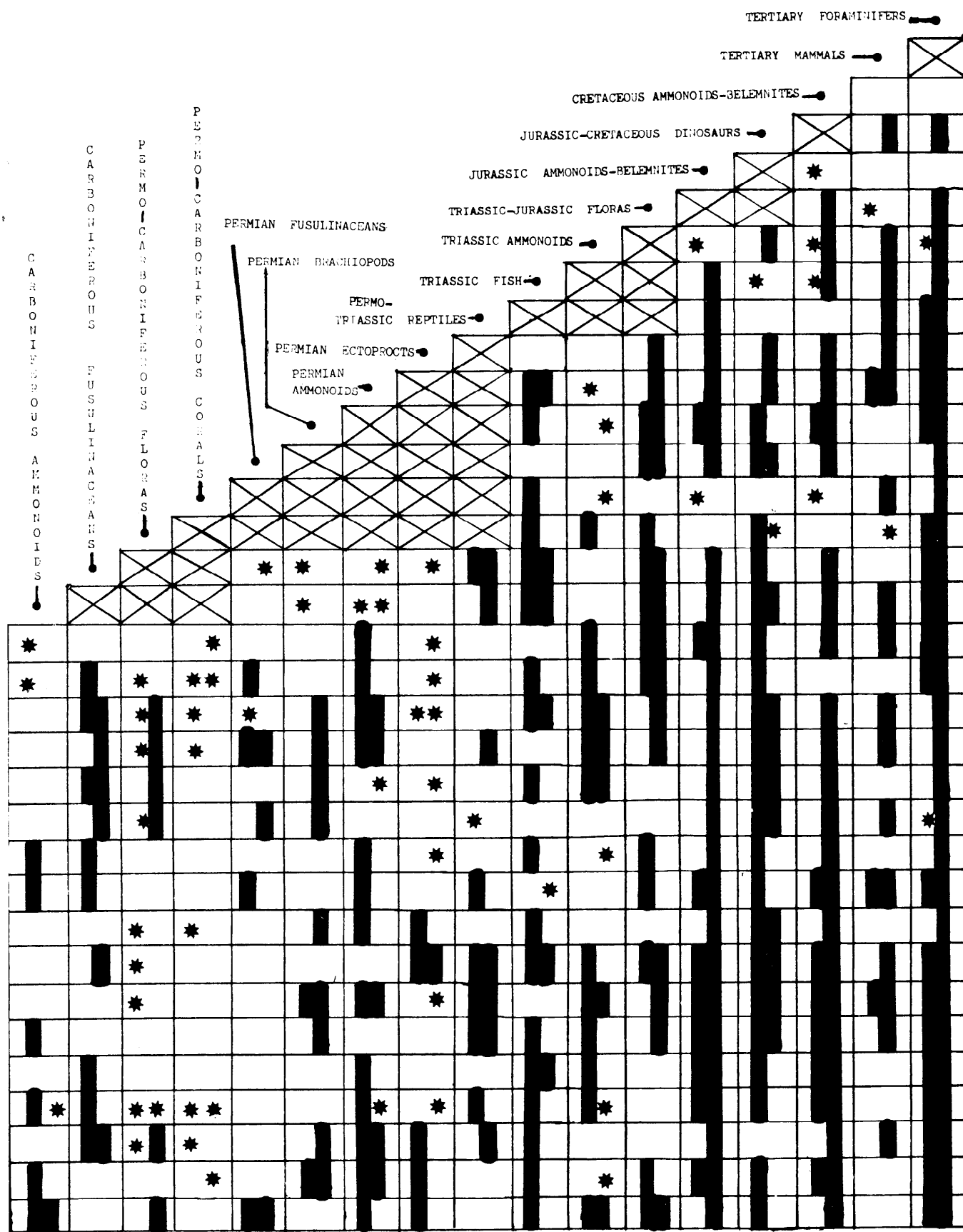
The principle of the origin of biostratigraphic differentiation by chance can be extended to multitudes of fossils, in contrast to the mere 3 shown in Figure 2. Again, the fact that most index fossils are geographically incompatible relative to each other (Table 3, Figure 2) makes it possible. In such a group of fossils, some stratigraphic combinations will fail to occur (by chance); these will be the source of index fossils. Other combinations will occur, and these fossils will be rejected as index fossils. Since adjacent geologic periods have a majority (or very large minority) of families stratigraphically common to each other (Figure 1, Table 1), the principle of chance by itself may be sufficient to account for the biostratigraphic differentiation of any three adjacent geologic periods. The geologic column and its fossil population can be therefore broken down into four principle divisions; these divisions needing deterministic factors to account for their biostratigraphic differentiation relative to each other. Such deterministic factors are the topic of the succeeding chapter.

A major ramification of the origin of biostratigraphic differentiation by chance is the fact that many (if not most) stratigraphic occurrences of index fossils are solitary (see occurrence nos. 4, 5, 11, 17, and 19). Once fossils are elevated to index fossil status, their time-

stratigraphic confinement becomes largely circular and therefore self-fulfilling. Creationists have commonly pointed out the circular reasoning in the use of index fossils but, in view of the fact that evolutionists-uniformitarians have commonly sought to deny this fact, it is worthwhile to provide additional evidence. Potapenko and Stukalina⁶⁸⁸ wrote: "The crinoids found here rule out a Precambrian or Cambrian age for the host limestone because no reliably identified primitive crinoids have ever been found in Paleozoic rocks older than Early Ordovician." The use of crinoids in ruling out a Precambrian-Cambrian age is justified by the "fact" that such crinoids have never been found in Precambrian-Cambrian rocks, and then the circle of reasoning closes by claiming that rocks are not Precambrian-Cambrian solely because they contain such crinoids! In being uncertain whether to date a certain lithology as Precambrian or Cambrian until a trilobite was found, Yochelson and Stump said:⁶⁸⁹ "The trilobite fragment precludes a Precambrian age." In another situation, Skehan, *et al.*,⁶⁹⁰ wrote: "Middle Cambrian trilobites of Acado-Baltic affinities have been found in southern Narragansett Bay, Rhode Island, in phyllites previously mapped as part of the Pennsylvanian stratigraphy of the Narragansett Basin." The claim that certain trilobites are confined to the Cambrian begs the question because rocks are dated as Cambrian (and not some other geologic period) often solely because they contain such trilobites. Many other examples could be given.

Table 3. The Actual Geographic Compatibilities and Incompatibilities of Index Fossils: A Quantitative Tabulation. Each row-column intersection shows the juxtapositional tendencies of two index fossils relative to each other. There are 479 possible different "age" juxtapositional combinations of the 34 index fossils; all of these are shown. The symbols indicate percentages of fossils juxtaposed based on the number of juxtapositions divided by the total number of fossils given in Table 2. The star denotes percentages over 10%, blank space indicates percentages between 5% and 10%, and vertical bar indicates percentages under 5%. The symbol (or blank) at the left refers to the "older" fossil; at the right to the "younger" one. For example, over 10% of the 157 Triassic ammonoid localities (Map 28, Table 2) are overlain by Tertiary Foraminifers, but less than 5% of the 478 Tertiary Foraminifer localities (Map 34, Table 2) overlie Triassic ammonoids. (Overall, very few of the percentages over 10% are greatly in excess of that figure.)





Still another major factor in the origin of biostratigraphic differentiation by chance is preservation bias. Collier⁶⁹¹ wrote: "When similar living faunas are preserved in the fossil record, they become much less similar, due to incomplete habitat representation and small sample size." This factor, applied to biostratigraphy, can be visualized by referring to Figure 2 (Case 2). In stratigraphic section 5, only P is found but there may have been N and/or S also originally present that had not been preserved. If any occurrence of N or an occurrence of S above the P had in fact been preserved, it would have made no difference on the special S/P relationship and on the use of S and P as index fossils. But if there had originally been a mixture of S with the P or else an instance where P overlay S in section 5, then the fortuitous non-preserving circumstance with respect to S in section 5 would have spared the whole S/P relationship. Thus, in Figure 2, there were many instances where there were additional fossils in given sections that had not been preserved and at times this non-preservation eliminated would-be biostratigraphic conflicts.

B. Deterministic Factors leading to Stratigraphic Differentiation of Fossils: The Primacy of TAB's (Tectonically-Associated Biological Provinces)

This section considers how the physical, ecologic, and biogeographic properties of organisms led to their biostratigraphic differentiation; emphasis being placed upon possible connections between biogeographic realms of antediluvian organisms and their tectono-sedimentary environment. These factors are complementary to the indeterministic ones discussed in the previous chapter and also make considerable use of the fact that there is considerable net biostratigraphic overlap (Figure 1, Table 1) and that index fossils tend not to superpose (Tables 3 and 4, Figure 2).

Creationists have cited deterministic factors which lead to a stratigraphic differentiation of fossils, and these factors have their greatest realization because index fossils shun each other geographically (Table 3, Figure 2). Consider hydrodynamic sorting and differential escape, proposed by Whitcomb and Morris,⁶⁴³ in the light of the information in Figure 2, Case 1. Suppose that, when in the same geographic area, fossil S has 70% chance of being buried later than fossil N due to sorting and/or differential escape. The fact that S and N so rarely coexist geographically enables the 30% tendency of N/S never to occur. In Case 2, the Flood is allowed to happen all over again and this time the 30% situation of N/S does occur and so N and S are not made into index fossils relative to each other. However, in Case 2, hydrodynamic sorting and/or differential escape cause a burial bias where P is buried before S, say 80% of the time, the same bias having been thwarted by the 20% chance in Case 1. It can thus be seen that factors such as hydrodynamic sorting and differential escape do not have to be overly efficient in order to generate biostratigraphic differentiation. This overcomes objections about the turbulence of Floodwater: since index fossils rarely superpose relative to each other (Table 3, Figure 2) the sorting, etc., need work consistently only a few times relative to any two organisms in order for them to be buried in consistent biostratigraphic order.

The factor of ecological zonation (discussed by Clark⁶⁴⁵ and also applied to fossil cephalopods by the present author⁶⁹²) probably is more efficient in generating biostratigraphic differentiation than passive sorting or differential escape. Nevertheless, ecological zonation also does not need to be highly efficient to generate biostratigraphic differentiation for the same reason as was discussed in the preceding paragraph for hydrodynamic sorting and differential escape. Examining Figure 2, it can be seen that (in Case 1) N could be in a lower habitat than S. The combination S/N would then be generated through ecological zonation if: N was benthic while S was pelagic, N was either benthic or pelagic while S was planktonic (both situations in marine ecology were discussed in my work⁶⁹² on cephalopod ecological zonation), N lived on lower ground while S lived on higher ground. Again, the fact that S and N rarely coexist geographically means that ecological zonation needs to work consistently only several times for the S/N biostratigraphic relationship to be established. The process for S and N is applicable to any other situation where index fossils are members of different ecological habitats.

Ecological zonation is in many instances so prominent that it not only plays a major role in total biostratigraphic differentiation, but also causes biotal incompatibilities *within* geologic periods. Many fossils are rejected as index fossils because they are facies fossils—fossils restricted to some particular lithology or well-defined sedimentological circumstance. Yet even index fossils show by their predominance in certain lithologies that they were ecologically-controlled and hence capable of flourishing only in certain environments. For instance, Nelson⁶⁹³ cited: ". . . the extreme rarity of graptolites in limestone." In view of this fact of ecological dependence of even the most ideal index fossils, there is no *a priori* reason why the role of ecological zonation cannot be extended beyond faunal differences within (alleged) time-horizons to differences between (alleged) time-horizons (that is, between different geologic periods).

Thus far, the factors discussed (hydrodynamic sorting, differential escape, preservation bias, and ecological zonation) are well known to informed Creationists. The present author now proposes a whole new mechanism to account for biostratigraphic differentiation of fossils. It is based on the fact that sedimentation in the Phanerozoic record is strongly influenced by tectonics, and at the same time on the fact that fossil organisms are not only ecologically zoned but also biogeographically zoned. If tectonics and biogeographic zonation are linked (see Figure 3) then biogeographic provinces must be superposed in a consistent manner, thus resulting in biostratigraphic separation of fossils. The Flood model herein proposed that envisions such linkage is termed *the concept of TAB's (Tectonically-Associated Biological Provinces)*, and will be discussed later. There is a major trend of changes in tectonics going stratigraphically upward in the Phanerozoic and this trend (to be discussed later) may be taken as independent evidence for the existence of TAB's. But first the role of biogeography in the fossil record is described.

It is common when considering modern examples of biogeography erroneously to think of it only in terms

of climatic differences (tropical plants versus the high-latitude pines of Canada and Siberia) or continental differences (the marsupials native to Australia and South America versus placentals elsewhere). Many factors, in actuality, cause biogeographic zonation and such zones need not cover large areas. Looking at paleobiogeographic examples, even within the context of geologic periods, bears this out. For instance, the *Tuvaella* fauna²²³ is a distinctive Silurian brachiopod biogeographic zone, and it is restricted to only Mongolia and adjacent parts of the USSR and China. One need only consult the *Atlas of Palaeobiogeography*¹ to see how fossil organisms of all geologic periods are divided up into paleobiogeographic provinces. Thus, the evolutionist-uniformitarian will note (to give another example) that Ordovician trilobites differ markedly in different places on earth and ascribe such differences to paleobiogeographic provinces (such as the bathyurid province, remopleuridid province, etc.).⁷²⁻³ At the same time, he will note differences between Ordovician and Silurian trilobites and ascribe such differences to evolution and geologic time. The Creationist-Diluvialist can reject such a dualism and view the same fundamental biogeographic processes that cause faunal differences *within* Ordovician trilobites to be the basic cause of differences between Ordovician and Silurian trilobites. In fact, biogeographic differences between marine faunas ascribed to the same geologic periods are so pronounced that Sheehan⁶⁹⁴ proposed that there is a major breakdown in any comparison between extant marine communities and ancient ones. Since biogeographic differentiation *within* geologic periods is so considerable, there is nothing farfetched about the Creationists-Diluvialists' use of the same basic mechanism (when developed in the TAB model) to explain faunal differences *between* geologic periods.

It is worthwhile to make a distinction between ecological zones and biogeographic zones. Taylor and Forester⁶⁹⁵ point out that biogeographic zones (which, as they note, can also be termed faunal provinces or biofacies) may be ecologically controlled; hence the definitions, strictly speaking, overlap. The working definitions used in this work are as follows: The term ecological zonation refers to organisms that are mutually proximate but do not live together because they occupy different habitats or have different environmental tolerances. The term biogeographic zonation refers to organisms that are geographically separated, irrespective of whether or not they occupy the same ecological niche. The term biome would apply to organisms that are both ecologically different (such as those possessing different climatic tolerances) and biogeographically zoned. When organisms are members of the same ecological niche but biogeographically zoned, then they could live together were it not for their geographical separation and any geographic barriers that enforce it.

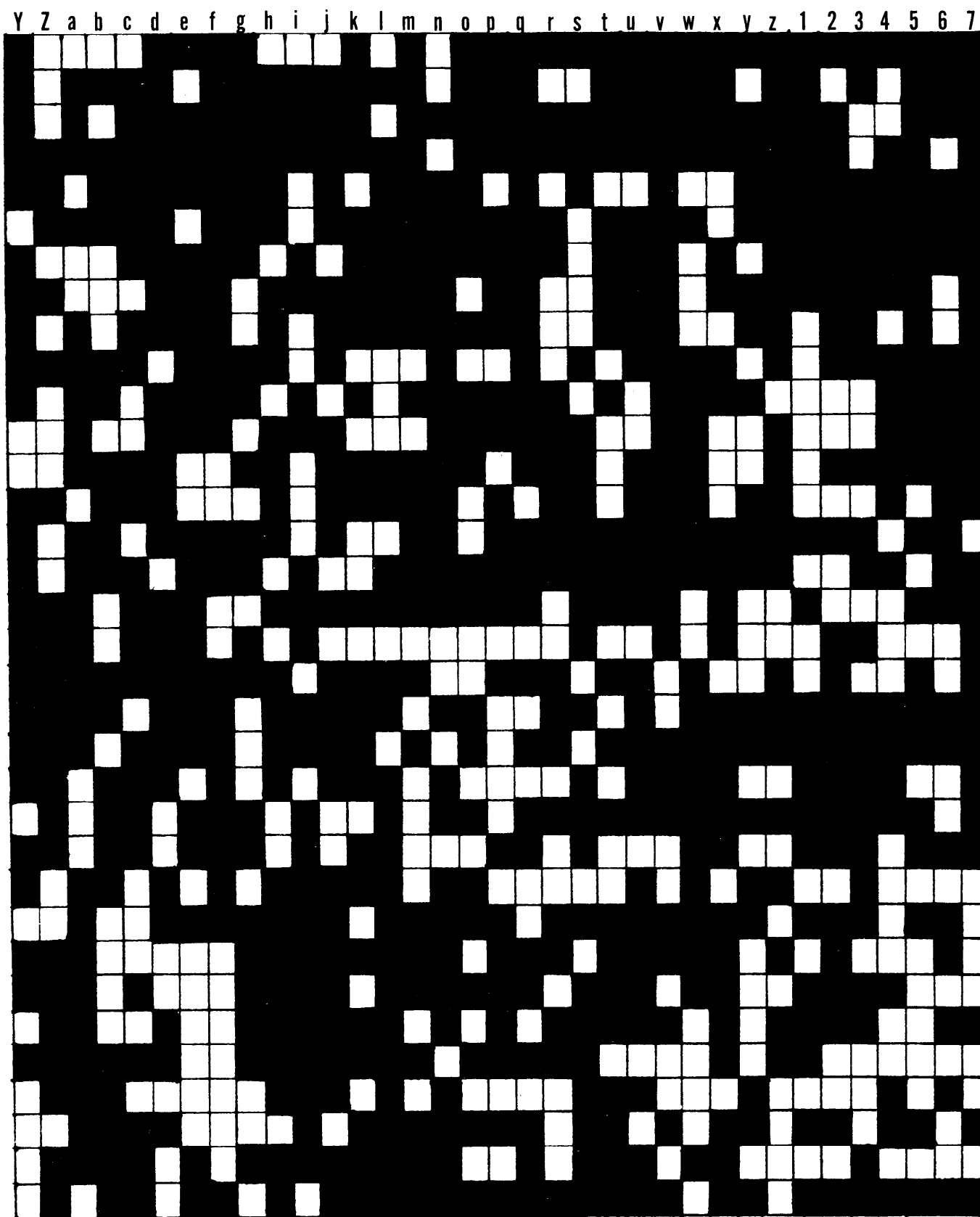
A contrast is now made between the evolutionary-uniformitarian and Creationist-Diluvialist paradigms with respect to the origins of ecological zonation and biogeographic zonation. In the evolutionary-uniformitarian paradigm, ecological zonation is caused by organisms evolving to match their environment: biogeographic zonation is caused by organisms evolving in

a distinct geographic area and being imprisoned in that (or somewhat larger) area by geographic barriers. The Creationist-Diluvialist, not confined by the implicitly atheistic presuppositions of the evolutionist-uniformitarian, is free to explore possible Divine causes in the origins of ecological as well as biogeographic zonation. In attempting to "think God's thoughts after Him," it is worthwhile to note the fact that both ecological and biogeographic zonations are means by which a higher diversity and number of organisms can be supported on earth. There is also less conflict for space and for food when organisms are ecologically partitioned or geographically separated. Thus God may have created ecological and biogeographic zones in order to be able to Create a far wider variety of organisms than would have been the case had He Created only one ecological niche or only one global biogeographic zone. His actions with respect to His New Creation (the Church) may help clarify His Creative actions with respect to the Old Creation (the natural world). We are told that: "Now there are varieties of gifts, but the same Spirit." (1 Corinthians 12:4 NASB). Just as the Spirit gives different gifts so that believers can occupy different "spiritual niches?" so also God Created different organisms suited for their respective ecological niches. (Ecological zonation may itself have Scriptural basis—see Isaiah 41:19-20). Biogeographic zonation may find its analogy within the New Creation in the form of geographic separation of ministries (such as in the geographically differentiated preaching of the Gospel—Romans 15:20). Just as the Spirit can multiply the number of ministries if each has definite geographic boundaries, so God can Create more organisms if each is subject to biogeographic partitions.

Having reflected upon teleological considerations with respect to ecology and biogeography, attention is now focused upon how biogeographic provinces could have been linked with tectonics and thus have been the primary source of biostratigraphic differentiation (the TAB concept—see Figures 3 and 4). Note that in Figure 3 biogeographic provinces repeat themselves; on the land surface of the world each biological province may occupy an area with a transverse distance across it of up to a few hundred miles, the same province appearing again several hundred miles away. But, according to the TAB concept, the same biogeographic province is linked with the same tendency for tectonic downwarp irrespective of where it occurs on earth. Thus, note that in Figure 3 the biogeographic province symbolized by solid rectangles is always linked with the areas on earth having the greatest tendency for tectonic downwarp. Actually, there is greater biogeographic differentiation than tectonic differentiation (as evidenced by the previously-discussed fact that even biotas *within* geologic periods exhibit biogeographic differentiation). This is shown in Figure 3 in the form of asterisk-type stars sharing the same tectonic proclivity (the next to greatest) with ovals. Most other symbols in Figure 3 show the same effect. It is thus not special pleading to invoke the TAB concept as the major causative factor for total biostratigraphic differentiation in view of the fact that there would actually be more biogeographic differentiation than tectonic.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Tertiary Foraminifers																								
Tertiary Mammals																								
Cretaceous Ammonoids-Belemnites																								
Jurassic-Cretaceous Dinosaurs																								
Jurassic Ammonoids-Belemnites																								
Triassic-Jurassic Floras																								
Triassic Ammonoids																								
Triassic Fish																								
Permian-Triassic Reptiles																								
Permian Ectoprocts																								
Permian Ammonoids																								
Permian Brachiopods																								
Permian Fusulinaceans																								
Permian-Carboniferous Corals																								
Permian-Carboniferous Floras																								
Carboniferous Fusulinaceans																								
Carboniferous Ammonoids																								
Devonian Brachiopods																								
Devonian Coelenterates																								
Devonian Ammonoids																								
Devonian Floras																								
Siluro-Devonian Trilobites																								
Siluro-Devonian Fish																								
Siluro-Devonian Graptolites																								
Silurian Brachiopods																								
Siluro-Ordovician Echinoderms																								
Ordovician Nautiloids																								
Ordovician Conodonts																								
Ordovician Brachiopods																								
Ordovician Graptolites																								
Ordovician Trilobites																								
Cambrian Archaeocyathids																								
Cambrian Trilobites																								
Precambrian Miscellaneous																								

Table 4. The Global Successional Tendencies of Index Fossils. The Table shows which of the 34 index fossils can be seen superposed at the localities shown on Map 37: the localities shown being those where the greatest number of index fossils can be seen to superpose. Blacked-out rectangles denote absence of that given fossil at that given locality.



One may wonder if there is any independent evidence for such a proposed linkage between tectonics and biogeography, and also if there are plausible reasons to account for such a linkage. The answer to both questions is yes; and so the concept of TAB's can be independently justified. Studies on modern marine biogeography described by Taylor and Forester,⁶⁹⁵ and Crick,⁶⁹⁶ have shown that oceanic current patterns result in biogeographic differentiation (a differentiation that is also biomic in character), temperature of the water being the major factor. Salinity is another. Crick added that water-temperature patterns of oceanic current flow can be controlled by submarine topography. This concept can be applied to antediluvian epicontinental seas. Suppose that the entire Phanerozoic is divided into four divisions—I, II, III, and IV: these are simultaneously four antediluvian biogeographic provinces and also are approximately equivalent to Eras. Thus, no. I (see Figure 4) represents the biogeographic province (roughly corresponding to Lower Paleozoic in biotal content) that is associated with the regions on earth showing the greatest tectonic proclivity. Returning to the discussion concerning Crick,⁶⁹⁶ one can see that, in this instance, the no. I biogeographic province could have had uniform temperature of water, and that this temperature could have been regulated by submarine topography. Submarine topography could have, in turn, been a reflection of the tectonic stability of the region. This is one possible causal connection between biogeography and tectonics. Another temperature-based biomic situation could result from the fountains of the deep (Genesis 7:11) having been partly geothermal springs and underground rivers. The temperature and number of such springs in a region could have depended upon the tectonic proclivity of the region; more numerous and hotter springs being generated in regions of greatest tectonic proclivity because of numerous deep fissures (no. I of Figure 4), the biotic contents of the associated biological province living at a high temperature environment due to the number and temperature of the geothermal springs. Note that in the examples discussed thus far (marine currents and geothermal springs), the temperature of the water was the causal factor of the TAB's and also the factor linking the tectonic proclivity with the biogeographic provinces. Still another connecting factor between biogeography and tectonics could have been the chemistry (eH — pH nutrients, trace elements) of the seabed and seawater (in marine regions of biogeographic provinces) and the chemistry of soils (in land regions of same). Geothermal springs, once again, could have been the causal connection between tectonic proclivity and chemistry (and thus biogeography).

An example from modern ecology where biogeographic distribution is regulated by chemistry is discussed by Parker and Toots.⁶⁹⁷ "Proboscids are highly advanced in the evolution of their dentition but are primitive in their sodium metabolism. Because of the latter fact, distribution of elephants in modern Africa is closely correlated with high environmental sodium levels (Weir 1972), and elephants are known to depend on food that is particularly rich in sodium."

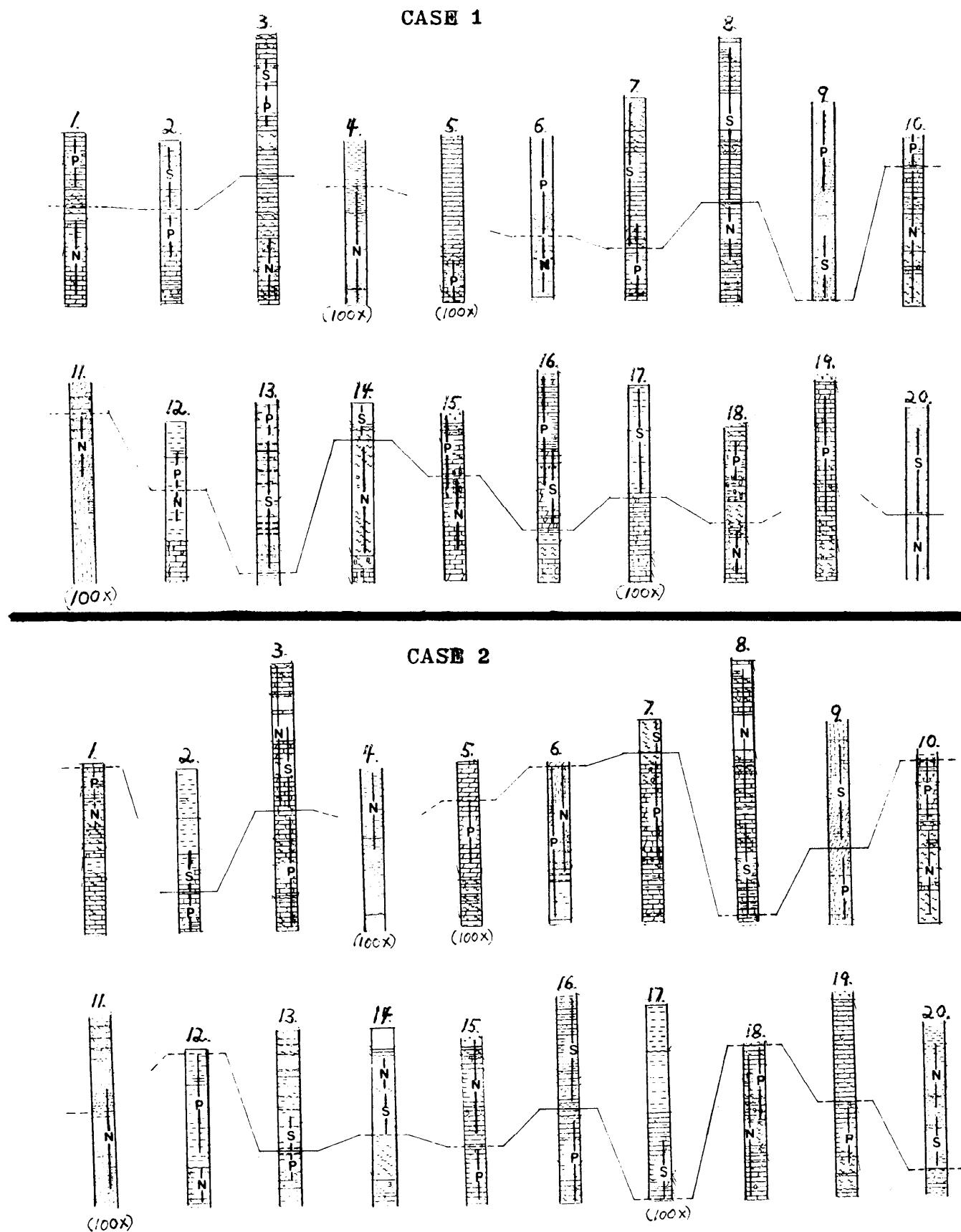
TAB's could have also been Created without any ecological (biomic) character to them; the tectonic

proclivities being part of the structure of geographic barriers designed to prevent significant migration of organisms from one biogeographic province to another. (It should be emphasized that TAB's did not arise from trial-and-error migrations but were present since the Creation and were based on teleological design.)

Independent evidence that there is a connection between biostratigraphic segments of the Phanerozoic and tectonics of sedimentation is now presented. When the present author conceived the TAB process, he predicted that, if it is valid, then the lower part of the Phanerozoic column should contain evidences of sedimentation under more tectonically-active conditions than the upper part of the same. After making such a prediction, it was discovered that such is indeed the case. First of all, note that in Table 3, Lower Paleozoic fossils have a greater tendency to superpose among themselves than is the case for fossils of adjacent geologic periods higher in the geologic column (this is clearly manifested by the concentration of star symbols in the left half of Table 3 and simultaneous negative concentration of bars). This indicates that Lower Paleozoic fossils have been deposited in smaller geographic areas than was the case for higher fossils, indicating that tectonic downwarp was greatest for Lower Paleozoic and thus forced the concentration of those fossils into geographically restricted areas. Other lines of evidence, presented by other authors, bears this out. Note that geosynclines are regions of greater tectonic activity (downwarp followed by uplift) than platforms. Ronov⁶⁹⁸ did extensive calculations on the areas and volumes of Phanerozoic rock with respect to geologic periods. He showed (his Figure 32) that geosynclines occupy 40% of the area of oldest geologic periods but less than 20% of the recent ones. The present author performed calculations on the data presented by Ronov⁶⁹⁹ in another article. It was determined that the Mesozoic-Cenozoic (roughly corresponding with TAB's III and IV) contains 57.4% of the total volume of Phanerozoic platform sediments but only 41.3% of the total volume of Phanerozoic geosynclinal sediments. The ratio (by volumes) of geosynclinal to platformal sediments (taking the Phanerozoic as a whole) is 2.4. A clear trend is evident between the Eras (and sub-Eras). In the Lower Paleozoic (TAB I), the ratio is 3.1; in the Upper Paleozoic (TAB II), it is 3.4; in the Mesozoic (TAB III) it is only 1.8; and in the Cenozoic (TAB IV), it is but 1.6. The trends discussed in this paragraph demonstrate that there is a tectonic trend going stratigraphically upward in the geologic column: this trend provides independent evidence for the TAB concept.

Some ramifications of the TAB concept should be discussed; both biogeography and tectonics being considered. The reason why the Phanerozoic was divided into four lateral equivalents (the biogeographic provinces I through IV) was because (as demonstrated in the earlier chapter on indeterministic factors) geologic periods adjacent to each other share a great many families between them (Figure 1, Table 1), so that there are really only four (not more nor less) groupings of Phanerozoic faunas. This approximately corresponds to Eras and Sub-Eras in terms of a "natural" division of the Phanerozoic. Furnish, *et al.*,⁶¹⁵ wrote:

Figure 2. A schematic representation of the effects of pure chance on stratigraphic ranges. Note that Stratigraphic Sections 4, 5, 11, and 17 are numerically weighted 100 times, so there are actually 416 different sections shown per case. Relatively rare mutual stratigraphic occurrences of fossils P, N, and /or S generate *apparent* stratigraphic incompatibilities. Explained in Text.



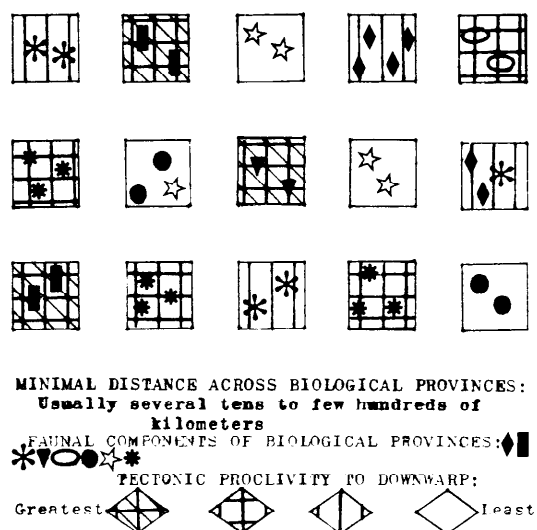


Figure 3. The Approximate Geographic Congruence of Antediluvian Biogeographic Provinces with Differentiated Tectonically-Prone Regions. The squares symbolize different areas on earth, and show given organisms associated with areas having the same tendency to downwarp. Explained in text.

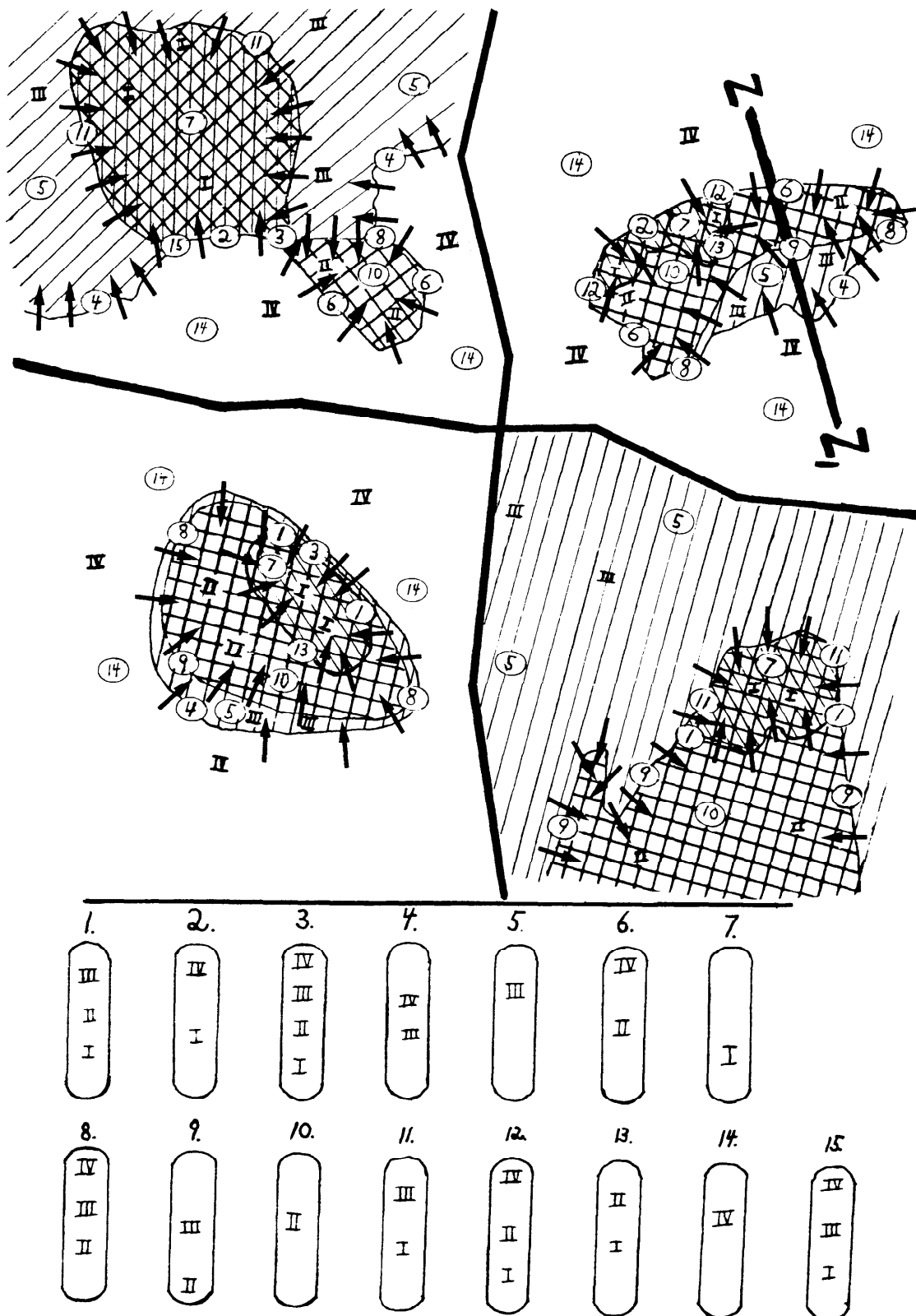
"Since the first half of the 19th century, it has become apparent that assemblages of fossil organisms can be grouped as 'ancient,' 'medial,' or 'recent' in overall aspect. These groupings formed the basis for Phillips' definition (1) of the geological eras: Palaeozoic, Mesozoic, and Kainozoic. Even casual comparison reveals basic differences between marine invertebrate faunas of those three eras, with the era boundaries representing intervals of faunal crisis." In considering tectonic proclivities, it should be pointed out that the tectonic proclivities became operable upon the application of great subterranean stress, irrespective of the source of the stress. Just as a dark fabric will get hotter than a similar white fabric regardless of the source of heat (be it sunlight, ordinary fire, or a nuclear explosion), so also note that the TAB process will have worked regardless of whether the stress was imposed by direct Divine will, passive Divine will (such as undirected flow of Divine energy), or providentially-timed naturalistic causes (such as providentially-timed release of earth-interior stress that had been built-in into the earth since Creation Week, gravitational stresses from a passing celestial body, or a bolide impact). Thus it should be clear that the TAB concept can be incorporated into the theories of other Creationists-Diluvialists, since it does not matter what the overall causal factor of the Flood was: the TAB process operated regardless of cause. However, it should be noted that the exact process by which earth-interior stress becomes manifested as crustal tectonic movements is not yet clarified. Hobson and Tiratsov⁷⁰⁰ cited: "Tectonic forces, the nature of which are still only partly understood . . ." This partial knowledge applies to both uniformitarian and Diluvialist understandings of tectonic action: uniformitarians are certainly not deterred by this fact from proposing models of tectonic action, so neither should the Diluvialist be discouraged from

accepting TAB's. Just as the TAB concept operated regardless of the ultimate cause of earth-interior stress, so also it operated regardless of the mechanism by which earth-interior stresses get converted into crustal tectonics. The lack of knowledge of cytological and biochemical genetics in the 19th century did not prevent Gregor Mendel from proposing his laws of inheritance; neither should the overall partial knowledge of tectonics hinder the Diluvialist. The TAB process finds its greatest realization with respect to tectonics by the clear geological evidences of tectonic motion. Stokes⁷⁰¹ cites troughs, grabens, downwarps, depressions, rifts, and "pull apart" structures (not to mention orogens and geosynclines) and concludes: "As a matter of fact, negative features should be even more common than positive ones. The forces that cause uplift must work against gravity, while those causing depression work with it."

TAB's are not equivalently distributed over the earth. Thus, the reason why ocean floors are almost exclusively Mesozoic and Cenozoic is because they were exclusively overlain by TAB's II and IV. (The percentage of all 15 possible combinations of TAB successions with respect to earth's land surface will be discussed later in conjunction with Figure 6.) TABs have been described in terms of Phanerozoic biotas, but Precambrian biotas can be assigned to TAB I; one need realize that the sum of Precambrian biotas is minute in comparison with the number and diversity of Phanerozoic biotas, and that Precambrian biotas can be attached to TAB I because they commonly range into Lower Paleozoic and because (as previously mentioned in conjunction with trilobites) the Cambrian-Precambrian boundary is circularly defined. Dott,⁷⁰² in an anti-Creationist article, completely misses the mark when he asserts that the Noachian Deluge would need to have deposited all Precambrian, along with Phanerozoic, sedimentary rock. Only a vanishingly small percentage of Precambrian is fossiliferous and therefore must be post-Creation Week. Even if this were not so, Late Precambrian (Riphean and Vendian, which together are ascribed to the time span 1600 m.y. to 600 m.y. ago and in which the vast bulk of Precambrian biotas are concentrated), volumetrically occupy only 16% of the total combined volume of Riphean-Vendian-Phanerozoic sediment, according to Ronov.⁶⁹⁹ When intensely metamorphosed equivalents are included, the figure rises to 27%, but again only a very small percentage of even this volume is fossiliferous and therefore must be Diluvial in origin.

The Lower Paleozoic (TAB I) contains almost exclusively marine fossils, and this indicates that the biological province was exclusively marine. All other geologic periods, while containing land faunas and floras, are still dominated by marine biotas. This indicates that TAB's II, III, and IV contained both marine and terrigenous regions. When a particular regional TAB was land in entirety, then the geologic periods deposited had only land faunas. For example, the Gondwana Formations of South Africa were primarily TAB III of nearly entirely terrigenous geography. Many TAB's, by contrast, contain alternations of marine and nonmarine biotas, indicating that the particular regional manifestation of a given TAB si-

Figure 4. The Generation of Biostratigraphically-Differentiated Strata through the Operation of TAB's (Tectonically-Associated Biological Provinces). The four quadrants depict four representative depositional regions during the Flood (from anywhere on earth). The denotation for Tectonic Proclivity is identical to that in Fig. 3. The biogeographic components of the areas are shown by the numerals I-IV (corresponding approximately to a fourfold division of Phanerozoic life) replacing the geometric symbols of life shown in Figure 3. The numbers in ovals show the type of local biostratigraphic succession generated; the age possible successions are shown on the bottom of the diagram. The arrows show how Floodwater deterministically flows across regions, irrespective of whether it is progressional, intra-Flood, or recessional. Explained in text.



multaneously contained both land and marine areas. Every regional manifestation of a TAB is independent from any other regional manifestation in terms of sedimentology and most sediment is regional in origin, so there are no major global volumetric tendencies with respect to primary lithologies. Thus, Ronov⁶⁹⁹ showed that every geologic period has sandstone, shale, carbonate, etc., in percentages that fluctuate considerably going from one geologic period to the next, but without any major volumetric trends across the whole Phanerozoic.

TAB's have thus far been discussed in terms of their biogeographic and tectonic components, as well as in terms of their implications and ramifications. The following discussion concerns their *modus operandi* with respect to the Flood (see Figures 4 and 5). Note that Floodwater (and its transported sedimentary particles and organisms) always flows from an area of lesser tectonic proclivity to a higher one. This is because an area of greater tectonic proclivity always downwarps before an area of lesser tectonic proclivity. Thus the sequence of TAB's: IV/III/II/I is always preserved in that relative order no matter how many of the four TAB's are actually present in a given area. Note that in the regions illustrated in Figure 4, stratigraphic successions of multiple TAB's are generated only at and near junctions of TAB's. In geographic centers of large

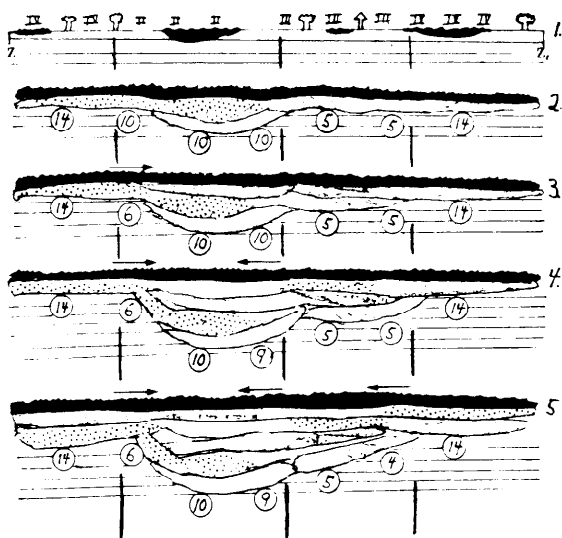


Figure 5. A cross-section showing how biotic members of TAB's become superposed throughout the course of the Flood. The section dissected is shown by the line segment Z-Z, in the upper-right quadrant of Fig. 4. The denotation for Roman numerals and for numbers in ovals is identical to that of Figure 4 (except that the situation in Figure 4 is in plan (areal) view whereas this figure is in cross-section). No. 1 (at right) refers to the antediluvian section: the projections symbolize trees whereas the black symbolizes antediluvian epicontinental seas. The thin, continuous horizontal lines indicate antediluvian regolith; the thick horizontal line segments indicate boundaries of TAB's and their respective tectonic proclivities. Nos. 2-5 refer to progressive stages of Flood deposition; the black band denotes the surficial cover of Floodwater whereas the thin arrows indicate the net direction of Floodwater and its sediment transport in response to the sequential downwarp of TAB's. The vertical scale is approximately 1 centimeter to a few thousand meters; the horizontal is 1 centimeter to a few tens of kilometers. Explained in text.

representatives of specific TAB's only biotic members of that same TAB are superposed. This is shown in Figure 4 under stratigraphic succession numbers 5, 7, 10, and 14. On the earth, such singular successions are seen in the form of thick geosynclinal deposits containing a few mutually-adjacent geologic periods (for example, very thick Lower Paleozoic Caledonian geosynclinal accumulations) and also platform deposits with singular geologic periods represented.

In order to get an idea of how TAB's would be geographically proportioned (wide TAB representatives which would have given singular successions versus small and narrow representatives sharing boundaries with other similar TAB's and hence yielding multiple-TAB successions), the earth's land surface was divided into the 15 possible TAB successions shown in Figure 4 (the 16th possibility being a region having none of the four TAB's present there). The raw data came from Table 1 of the author's previous work⁷⁰³ on the nonexistence of the evolutionary-uniformitarian geologic column. The results, shown in Figure 6, indicate that over half the earth's land surface has 2 or fewer of the 4 TAB's superposed at any one locality. This indicates that the dominant mode of sedimentation during the Flood involved little tendency for TAB constituents to be transported much beyond their boundaries; hence less than half of earth's land surface has more than 2 locally superposed TAB's. When oceanic data are included (only TAB's III and/or IV), this tendency is increased to such an extent that only about 15% of the earth's entire surface has more than 2 locally superposed TAB's. It is interesting to note (from Maps 11-15 of the author's previous work⁷⁰³) that regions of greatest completeness of the geologic column are also regions of greatest sedimentary thickness (that

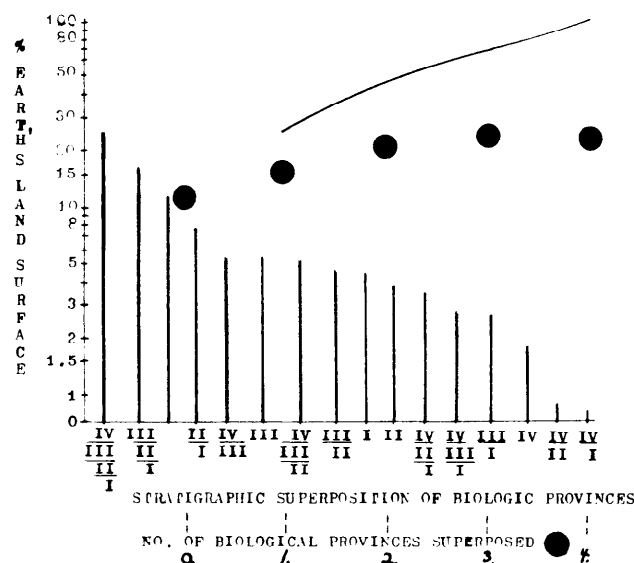


Figure 6. A quantitative breakdown showing tendencies of superposition of TAB's over the earth's land surface. The superposed Roman numerals show every possible combination of TAB's; listed from most to least frequent going rightward together with the per cent of earth's land surface each covers. The black circles and cumulative frequency curve refer to the absolute number of TAB's and their per cent occurrence. Explained in text.

is, the geosynclines). Map 37 also indicates this in its own way: areas of most superposed index fossils tend to be geosynclines. Both these trends are logically explicable in terms of TAB's; in fact, they may be yet another independent evidence for the existence of TAB's. Regions that have most or all TAB's locally superposed will naturally tend to have the greatest thickness of accumulated sediment because they have the most sources of sediment (multiple TAB's) all delivering their sediment into those regions.

It is worthwhile to consider how TAB's operate during the Deluge in terms of a specific representative region: this is shown in Figure 5. Note that only TAB's II, III, and IV are present in the cross-section pictured. Stage 1 is the antediluvian situation. Stage 2 the earliest part of the Flood, erosion and deposition taking place thus far only within TAB's (shown as successions 5, 10, and 14 in both Figures 4 and 5). The Flood progresses on to Stage 3, and TAB II begins to downwarp. As a result, the Flood transports (as indicated by arrow) sediment and organisms from TAB IV on top of the sediment already deposited within TAB II; hence the succession no. 6 (IV/II) is generated. In Stage 4, the downwarp of TAB II continues and now the Floodwater (again shown by arrow) transports sediment and organisms from TAB III unto the previously-deposited sediment of TAB II; thus succession no. 9 (III/II) is produced. (There is a greater differential between IV and II than between III and II, so succession no. 6 starts to form somewhat before succession no. 9.) Finally, TAB III begins to downwarp (Stage 5) so sediment from IV becomes transported on top of III and succession no. 4 (IV/III) is generated. The sequential downwarp of TAB's is largely independent of the hydrologic stages of the Flood (encroaching, prevailing, and recessional). Thus the covering of Floodwater (shown as black film in Figure 5) is already prevailing on land in Stages 2-5. (While TAB I starts downwarping, it may be occurring just as Floodwaters encroach on land, but it need not be.)

The TAB concept firmly rebuts the objection to the Flood that great thicknesses of sediment could not be laid down in one global Flood. Since sedimentation is primarily controlled by tectonics, and sequentially-downwarping TAB's operate throughout the duration of the Flood, there is constant impetus for mass Floodwater transport of sediment from one region to another. Thus the caricature of the Flood being merely a passive rise and fall of ocean levels (with then only relatively small extent of erosion and deposition—certainly not tens of thousands of feet) is shown to be just that. (Not to mention the probable fact that antediluvian regolith was unconsolidated and thick; hence easy to erode.) The anti-Creationist Milne⁷⁰⁴ did a farcical misrepresentation of the Flood by claiming that, if it had occurred, then organisms in the fossil record would be uniform and identical to those organisms that are extant. Such a straw-man situation would have had validity only if the Flood had been merely a passive rise of water (like a river flood but global in extent). Once the geologic record is consulted and uniformitarian preconceptions are dispelled, the record in all its catastrophic implications testifies to the fact of the Deluge; the TAB concept showing how the

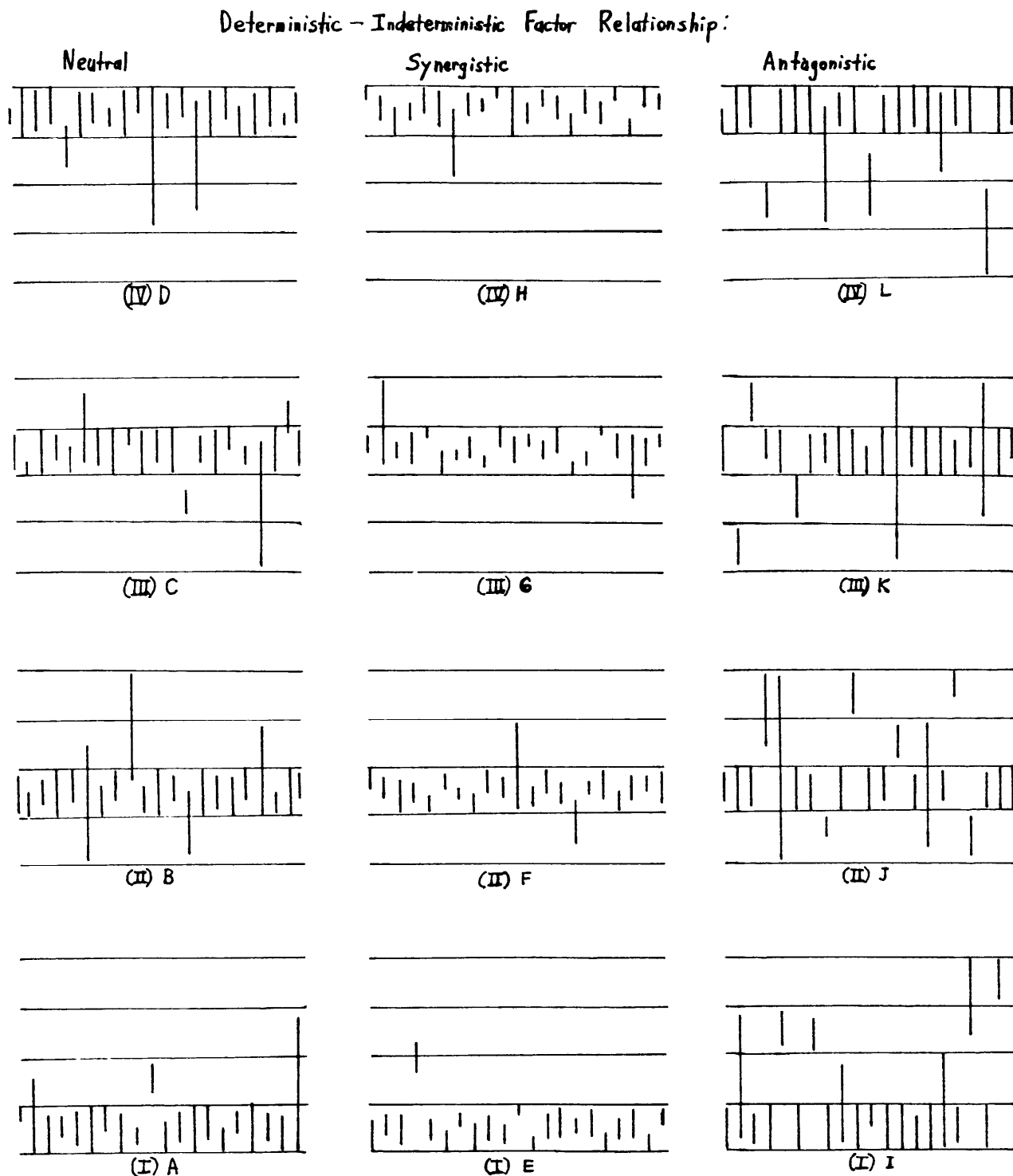
paleontological details of the fossil record can be understood in terms of the Flood. In fact, a Diluvian interpretation (such as the TAB Concept espoused in this work) is scientifically superior to the evolutionary-uniformitarian view because the Diluvian interpretation explains fossil succession with less multiplication of concepts and hypotheses, and less special pleading, than the evolutionary-uniformitarian interpretation. A concrete example of this, where Occam's Razor favors the Diluvian interpretation, is shown by biostratigraphic differentiation itself. The uniformitarian must resort to special pleading in citing some fossils as being index fossils, while disregarding long-range forms. The Diluvialist can consistently explain both in the TAB concept, and need not imaginatively ascribe time properties to selected fossils. The Diluvian interpretation of the fossil record is simpler and more direct because it does not proliferate grandiose unobserved processes (such as organic evolution) but offers a more mundane cause for biostratigraphic differentiation. Also, the TAB concept is a more unifying cause than evolution and geologic time, because the former is a single-shot cause while the latter is a proliferation of (imagined) causes and (imagined) processes. The Diluvialist can use ecology, biogeography, etc. to explain fossil differentiation, while the uniformitarian must not only utilize those causes but also invoke evolution with geologic time. Thus the uniformitarian position multiplies hypotheses to a greater extent than the Diluvian position, which again is why Occam's Razor favors the Diluvian position and makes it more scientific. Why invoke evolution and geologic time in addition to ecology and biogeography as causes of biostratigraphic differentiation when the latter two causes are sufficient?

C. The Stratigraphic Separation and Succession of Fossils: a Diluvian Synthesis

This chapter unites all the factors involved in the stratigraphic separation of fossils; that is, all the factors discussed in the previous two chapters. The TAB process is the dominant factor in fossil separation and all other factors supplement it.

Figure 7 has been drafted in order to illustrate how the TAB process causes organisms to be restricted to specific stratigraphic intervals. For illustrative purposes, Figure 7 has been constructed with the stipulation that sedimentation rates are identical and that all four TAB's are locally present; the stipulations only temporarily held as real so that the full scope of TAB operations can be clarified. Thus, organisms A, E, and I are TAB I organisms and hence tend to have their stratigraphic ranges confined to the lowest quarter thickness of sediment. Organisms B, F, and J are TAB II organisms and tend to be injected into the second quarter thickness (from bottom) of sediment, etc. However, organisms are not absolutely restricted to the stratigraphic interval "belonging" to their respective TAB's because biogeographic boundaries are usually gradational and because the TAB mechanism is statistically-not absolutely-efficient. Nor need it be; since most index fossils do not actually superpose locally (Figure 2, Table 3) the few cases where any two fossils A through L superpose determine which be-

Figure 7. The generation of biostratigraphic differentiation (primarily through TAB's; with an interplay (both constructive and destructive) of other relevant factors discussed in text). The 21 occurrences each of fossils A-L, shown clustered together, actually are from diverse locations from all over the world. The four horizons per fossil denote quarter-thicknesses of rate-normalized sediment accumulations over the entire earth; each TAB deterministically injecting its sedimentary and biotic constituents into one of four quarter thicknesses. Explained in text.



Possibility of Eventual Index Fossil Status:

Fair
Good
Poor

come index fossils—as will be discussed later in conjunction with Figure 8.

In the real world, neither sedimentation rates are constant nor are usually all four TAB's locally present. Suppose all four TAB's are present but the amount of sediment is the greatest for TAB II: TAB II organisms and sediment will be still deposited after TAB I organisms and sediment and before TAB III organisms and sediment, but the stratigraphic interval of TAB II will be greater than one quarter of the total thickness of total sediment deposited locally. Since TAB's provide both organisms and sediment, their respective absences deprive a given region of both. Thus, if a region only contains TAB's II and IV, one will not usually find organically-blank thicknesses of sediment where I and III would have been; only IV superposed over II with either a paraconformity or angular unconformity between them, depending on local tectonic dynamics.

The effects of the TAB process alone on the stratigraphic partitioning of organisms is shown under the "Neutral" column in Figure 7. All other relevant factors (pure chance, preservation bias, hydrodynamic sorting, differential escape, ecological zonation) acted either neutrally, synergistically, or antagonistically with respect to TAB's. For example, if an organism was benthic (and hence tending to be buried at the lowest stratigraphic interval) but it belonged to TAB III or IV (which would have tended to have it buried at high stratigraphic intervals) then ecological zonation and TAB's were antagonistic in that situation. This would have produced an organism as K or L, with many stratigraphic occurrences smeared over several reference quarter-thicknesses or translocated outside the expected quarter-thicknesses. However, even in such cases, the dominance of the TAB process in determining what stratigraphic interval an organism was deposited guaranteed that organisms will still have tended to be confined to stratigraphic intervals "belonging" to that TAB. Where multiple effects on the burial of organisms were synergistic, then the more consistent restriction of such an organism to a particular stratigraphic interval will have increased its chances of never being found overlapping with a like organism confined to a different stratigraphic interval—and thus both being index fossils. Note also from Figure 7 that, when effects are synergistic with TAB's, not only are organisms almost totally prevented from deviating beyond their TAB's quarter-thickness of sediment or from being translocated beyond the thickness interval, but even within each quarter thickness the organisms occupy shortened stratigraphic intervals.

Keeping in mind that every individual stratigraphic occurrence (each of the 252) shown in Figure 7 is geographically discrete, one should note that each occurrence can be juxtaposed with any other one. Figure 8 has been drafted to show how index fossils are concocted from juxtapositions of the discrete occurrences portrayed in Figure 7. Each of the 252 occurrences is denoted by a letter-numeral: for example, E7 means the 7th occurrence (from left; out of the 21 possible) of fossil E. The ordered pairs denote specific juxtapositions: for example, (E7, K12) denotes a juxtaposition of stratigraphic occurrence E7 with stratigraphic

occurrence K12. Compatible juxtapositions are ones where the stratigraphic occurrences involved overlap; incompatible juxtapositions are ones where they do not. It is obvious that incompatible juxtapositions (and index fossils) are generated most frequently from fossils E, F, G, and H, the organisms most rigidly restricted to stratigraphic intervals of rock.

The concoction of index fossils is an interplay of actual TAB-generated stratigraphic restrictions of organisms (Figure 7) with the limited number of opportunities for fossils to be juxtaposed (Table 3, Figure 2). The fact that there are few chances for any two fossils to juxtapose means that stratigraphic mixtures and overlaps take place only when certain combinations of TAB-generated stratigraphic ranges simultaneously occur. For instance, consider fossils F and H from Figure 7. The only possible way that the juxtaposition of F and H could result in a stratigraphic overlap would be for the juxtaposition (F11, H7) to take place. The chance of an occurrence of F to be F11 is 1 in 21, and the same probability exists for an occurrence of H to be H7. Thus, the probability that a juxtaposition of F and H will result is thus only 1 in 441. But since there are only a handful of places on earth where fossils F and H occur juxtaposed, there are few chances for that 1 in 441 combination to have ever come up. Thus, if there are 10 locations on earth where F and H juxtapose, the chances are only $(10)(1/441)$ that F and H coexist stratigraphically. The same principle of limited opportunities for juxtaposition governs all fossils. Thus, in Figure 8, the limited opportunities (six shown) for juxtaposition of any combinations of two fossils is schematically illustrated by six lines emanating from representative places on earth where juxtapositions may have actually occurred.

Uniformitarians take the results of juxtapositional situations and imaginatively ascribe time-stratigraphic significance upon them. Seeing that the combinations EC, IH, IC, HE, and CH (see Figure 8) are consistently incompatible, they imagine that each fossil denotes a time horizon relative to the other fossil and that such (imagined) time-horizons can be correlated with other such (imagined) time-horizons. Thus (referring to the right side of Figure 8) E is always stratigraphically below C, and C is always stratigraphically below H: the time-relationship E-C-H (going chronostratigraphically from earliest to latest) is concocted. Other fossils are rejected as index fossils because they are found to be partly or totally compatible stratigraphically with each other, J is found to be compatible with both C and E (no relationship with H nor I is shown developed in Figure 8). I is found to be incompatible (and below) H, but the (imagined) time-relationship is refined by noting that I is also incompatible (and below) C. However, I is found to be compatible with E, so it is regarded as being time-equivalent with E but not ranging stratigraphically higher (and earlier) than E because, like E, fossil I is incompatible with (and stratigraphically below) C. In summary, fossils E, C, and H are the main index fossils while I is an auxiliary one; J is dismissed as an index fossil and considered to be a long-ranging form. The same line of thinking discussed in conjunction with Figure 8 applies to actual index fossils. In conclusion, the TAB process pro-

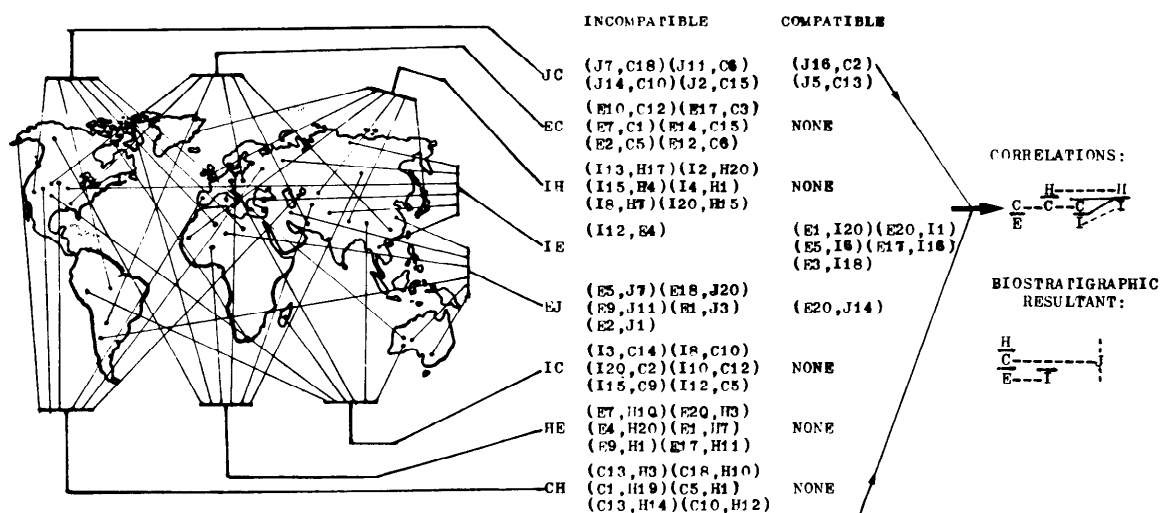


Figure 8. The selection of index fossils: a synthesis. The letters denote the same fossils as they do in Fig. 7, with the numbers indicating the numbered stratigraphic occurrences. The ordered pairs indicate which types of occurrences (of Fig. 7) participate in the juxtapositions. Incompatible combinations are those where stratigraphic occurrences do not overlap each other; only these can be index fossils. How the fossils are placed in an (imagined) time-stratigraphic relationship is illustrated on the right. Explained in text.

vides the main source of actual biostratigraphic differentiation, while the general non-superposition of fossils adds a large element of imagination to the whole concept of such differentiation.

D. Biostratigraphically-Progressive Extinctions with Respect to the Extant Biosphere: An Explanation in Light of the TAB Concept

In previous chapters the focus of attention was biostratigraphic differentiation; the why of fossils being different from one rock horizon to another. This chapter considers why there is progressive extinction; why the lower one goes into the geologic column, the fewer are the taxons still extant (and, conversely, why the present biosphere has the greatest number of taxons in common with the most recent geologic periods and the least number common with the most remote ones). This trend is quantitatively illustrated in Table 1; the rightmost column showing the percentage of families shared between Recent and the different Phanerozoic geologic periods. The periods of the Lower Paleozoic have only 11-15% of their families extant while the figure rises to 60-80% for the most recent geologic periods. An even sharper trend is shown for the number of families in the present biosphere in common with geologic periods; only 2.5% of all presently-living families are to be found in Cambrian.

The same basic TAB process that explains biostratigraphic differentiation also explains stratigraphically-progressive extinction with respect to the present biosphere. But before it is explained how it does let it first be noted that there is nothing intrinsically natural about the evolutionistic-uniformitarian explanation for progressive extinction. In fact, it is difficult for the evolutionist-uniformitarian to explain what causes extinctions! Benton⁷⁰⁵ recently wrote: "Many hundreds of pages have been written about how the dinosaurs became extinct without our being any the wiser." Both

concepts of gradual extinction of groups (such as by climatic change) and catastrophes within the context of geologic time (such as by a bolide impact at the end of the Cretaceous) encounter the difficulty of explaining how they could be sufficiently efficient and global in extent to totally obliterate taxa from off the earth. The Flood provides the best overall explanation for extinction because it is simultaneously global in extent and pervasive in effects (in contrast to the bolide impact whose effects on the biosphere would have been considerable but not as pervasive on a global scale). Moreover, the Diluvian interpretation is scientifically superior to a uniformitarian one because while the uniformitarian explanation must invoke multiple causes for extinctions throughout the geologic column, the Diluvian interpretation offers a single unified explanation. Occam's Razor thus favors it.

The initial understanding of how the Flood caused extinctions is the realization that the vast majority of organisms living at the time of the Flood were killed by it. The TAB process governed how many organisms of each antediluvian biogeographical zone (I, II, III, and IV) survived. The deeper the burial of a group of antediluvian organisms (irrespective of whether they were buried nearly *in situ* or transported significant distances) the less the probability that any organisms (or their eggs, larvae, seeds, spores, etc.) survived in the residual Floodwater and hence were available to repopulate the post-Diluvian earth. The sediment carried by the Floodwater not only acted as an entombing and filtering agent with respect to organisms, but also served to suffocate marine organisms. Where the burial was shallow, it meant that large amounts of sediment had not been suspended in the Floodwater and/or the period of deposition was not prolonged. In such a situation, it was more probable that some organisms had been spared from the entombing action of sediment or had not been filtered out of the Flood-

water by descending sedimentary particles.

Figure 9 illustrates how depth of burial (and hence probability of survival, and thus ultimately the probability of not becoming extinct after the Flood) was controlled by the TAB process. Note that almost all of the representative stratigraphic sections (from all over the world) laid down in TAB I are thick, so this is indicative of very few organisms from that antediluvian biogeographic province having survived the Flood (this is shown in Figure 9 by the single line denoting minimal contribution to the postdiluvian biosphere). By contrast, the TAB IV sections are nearly all thin, so relatively many organisms from that biogeographic province survived the Flood (this is shown by the many lines fanning out from the TAB IV stratigraphic sections). This differential survival of TAB faunas and floras is the key to progressive extinctions relative to the contemporary biosphere. Note that the antediluvian biosphere (Figure 9, top right) had a considerable presence of all four biogeographic-province biotas (in terms of both population and low-taxon diversity). The center circle illustrates the effects of differential survival of TAB biotas: the organisms immediately surviving the Flood were numerically and taxonomically impoverished in TAB I and II constituents, and the largest share of survivors were from TAB IV.

As organisms began to repopulate the earth after the Flood, the lopsided representation of antediluvian biogeographic provinces became even more lopsided as organisms that had lived in separate biogeographic provinces before the Flood now coexisted and were now in direct competition. The organisms from the lower TAB's, being at a numerical disadvantage, were much more likely to be driven to extinction in the competition against the numerically-abundant higher-TAB biotas than this latter group. Numerical abundance was not the only extinction-biasing factor: the fact that the higher-TAB organisms were more taxonomically abundant gave them a reproductive advantage over lower-TAB organisms because the antediluvian ecological "webs" of higher TAB's were more likely to be nearly intact than was the case for lower TAB's. The end result is that the contemporary biosphere (Figure 9, lower right) is overwhelmingly dominated by TAB IV organisms: in biostratigraphic terms, the contemporary biosphere thus has much in common with Cenozoic but very little with Lower Paleozoic.

The discussion in the last few paragraphs was concerned with organisms that directly experienced the Flood; i.e., were not on the Ark. The present author follows Jones⁷⁰⁶ in accepting "... (1) all birds, (2) all land-dwelling reptiles and mammals, (3) possibly some of the more terrestrial amphibia ..." as having been the only animals on the Ark. Attention is now focused on the question of why the Ark-inhabiting organisms show the same progressive extinction with respect to the contemporary biosphere as do organisms that experienced the Flood. It has just been shown how the TAB process itself accounts for progressive extinction of organisms that went through the Flood. But the animals on the Ark were ecologically dependent on organisms that went through the Flood! One manifestation of this was the food chain. The Paleozoic reptiles ate TAB II vegetation, the dinosaurs primarily

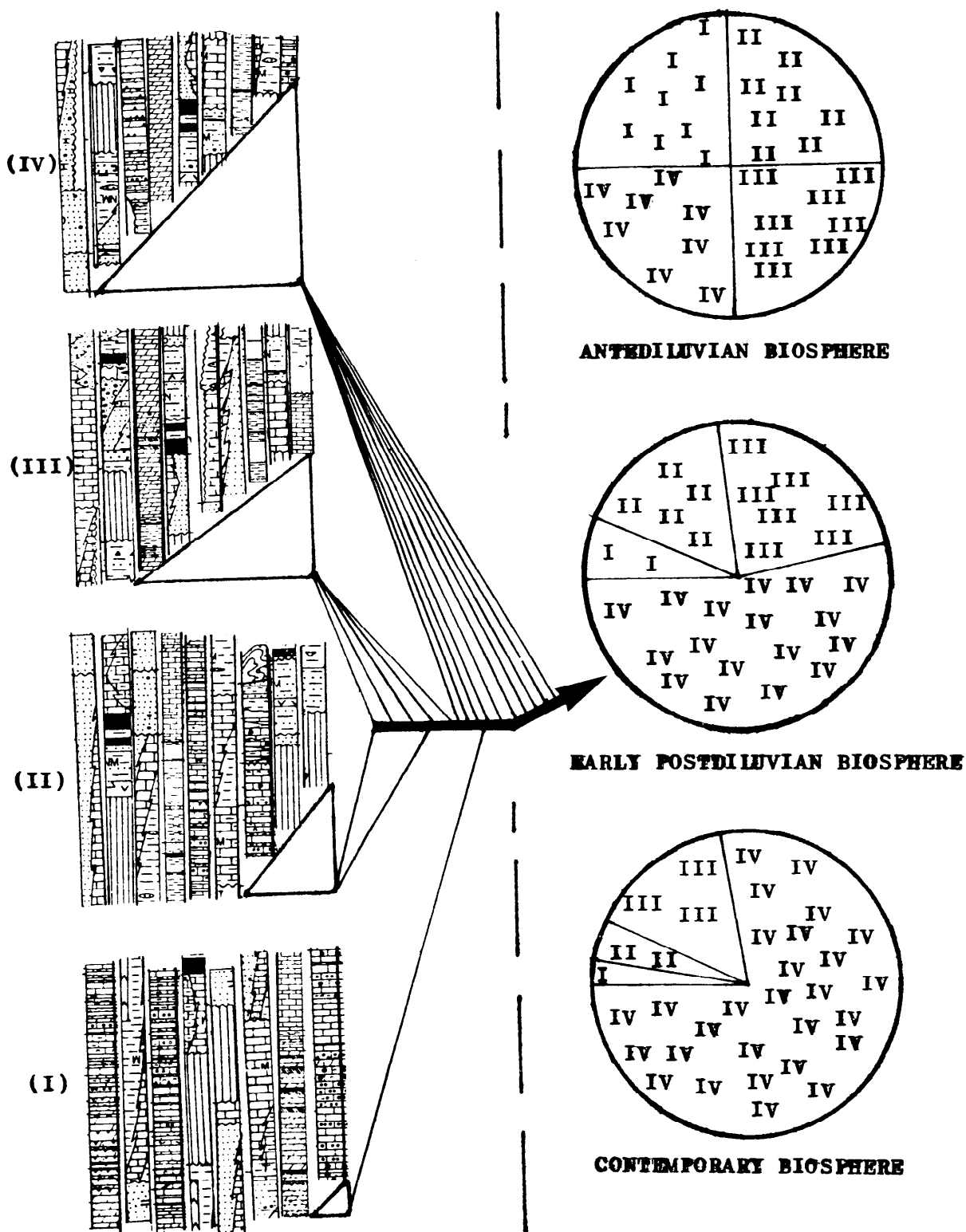
TAB III vegetation, and mammals were designed to subsist on TAB IV vegetation. Since vegetation, being outside the Ark, was subject to immediate differential extinction, the animals released from the Ark were subject to differential extinction which necessarily paralleled that of the vegetation they were dependent upon. Thus, the main reason why mammals survived at the expense of dinosaurs, "primitive" reptiles, etc., was because mammals had such a great reproductive advantage due to the overwhelming predominance of TAB IV vegetation soon after the Flood. The preferential relationship with humans of mammals probably was also a significant factor. It is concluded by reiterating that differential extinction was statistical, not absolute, which is why there are "living fossils" still extant (Table 1 shows measurable percentages of families from the Lower Paleozoic still extant) and why—conversely—many types of "advanced" mammals are extinct.

E. Causes for the (Near) Absence of Pre-Pleistocene Human Fossils

One major ramification of biostratigraphic differentiation is the (near) fact that humans do not appear until the very top of the geologic column. In a sense this should not be surprising to the Creationist-Diluvialist in view of the fact that man is totally different in capabilities and manner of life from all other organisms.

First of all, there are significant reports of pre-Pleistocene human remains pointed out by Creationists (for example, Jochmans⁷⁰⁷), and there are good reasons to suspect that there are many more that are not recognized — unintentionally and intentionally. Non-recognition of human fossils is unintentional if fragmentary skeletal remains are erroneously ascribed to some other vertebrate. As far-fetched as this may appear, it actually frequently happens. Walker⁷⁰⁸ said: "Sometimes mistakes occur and, since the specialist is usually unfamiliar with groups other than his own, he may not recognize the mistake. In this way crocodile femora have been described as hominoid clavicles (Le Gros Clark and Leakey 1951), lateral toes of *Hipparion* called *Australopithecus* clavicles (Bone 1955), crocodile naviculocuboids called *Palaeopropithecus* capitates (Sera 1935), and so on. It is no accident, perhaps, that mistakes occur most frequently in human and primate paleontology, because every scrap is seen as important and the anatomists are sometimes unfamiliar with other orders of mammals, let alone other classes of vertebrates. As a general rule, the smaller the fragment, the greater the chances of mistaken identity. The chances are especially high, it seems, if the bone to be examined is presented together with a set of similar bones ... Apart from bones finding their way to the wrong specialist, it may also be true that a large number of unrecognized primate fossils still remain in museum collections. This is because the time involved in sorting through boxes of bone scraps and unidentified fragments is too long for most visiting scientists to expend." This process operates even more so down in the geologic column, where there is the widely-held evolutionary-uniformitarian belief that there are no human remains there. For example, a

Figure 9. A schematic illustration of the effect of TAB's on progressive extinction trends in the fossil record. The stratigraphic columns at left are representative of thicknesses that biotic members of TAB's are buried under; decreasing in trend going from I to IV. The width of each right triangle is directly proportional to the number of relatively thin stratigraphic sections, whereas the height is directly proportional to the thickness of such strata. The lines terminating at the arrow are units of biological survivors' representation—the organisms (primarily eggs, larvae, spores, seeds, etc.) which survived the straining action of sediments in Floodwater and were thus available to repopulate the postdiluvian world. The circles at right depict changes in the global biosphere since the Creation; the sections of the circle being proportional to the taxonomic diversity of each of the respective Biological Provinces with the amount of numeral figures proportional to the numbers of individuals extant. Explained in text.



specialist in Paleozoic tetrapods will have no training in human paleontology and will misidentify human skeletal fragments found in a Paleozoic bone assemblage as belonging to some vertebrate of that (alleged) time. The same holds true for Mesozoic, early Cenozoic, and Middle Cenozoic bone assemblages.

One must face the rather unpopular question of intentional nonrecognition of pre-Pleistocene human remains. Is one justified in suspecting that discoveries of human remains low in the geologic column are deliberately ignored or discounted? The likely answer can be found by considering the uniformitarian reaction to fossil finds that appear much earlier in the geologic column than had been previously accepted. Consider the "fact" that angiosperms do not appear until Late Cretaceous, and how a much earlier candidate was treated. Daghlia⁷⁰⁹ wrote: "The Triassic age rather than morphological considerations appears to be the main obstacle to accepting *Sanmiguelia* as a possible angiosperm." Evolutionary-uniformitarian preconceptions are vividly evident. In similar fashion is the example of belemnites, discussed in the author's work on cephalopods.⁷¹⁰ Reports of Devonian belemnites were admittedly "ignored or discounted" for nearly a century because of a widely-held preconception that there were no belemnites until the Triassic. If angiosperms and belemnites could be subject to such stratigraphic preconceptions, how many magnitudes more so would early Phanerozoic human remains! If such ancient human remains were ever recognized as valid by uniformitarians, they would probably be taken as evidence for, of all things, time travel! Lipps⁷¹¹ wrote: "It is more likely that anomalies produced by time travel would be 'anachronisms' in historical or fossil records—for example, the fossilized remains of a modern human in Jurassic rock strata or descriptions of nuclear weapons in ancient literature. Should errata like these be found, they would constitute evidence that time travel is possible and will be developed."

Even having considered pre-Pleistocene human remains to be rare, one should note that such a situation is not unusual nor problematic when one considers it in the context of the whole fossil record. In other words, there are many extant organisms with a non-existent (or poor) fossil record—not only organisms (for example, worms) lacking hard parts but also vertebrates. For instance, concerning certain modern amphibians, Carroll⁷¹² wrote: "There are approximately 34 genera and 160 species of living Apoda. None has a fossil record. A single vertebra from the Upper Paleocene of Brazil is the only known fossil." Other examples include monotremes and marsupials: the latter has only 12 known Pre-Pleistocene fossil specimens.⁷¹³

The clearest, least complex, and most probable single explanation for the near nonexistence of lower Phanerozoic human fossils is low antediluvian human population. Whitcomb and Morris⁷³⁰ proposed a population of 1 billion, resulting from 6 surviving-reproducing offspring per generation. The population shrinks to 10 million if the number drops only slightly to 4.6.

The evidence derived from the extreme sinfulness of the antediluvians, as will now be shown, provides an independent basis for concluding that there were relatively few humans (perhaps only several million worldwide) as candidates for fossilization at the time of the Flood. It must be remembered, first of all, that plants and animals existed since Creation week as populations, whereas humans began with a single pair (Adam and Eve). The almost universal depravity of the antediluvians guaranteed low fecundity. Anywhere from a large minority to a majority of the antediluvian population undoubtedly engaged in homosexual, zoophilic, or pedophilic contact. Even heterosexual contact was promiscuous, causing rampant venereal diseases and thereby damaging reproductive organs beyond use in childbearing and making it likely that any children born to parents whose organs had not been irreversibly damaged would themselves be born diseased and die shortly after birth. If a certain apocryphal tradition cited by von Wellnitz⁷¹⁴ is historically accurate, then low fecundity was also caused by the widespread use of contraceptives by women interested only in beauty.

The second major cause of low antediluvian population was the high murder rate (Genesis 6:11). A large fraction (perhaps majority) of babies and young children of every generation died through infanticide and child sacrifice to idols. Both children and adults were subject to the gross disrespect of life so characteristic of florid depravity. It would have mattered little that the longevity of antediluvians was measured in centuries if the vast majority of people were murdered long before that age. Lest it be considered that low fecundity and high murder rates discussed here are an exaggeration, let it be noted that the merciful God would have withheld the Flood had there been any significant percentage of people not totally depraved (just as He would have spared Sodom and Gomorrah if only 10 (relatively) righteous people were found—Genesis 18:32).

The net effect of the great evils of the antediluvians was a low population, and this caused a parallel situation with preservable implements. However, just because metal-work existed among the antediluvians (Genesis 4:22) does not mean that it was common among the populace. If there were sharp distinctions between antediluvian social classes, then probably only the upper classes had significant metal and ceramic implements.

Suppose that the antediluvian population totaled 10 million, and (for purpose of discussion) the number of preservable implements balanced out the number of skeletons that had not been preserved. According to Ronov,⁶⁹⁹ there are 700 million cubic kilometers of Phanerozoic rock in the earth's crust. If randomly distributed, the antediluvian anthropogenic remains (bones and implements) would occur at a rate of one specimen per 70 cubic kilometers of rock. It takes little reflection to appreciate the vanishing probability of such remains ever being discovered. (If skeletons were disarticulated and the fragments scattered, this would increase the absolute number of individual remains. But this would be more than offset by the fact, known in studies of taphonomy,⁷¹⁵ that fragments are

much more likely to go unnoticed than complete skeletons.) In reality, fossils are very inhomogeneously distributed in rock. However, the rarity of antediluvian anthropogenic remains overcomes any apparent increase in chance of discovery caused by exceptional concentration of remains. Suppose that the 10 million antediluvian anthropogenic remains, instead of being randomly scattered over the 700 million cubic kilometers of Phanerozoic rock, were concentrated in only 1 million cubic kilometers. Occurring at a rate (in the special rocks) of 10 specimens per cubic kilometer, the chances of discovery would still be quite small; and the chance that any cubic kilometer is one of the special ones would be only 1 in 700. It is thus improbable that the 1 million cubic kms. would simultaneously be those of many outcrops and in situations attracting particular investigative interest. In fact, paleontological interest is probably being inadvertently diverted away from any special humaniferous rocks. One of the sampling biases reviewed by Signor⁷¹⁶ is that of paleontologists' interest: paleontologists (and not to mention other professional—and amateur—collectors) tend to study rocks which are highly fossiliferous. But since humans were rare and humans probably did not live near regions of great animal population, then areas highly fossiliferous in these animal vertebrates (even more so those of concentrated marine invertebrates) are very negatively concentrated in human remains. This makes it all the more unlikely that the exemplary 1-in-700 million cubic kilometers has attracted any significant collectors' interest.

The present author believes that the smallness of the antediluvian human population is more than sufficient in itself as an explanation for the near absence of pre-Pleistocene human remains. Yet there are still other significant factors tending to greatly reduce the number of human fossils. Shotwell⁷¹⁷ wrote: "Forms which are nearly always rare or missing in fossil mammalian faunas, irrespective of their probable abundance in the area, are those with volant or arboreal habits. This characteristic has hindered the study of such groups as bats, primates, and flying squirrels. Their usual small size and fragility does not seem to be the important factor since insectivores and small rodents are not uncommon in quarries." Bishop⁷¹⁸ wrote: "... primates are normally 'shy' candidates for fossilization." Since humans lived away from regions of deposition (those first covered by the sediment of the Flood), their remains are more likely to have rotted away before having much chance to be buried. Figure 10 has been drafted to illustrate how antediluvian human communities were probably distributed—in a way that would have minimized the number of human bones eventually preserved. Every student of ancient history knows that most ancient civilizations were situated near rivers. This was probably even more so in the antediluvian world, because the dense forestation (and impenetrable grasslands) probably made rivers the only practical mode of long-distance transport and trade.

A very major clarification about the sedimentology of rivers is necessary in order to differentiate between rivers under ordinary (local flood) conditions and those at the time of the Flood. Rivers are normally areas

of burial and preservation of vertebrates, under local flood conditions, because sediment is deposited on the floodplain or delta, entombing organisms. But in the global Flood situation, rivers were quickly elevated to flood stage from rain runoff and the runoff from subterranean springs. They were maintained at this flood stage at great intensity and for a prolonged period of time (relative to any local river flood), enabling the river and its adjacent floodplain to be entirely erosional along the entire length of the river. Under these conditions, humans living near the rivers were not entombed on the floodplains but were flushed out into the open ocean (Stage 2 of Figure 10). Since the rivers under these extremely erosional conditions did not become depositional until they entered the oceans, man-made implements and the human corpses that had sunk did not get deposited until they reached the mouths of the rivers. Any such remains were concentrated into small volumes of sediment (at the prodeltas) and—as discussed previously—overall few remains concentrated into small volumes of sediment means very low probability of discovery. Yet it is even plausible that the volumes of prodeltaic sediment were metamorphosed beyond recognition, obliterating all their anthropogenic remains. This is because there occur at the center of mountain ranges evidences of ancient oceanic crust (ophiolites): in plate-tectonics models, mountains are believed to be largely the result of ancient oceans that had been compressed into relatively small linear areas. Irrespective of whether or not there was continental drift during or after the Flood, narrow antediluvian oceans became compressed to form extant ophiolite-containing orogens. Any prodeltaic remains from antediluvian rivers (as shown in Figure 10) thus were probably metamorphosed as a result of being associated with oceanic crust.

Humans flushed down the antediluvian rivers (Stage 2, Figure 10) usually did not even get deposited in the prodeltaic sediments at the mouths of these rivers, but instead tended to float on out into the ocean where they decomposed or else were devoured by predators or scavengers. This follows from the fact that both living mammals⁷¹⁹ and their corpses⁷²⁰ tend to float on water (the latter buoyed up by the gases of decomposition). Since the antediluvian topography was probably low, only a relatively small water-level elevation of the antediluvian rivers was required to wash away the antediluvian human communities downstream. This has important ramifications. It took much less time for the antediluvian rivers to reach flash flood stage and wash out the human communities into the ocean (Stage 2, Figure 10) than it took for the ocean bottoms to be uplifted and the continental interiors to be submerged (Stage 3, Figure 10). Thus appreciable flooding of the continents, initiation of the TAB process, and actual burial of organisms found in the Phanerozoic fossil record (Stage 3) all did not begin until after humans had been flushed out into the oceans. The flatness of the topography meant that the antediluvian human communities could have been flooded in a matter of hours, denying the antediluvians time to flee their homes near the rivers.

Once human corpses were out at sea, they could have decomposed in a very few weeks—this fact based

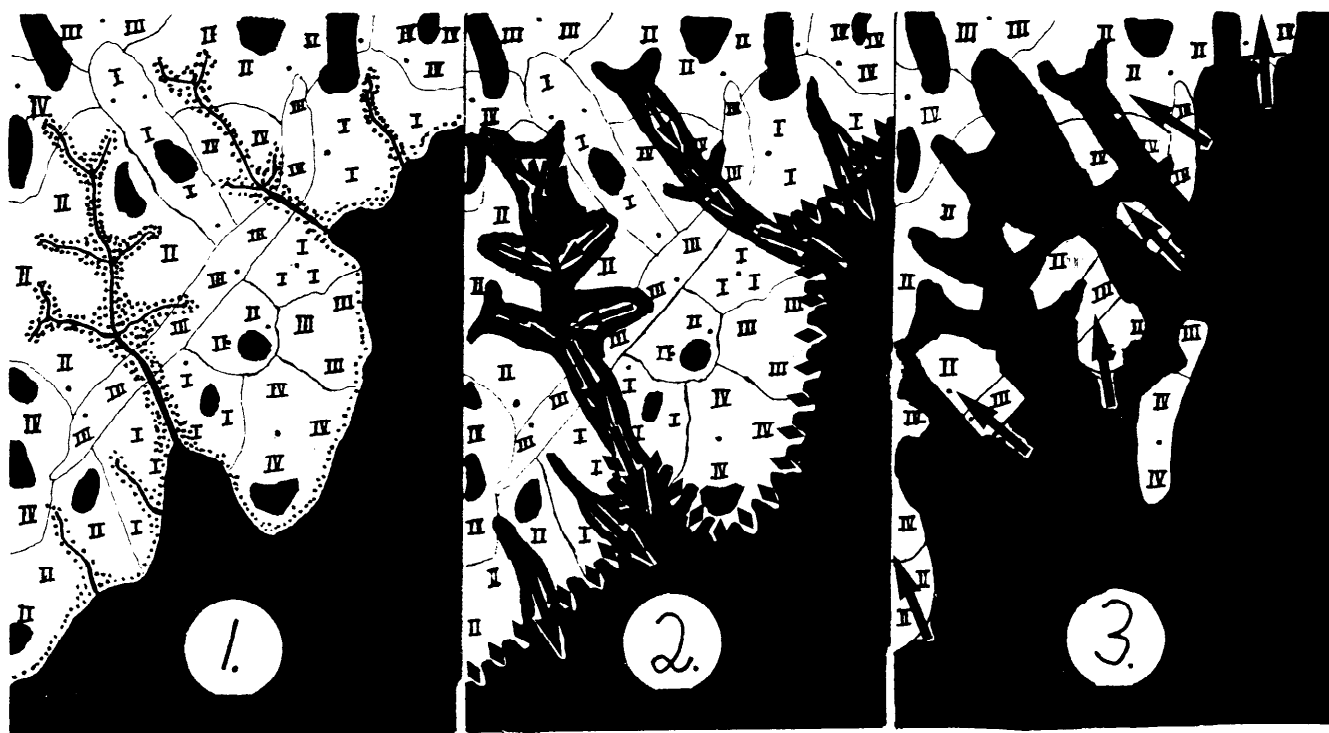


Figure 10. Antediluvian human communities and the near non-preservation of human remains in the pre-Pleistocene fossil record. Roman numerals and their enclosures depict TABs, dots indicate units of antediluvian human population, thick sinuous and dendritic lines denote rivers, the black denotes sea. No. 1 refers to geography before the Flood, No. 2 to the same area at the earliest part of the Flood (diamonds indicate tsunamis battering the coast, arrows indicate rivers swollen at flash flood stage), and No. 3 to Flood proper with its encroachment of seawater on continents (shown by arrows) and initiation of the TAB process. Explained in text.

on taphonomic studies⁷²¹ on floating mammal corpses. The skeleton could disarticulate before all the flesh was gone.⁷²² Flume experiments⁷²³ have shown that complete crania are the easiest transported of all skeletal components by water currents. Thus the great preservability of teeth was offset by their tendency to be scattered; teeth gradually falling out of floating skulls as the alveoli decayed. (It should be pointed out that humans who had died before the Flood would not have much of a candidacy for fossilization because—as anthropological studies⁷²⁴ have shown—perishable buried anthropogenic remains decay completely within 20 years at most.)

Another major factor limiting the number of fossil humans was diagenesis, but its exact role is not yet known. Behrensmeyer and Hill⁷²⁵ wrote: "There are too many variables, too many unknowns, and a general lack of understanding of how bones become fossils." However, the selectivity of diagenetic conditions for preservation of buried bone is evident in the following statements of Hill:⁷²⁶ "Not all environments will favour a bone's ultimate preservation, and in this many factors are involved . . . Many Miocene hominoid localities in East Africa are associated with carbonatitic volcanics. Analysis show that the chemical composition of such rocks is similar to that of bone, producing a stable environment for fossilization. Similar work is needed to determine what chemical conditions are necessary for fossilization, and which of the whole range of possible palaeoenvironments might have possessed them."

It is evident that if most antediluvian humans lived in areas whose diagenesis following Flood burial was

not suitable for fossilization of even deeply buried bone, then this factor alone could account for the near absence of pre-Pleistocene humans. Organic acids help weather bone,⁷²⁷ and modern taphonomy⁷²⁸ suggests that alkaline conditions favor bone preservation. Still another important factor in diagenesis and fossilization is *eH*. Positive *eH* (oxidizing conditions) favors prompt decomposition of not only flesh but also bone.⁷²⁹ Thus fluvial regions where antediluvians lived (Figure 10) may have generated sediment too oxidized for the final preservation of any human bones that had managed to get buried. By contrast, reducing conditions probably prevailed in the poorly-circulated, poorly-ventilated shallow antediluvian seas, facilitating the preservation of the endless number of Phanerozoic marine fossils once the seas were Flooded (Stage 3, Figure 10). Likewise, land areas away from rivers (where few humans lived—according to the model proposed in Figure 10) were water-logged and therefore reducing, thus facilitating the preservation of Phanerozoic land biotas. Yet it must be remembered that low antediluvian human population itself accounts for the paucity of pre-Pleistocene human remains.

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- AF — Palaeontologica Africana
- AG — American Association of Petroleum Geologists Bulletin
- AJ — American Journal of Science
- AM — Geological Society of America Memoir
- AP — Bulletin d'Académie Polonaise des Sciences
- AS — Geology and Paleontology of Southeast Asia
- AZ — Proceedings of the Geologists' Association
- BB — Bibliography and Index of Geology

- BF — Bulletin Societe Geologique de France
 BI — Geobios
 BM — BMR Journal of Australian Geology and Geophysics
 BO — Palaeobotanist
 BP — Bulletins of American Paleontology
 BR — Bulletin of the British Museum (Natural History) Geology section
 CA — Geological Association of Canada Special Paper
 CB — Canada Geological Survey Bulletin
 CE — Canadian Journal of Earth Sciences
 CH — Alcheringa
 CO — Scottish Journal of Geology
 CP — Bulletin of Canadian Petroleum Geology
 CR — Creation Research Society Quarterly
 DE — Soviet Academy of Sciences Doklady: Earth Science Section (English-language Translations)
 DO — Dowden, Hutchison, and Ross Publishing Co., Stroudsburg, Pennsylvania
 EC — Ecology
 EL — Elsevier Scientific Publishing Company, Amsterdam, London
 FI — Fieldiana: Geology
 FR — Memoir hors serie Societe geologique de France
 FS — Fossils and Strata
 GA — Geological Society of America Abstracts with Programs
 GB — Geological Society of America Bulletin
 GE — Geology
 GL — Journal of the Geological Society of London
 GM — Geological Magazine
 GP — Geological Society of America Special Paper
 GU — Journal of the Geological Society of Australia
 HE — Eclogae Geologicae Helvetiae
 HO — Journal of the Faculty of Science of the University of Hokkaido
 IG — International Geology Review
 IN — Journal of the Geological Society of India
 JA — Neues Jahrbuch fur Geologie und Palaeontologie
 JJ — Japanese Journal of Geography and Geology
 JP — Journal of Paleontology
 JW — John Wiley and Sons, New York
 KA — University of Kansas Paleontological Contribution
 LE — Lethaia
 LI — (Liverpool-Manchester) Geological Journal
 ME — Ameghiniana
 MM — Geological Society of America Memoir
 NA — Nature
 ND — Proceedings of the Indian Geologists' Association
 NJ — Memoirs of Nanjing Institute of Geology and Palaeontology, Academia Sinica
 NO — Norsk Geologisk Tidsskrift
 OL — Palaeontologia Polonica
 PA — Palaeontology
 PB — Paleobiology
 PE — Journal of Petroleum Geology
 PH — Palaeontographica
 PJ — Paleontological Journal (translation from Russian)
 PL — Palaeontological Association of London Special Papers in Palaeontology
 PO — Acta Palaeontologica Polonica
 PP — Palaeogeography, Palaeoclimatology, Palaeoecology
 PV — Palaeovertebrata
 PZ — Palaeontologisch Zeitschrift
 RB — Revista Brasileira de Geociencias
 RU — Geologisch Rundschau
 SB — Akademiia Nauk CCCP Doklady, Sibirskoe Otdelenie
 SC — Science
 SB — Sedimentary Geology
 SI — Acta Paleontologica Sinica
 SJ — Palaeontological Society of Japan Special Paper
 SL — Senckenbergia Lethaia
 SN — Scientia Sinica
 SP — Springer-Verlag Publishing Company, Berlin, Heidelberg
 SV — Soviet Geology and Geophysics (translations from Russian)
 TE — Tectonophysics
 TO — Journal of the Faculty of Science of the University of Tokyo
 TP — Treatise on Invertebrate Paleontology
 TR — Trudy Instituta Paleontologicheskovo Akademii Nauk CCCP
 UB — United States Geological Survey Bulletin
 US — University of Chicago Press, Chicago and London
 UG — United States Geological Survey Professional Paper
 UK — Akademiia Nauk CCCP Doklady: Seriya Geologicheskaya
 UN — Gronlands Geologiske Undersogelse Rapport
 VO — Voprosy Mikropaleontologii
 WI — George Allen and Unwin Publishing Company, London
 YG — Proceedings of the Yorkshire Geological Society
 YO — University of Wyoming Contributions to Geology
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THE SYSTEMS OF NATURE

COLIN BROWN*

One of the features of the system of nature which we see as we look around us is predation, carnivorous animals preying on others. But most Creationists believe that it was not always thus; until after the fall, and possibly until after the Flood, all animals, and man, lived on vegetables.¹

What is more, it is prophesied that such a state of affairs will be restored: the wolf shall dwell with the lamb, the cow and the bear shall feed (i.e., eat the same food?), and the lion shall eat straw like the ox.²

Well, what we see today certainly does not fit any such picture. These things existed in the past, or are yet to come upon the Earth.

Some may question whether such things are possible, arguing that some animals simply could not live, nor ever could have lived, on vegetables; and also that predation is necessary to maintain the balance of nature. It is worth while, then, to consider these matters in a little more detail, to see what possibility there is for changing from the present system of nature to the one described in the prophecy, which I call the Isaiah model.

We may note, as a preliminary point, that, while ecosystems do not evolve, they do interact when the system in any given environment changes. Also, quite large changes within the kind are possible, through adaptation, according to what I have called the fourth law of creation.³ For instance, in the Hawaiian islands, the nettle plant has grown into a tree-sized plant, without stinging hairs.

Let us now consider some of these points.

The Efficiency of the Isaiah Model

There is no question that the Isaiah model would be more efficient, in the sense of enabling the Earth to support more animals and men. A (human) vegetarian can live off an area of land of about one half acre, whereas a meat-eater would need about two and one half acres to support the animals on which he himself would feed. Therefore, in the Isaiah model, the same area could support many more vegetarians. (We may assume that much the same ratio would hold for animals as for man.) This point certainly deserves consideration by those who talk about the population explosion.

Is Predation Necessary?

Obviously predators do have some effect on the populations on which they prey, but not as great a one as many people think. If they take only the weakest (as a rule) in no way do they have a far-reaching effect on the population.⁴ In the Isaiah model, control would be taken care of by some natural means, or some means approved by God. Examples of this kind of "predatorless control" are in evidence even now.⁵ For example, when foxes are removed from an area where pheasants are common, the pheasant population hardly changes. Most furry animals, and birds, have a system of terri-

torial population control. They stake out a territory which provides enough of the necessities of life, and reproduce accordingly; never overfilling an area, and "instinctively" knowing how much territory they will need. Even when food is plentiful, they do not begin to breed at an alarming rate, which would most certainly upset the "local" balance.

The Adaptability of Animals

Let us consider some cases in which animals have changed their diets. In the present system, it may be easier to find changes to meat-eating, rather than from; but what has changed in one direction should be able to change in the other.

The kea, a parrot-like bird in New Zealand, used to live on a diet of fruit and vegetables. Now, following the introduction of sheep, they dine on the carrion of dead sheep.

The brown bear, polar bear, fox, lion, leopard, and baboon all have one thing in common, viz. large canine teeth. Yet the brown bear eats a great deal of fruit and vegetables. The fox eats a very varied diet, including, besides meat, fish, insects, fruit, and vegetable matter. Fruit and vegetables make up a large part of the baboon's diet, but it will eat meat. The polar bear is a meat-eater, as we all know; but when summer conditions prevail that little bit longer it includes a great deal of plant material in its diet.

Animals' very strategies for getting food can vary widely. In swamplands in the United States, it is reported, rabbits have been seen swimming, and diving for food.

Among bats there is a great variety; for instance, fish-eaters, fruit-eaters, and insect-eaters. The fruit-eaters have very long and sharp pointed teeth. There is a bat which drinks the nectar of flowers, pollinating them in the process. See Figure 1.

It has been reported that there is a dog in Sweden which refuses to eat meat, preferring vegetables and confusing the veterinary fraternity.

Just after the recent eruption of Mount St. Helens in the United States, ladybirds, which normally thrive on a diet of aphids, returned to the area and, in the absence of the once abundant aphid population, commenced to dine on the sap of a type of fern, cutting out the aphid "middle-man."

A report some years ago told of horses, which were used to haul nets in the winter, becoming stranded, along with the fishermen, on an ice-floe. When the hay was exhausted, the horses were fed fish for several days.

Again, many reptiles eat fruit and vegetables; for instance tortoises, and the iguanas of the Galapagos Islands.

A most remarkable story, which I have reason to believe is perfectly true, concerns an elephant in a zoo in Germany. A woman, who evidently had some kindly feeling toward it, volunteered to stay with the elephant one night, when it seemed ill. When the keeper arrived the next day, all that he could find of the woman

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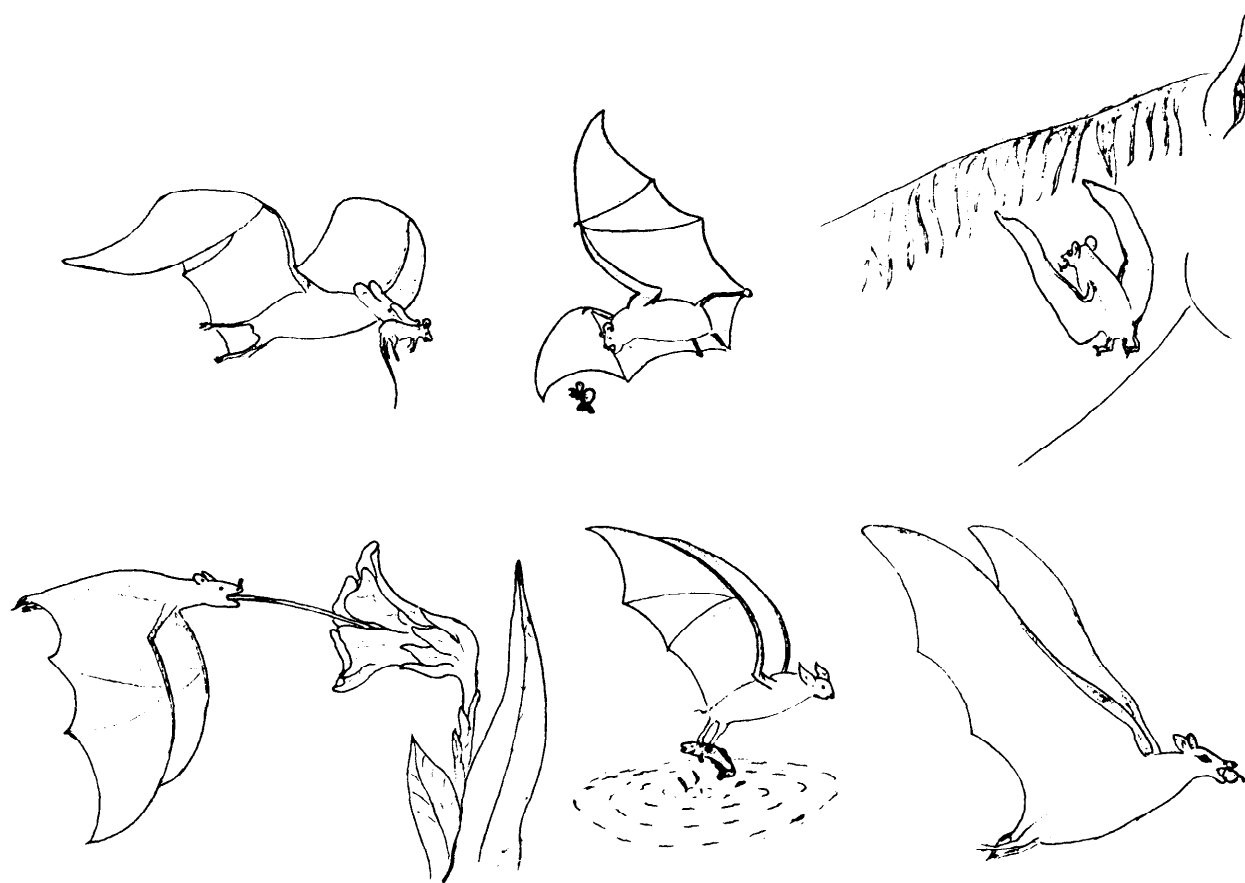


Figure 1. Some of the various modes of livelihood adopted by bats. This picture was drawn by Mr. Paul Stanton.

was her handbag. But evidence of the woman's fate was found later in the animal's droppings, in which were undigested pieces of her coat. It may have been that some vitamin or mineral was lacking in the elephant's diet. It is known that deficiencies may lead cows to eat the wood around their stalls, or chickens to turn cannibal.

Incidentally, whilst on the subject of elephants, there is a very rare species (or sub-species; the classification is, as yet, uncertain) of elephant which lives in the Kalahari Desert. It is very well adapted to its desert existence, drinking very little water and sustaining itself on a far less abundant supply of food than its plain-dwelling relatives. This case is, of course, of great interest to the human inhabitants of desert and semi-desert areas everywhere; for it suggests that domesticated animals, too, might adapt to such conditions.

Again, it is reported that during the war zoos, in some countries, had to feed their carnivores fruit and vegetables for a time, meat being in short supply. Apparently the carnivores coped reasonably well with such a diet.

Diet, Enzymes, and Vitamins

In considering changes of diet, it must be remembered that different enzymes may be required, to

break down the new type of food.

An example may be found today within the human population. A great many people throughout the world cannot digest cows' milk. Why not? Such people cannot make use of the natural sugar lactose, found in milk. They lack the necessary amount of the enzyme which acts on lactose, breaking it down into the smaller sugars glucose and galactose, which are easily assimilated by the human digestive system. In other cases, too, the lack of the right enzyme, or of sufficient amounts of it, can put restrictions upon a choice of diet. Thus northern European people can digest cows' milk; many others cannot. There seems to be some possibility, however, that these lacks of an enzyme may be altered or reversed, even in the case of an individual.

A similar thing may be said about vitamins. Humans cannot manufacture vitamin C within the body, as most mammals can. Many of those mammals, however, eat also a large amount of fruit, thereby at least doubling their intake of vitamin C; and they seem to come to no harm thereby.

Another vitamin necessary for man's well-being is B 12, the lack of which causes pernicious anaemia. This vitamin we derive mostly from meat, in our present diet. But investigations by Dr. Frey Ellis and his

colleagues, at Kingstom Hospital, London, have uncovered cases of vegans (strict vegetarians who do not consume even dairy products or eggs) living up to seventeen years without supplements of vitamin B 12 in any form, yet maintaining serum levels.⁶ They appear to have adapted (or reverted) to a state in which they absorb the vitamin from the colon, possibly by a change in the mucosa. Or, possibly a small part of the terminal ileum has become colonized by bacteria producing vitamin B 12.

It would appear, then, that in switching to another system of nature, problems about enzymes and vitamins would not be insoluble.

"Born Free"

In the book (or film) of the title mentioned, it is recorded that Elsa, the lioness, did not know how to kill or to hunt, nor did she appear keen to learn. She just played with live animals, or chunks of meat, offered to her. Even when repeatedly charged by a wart hog, she did nothing in the way of defence; and had they not been separated she would likely have been killed.

A similar story has been presented by the B.B.C. A Russian scientist and his family had been keeping

a young polar bear. He took the bear to the Arctic, thinking to introduce it to its natural environment; but the attempt was a failure. The bear, just like Elsa the lioness, played with the meat (a seal), having no idea what it was supposed to do.

It would appear, then, that in matters of behaviour there would be no insuperable difficulty in going to the Isaiah model.

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(Editor's note) May I mention another instance? As a boy on the farm I have seen swine, which normally had a vegetable diet, maim and eat chickens which had strayed into the pig-pen. The chickens, in turn, which ordinarily live on grain, would occasionally catch and eat small mice.

PANORAMA OF SCIENCE

Magnetic Field Reversals

Much emphasis is placed on alleged reversals of the earth's magnetic field. Support data are largely found in igneous rocks at the earth's surface. This material maintains a record of the surrounding magnetic field at the time of solidification. Alternating patterns of magnetic alignment are especially evident adjacent to the mid-oceanic ridge systems. This reversal interpretation of data conflicts with the model of a one-time decaying field, as explained by Thomas Barnes.

A possibly-related phenomenon is described in a recent book on the subject of earthquake prediction.¹ Several instances are described in which sudden magnetic changes coincide with seismic activity. One story is told of a Tokyo merchant who kept a large three-foot diameter horseshoe magnet in his store window. Just two hours before a severe 1855 earthquake, the magnet suddenly lost all its attractive strength and dropped off attached objects. Following the quake, the magnet regained its strength. The episode remains a mystery. Could there have been a temporary, local "transient field" that demagnetized the horseshoe coincident with the earthquake? There is at present no explanation for such anomalous magnetic activity. In the laboratory, a strong opposing field produced with unusual windings is required to demagnetize a horseshoe magnet. Nevertheless, intense, natural transient fields cannot be ruled out. After all, we are only now beginning to acknowledge the related optical electromagnetic glow associated with earthquakes.²

At this stage, one might suggest that electrostatic forces repelled the objects from the Tokyo horseshoe magnet. However, the necessary charge density to overcome such a permanent magnet is entirely unreasonable. Also, demagnetization effects are not limited to the Tokyo event. Immanuel Kant describes a 1755 earthquake in Lisbon: "I cannot pass in silence over the fact that on that terrible All Saints Day the magnets in Augsburg threw off their load and that magnetic needles were brought into disorder."³ Other scientists including Robert Boyle have also reported similar happenings during earthquakes in Naples, Rome, etc.

By extrapolation of this phenomenon, one wonders about transient magnetic fields along the oceanic ridges. By definition, these and all other regions of igneous activity are intense seismic areas. The suggestion is that local transient fields at the time of material flow may be responsible for the recorded magnetic alignments. In this case, alternate bands of alignment are due to temporary local field changes instead of complete earth field reversals. The complications of sea water permeability, rock temperature, and field generation remain to be worked out. However, since there is no known mechanism for reversing the earth's entire field, local seismic field transients certainly deserve consideration as an alternate interpretation of the data.

—Contributed by Dr. Donald B. DeYoung

Evidence for a World-Wide Flood?

Alviso, California back in the 20's and early 30's was a small community on the southern shore of San Francisco Bay. Its altitude was originally just above sea level, but in the 30's had already sunk four feet. Now the area is 6 feet or so below sea level and only stays dry because of levees that have been built. Those levees were broken in March '83 and the area was flooded.

Back in the 30's and 40's a Stanford geology student, a Joseph Poland, determined that the sinking was due to removal of the area's underground water supply through wells. Then it was realized that the same thing was happening in the San Joaquin Valley where land had already sunk more than 10 feet in places.

A March '83 *Smithsonian* article on aquifers stated, "The crust of the earth is porous like a sponge. It's just all filled with water." However, in our area, if the water table level becomes lower than around 125 ft., the weight of the dry sedimentary rock "sponge" causes a gradual collapse of the ground, or shall we say, of the "sponge." And once it has collapsed, it will

not expand again and it will not hold as much water as it used to even if it were pumped in.

Because the "sponge" collapses when the water table drops below a certain level, that means that the "sponge" has *never* been dry before or it would not collapse now. Because the "sponge" is sedimentary rock, that means it was formed, or should I say solidified, under water. The only event that could produce the great depth of sediments is a world-wide flood.

There are those who say that they do not see any scientific data that support the idea of a world-wide flood. For me, the very existence of 50 million or more cubic miles of sedimentary rock is proof. But now I also believe that the subsidence of many areas due to removal of ground water is further proof that Noah's Flood was a historical event.

Contributed by Everett H. Peterson.

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BOOK REVIEWS

The Illustrated Origin of Species by Charles Darwin, Abridged and Introduced by Richard E. Leakey, 1979. Hill and Wang, New York. 240 pages.

Reviewed by Clifford L. Lillo*

Many of Charles Darwin's mistakes are admitted by Richard Leakey in this abridged edition of Darwin's most famous work, but he, nevertheless, claims that "Darwin's genius transcends the century . . ." on page 13. Regarding the book, he says in his Introduction,

It was an important book in Darwin's time and it remains so today, for the theory of evolution is the cornerstone of modern biology and Darwin's book forms the foundation of that theory. p. 9.

Leakey does not wish to discredit Darwin in any way when he points out Darwin's errors and he frequently tries to explain away the differences between Darwin's views and those of modern evolutionists. Yet, what he does tell us is that in many ways Darwin was wrong!

In his Introduction Leakey says,

Sometimes . . . when subsequent research has shown Darwin's discussions to be wrong, I have added short explanatory notes . . . p. 12, 13.

Darwin brought many different kinds of information to bear on the question of evolution, among them: heredity and variation, fossils, geological formations, geographical distribution, embryology, taxonomy and homology . . . Since Darwin's time, there have been advances in all these individual disciplines, and some have changed beyond recognition in the past century. p. 21.

Expressed in other terms, in each of the areas mentioned, Darwin wrote his opinion but there has been change of thought over the years in the scientific community, and, in some cases the change is beyond recognition from previous views.

We must give Leakey credit for pointing out Darwin's mistakes, but I believe that a creationist would have done it differently. Leakey uses an Introduction to the book, comments within some chapters, and comments under his illustrations to tell us of Darwin's errors. Still, in reading Darwin's text, it is easy for the reader to forget that Darwin was *wrong* when he says that science has not yet proved Lamarck in error about spontaneous generation, *wrong* when he says that changes in habit can be inherited, and *wrong* when he says that use or disuse of an organ can be passed along from parent to child, etc. Leakey lets Darwin's statements continue to be expressed unchallenged in the text of this abridged edition. As a creationist, I would have put parenthetical statements immediately after each wrong statement by Darwin, such as, "He is wrong here because . . ." Leakey's illustration captions present another problem, in that they give some present beliefs and facts, which the reader accepts, causing him to accept the text in the same way. Leakey wants us to admire this self-trained naturalist, who took his observations about God's beautiful creation and extrapolated small differences within species to the preposterous conclusion that no Creator was necessary, or even existed. What does it take to discredit a man like Darwin?

Here is what Leakey says about spontaneous generation:

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... in Darwin's time it was widely believed that ... 'spontaneous generation could occur, since tiny creatures could be observed under the microscope, in liquid in which vegetable matter had been infused. ... At the very time *The Origin of Species* was published, Louis Pasteur was conducting his experiments demonstrating that spontaneous generation did not occur ... but Darwin still kept an open mind on the subject as late as 1872. p. 35.

It should be noted that the sixth and last edition of *The Origin of Species* was published in January 1872. Darwin says,

Lamarck, who believed in an innate tendency towards perfection in all organic beings, seems to have felt this difficulty so strongly that he was led to suppose that new and simple forms are continually being produced by spontaneous generation. Science has not as yet proved the truth of this belief, whatever the future may reveal. p. 91, 92.

To Darwin, science had not yet proved the truth of spontaneous generation but a scientist, Louis Pasteur (who was also a Christian), had already proven it to be fallacious!

Darwin was also wrong about variability with domestication. Leakey says,

Darwin's idea that domestication can, in itself cause greater variability to arise between individuals is now known to be wrong ... Gene recombination and mutation are what give rise to variation, and these will occur at the same rate in the wild as under domestication. But in the wild, variation will usually be far more ruthlessly weeded out. p. 50.

Darwin thought that habits could be passed from parent to child. He says on page 50, "Changed habits produce an inherited effect" Leakey counters this with, "Characters acquired by an individual during its lifetime cannot be passed on to its offspring."

Darwin believed that the use or disuse of an organ would be inherited. His statement was, "I think there can be no doubt that use in our domestic animals has strengthened and enlarged certain parts, and disuse diminished them; and that such modifications are inherited." p. 95. Is this true? If a farmer cut off a cow's tail would her descendents be unable to swish their tails? Would they be born without tails? Leakey says,

Although Darwin wrongly thought that habit and the effects of use or disuse could be inherited, he did not regard the inheritance of such acquired characters as essential to his theory. In the first edition of *The Origin of Species* there was less emphasis on this subject, but Darwin later gave it more prominence to answer criticisms that there had not been enough time for so much evolution to have occurred merely by the accumulation of random variations. p. 50.

Darwin's and Leakey's comments regarding variations due to chance are also significant. Darwin said, "I have hitherto sometimes spoken as if variations were due to chance. This, of course, is a wholly incorrect expression" page 95. In contrast, Leakey wrote, "Genetic variations are, in fact, 'due to chance,' since

the form they take is not influenced by the environmental conditions." p. 95.

One of Darwin's claims concerned the "eozoon." (I.e., "dawn animal.") Darwin says,

The Eozoon belongs to the most lowly organized of all classes of animals but is highly organized for its class; it existed in countless numbers and certainly preyed on other minute organic beings, which must have lived in great numbers. p. 164.

What made Darwin think that the eozoon was carnivorous? How did he determine that it preyed on anything at all? The eozoon was not an animal, not even a plant. This is what Leakey has to say about this:

He [Darwin] believed that numerous fossils of a tiny creature, which was given the name *Eozoon*, were present in certain Precambrian strata in Canada, but these were later shown to be nothing more than crystalline formations. p. 34.

These are only a few of the many many wrong statements by Darwin that Leakey has admitted in this book. Creationists are urged to get the book just to see how wrong Darwin was. The book should especially be read by theistic evolutionists. Since they do accept the reality of God, when they are shown that the basic theories of Darwin are wrong they may also accept the realities of creationism.

Life Itself, by Francis Crick, 1981. Simon and Schuster, New York. 192 pp. pb.

Reviewed by George F. Howe*

In *Life Itself* a noted coauthor of the Watson-Crick model for DNA structure embraces an origins view called "Directed Panspermia" (hereafter referred to as DP) in which it is assumed that life was originally sent to earth from outer space! According to Crick, life evolved from non-life on some other planet, starting with the spontaneous generation of bacteria and proceeding all the way to highly intelligent beings. These gifted individuals (about whom Crick says surprisingly little in the book) then sent our own bacterial ancestors here on an unmanned space craft.

This means that Crick believes life has evolved twice — once from molecules to intelligent people somewhere else and then again from bacteria to man on earth! He also holds that all this took place in about 9 billion years following a Big Bang!

Let's differentiate between Crick's DP model and the orthodox view of abiogenesis. In the latter it is assumed that life started right on earth with little or no assistance from outer space. We should also distinguish between DP of Crick and the strange but challenging views of Hoyle and Wickramasinghe who believe that intelligent beings fired gobs of genetic substance in numerous directions in the possible hope that somehow the right genetic units would land in the proper habitats for survival and subsequent evolution on suitable planets throughout the galaxy. For my re-

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view of Hoyle and Wickramasinghe's recent book, see C. R. S. Q., 1982, 19(3):191-193 (Dec.)

In this book, Crick elaborates on pros and cons of this DP model, discussing such problems as the following:

1. Why hasn't this intelligent life (if it exists in space) already arrived on earth?
2. Should we continue trying to send signals to and receive signals from space?
3. Should we try to establish our own form of life somewhere else in space?
4. Did these intelligent beings possibly ship bacteria through space in craft powered by solar sails so thin that the ships were able to ride the pressure of the sun's radiation?
5. Is DP just a bit too bizarre — something like science fiction at its worst?

One is tempted to answer this last question resoundingly "yes"; but origins students will realize ANY origins model which purports to give good explanation for the data bearing upon the subject deserves a hearing — even if its philosophical and underlying religious tenets seem foreign or bizarre! If someone else's origins model seems strange but at the same time seems to fit the facts, one should simply admit that the view would be acceptable for those who accept its underlying religious and philosophical assumptions. Such would be the case with DP — if you buy the underpinning system of "scientism" (humanistic religious naturalism) the arguments for DP are at least plausible. We await the day when macroevolutionists (be they advocates of DP or orthodox abiogenesis) will show that same scientific restraint — instead of calling scientific creationism "totally religious," "non-scientific," "ridiculous," or "mediaeval."

Is Crick, a Nobel Prize winner who thinks such unusual thoughts about the origin of life, tolerant of the alternative opinions others may hold on the same subject? He is, indeed, unless the alternative opinions veer toward creationism — a view that Crick feels has been little more than a "nuisance" up to this point (p. 163).

But he is not very patient with what he perceives as apathy on the part of the general public toward accepting the work of scientists:

Either they cling to outmoded religious beliefs, putting science into a totally distinct compartment of their minds, or they absorb the science superficially and happily combine it with very doubtful ideas, such as extrasensory perception, fortune-telling and communications with the dead. P. 164.

He also feels that:

... the myths of yesterday, which our forebearers regarded not as myths but as the living truth, have collapsed, and while we are uncertain whether we can successfully use any of the remaining fragments, they are too rickety to stand as an organized interlocking body of beliefs. Yet most of the general public seems blissfully unaware of all this, as can be seen by the enthusiastic welcome given to the Pope wherever he travels. P. 164.

But despite his anti-religious sentiments, Crick has here produced a volume that should be of some special interest to religionists in general and to creation scientists in particular.

In the first place, he presents an alternative to the orthodox abiogenesis view and piles up criticism upon criticism of that model as well as of his own DP concept. Atop page 153, for example, Crick relates that every time he writes a paper about the origin of life, he swears he will never write another one "... because there is too much speculation running after too few facts ...". But then he confesses that he cannot stick to this resolve because he finds the subject of origins too fascinating! Just about every time Crick forwards a piece of evidence supporting DP, he turns around a few lines later to analyze the weaknesses of this same evidence — an admirable trait.

Thus although Crick seems to accept the Big Bang idea uncritically, he confesses that Weinberg has feelings of unreality in writing about the Big Bang — and well Weinberg should, we might add! On page 25 Crick points out that interstellar distances are not really scientific although he then treats these distances himself as if they had been experimentally established as clearly as DNA or RNA interactions! Crick isn't really sure whether the universe will finally "... collapse on itself in another catastrophic event ..." or if it will keep on expanding forever instead! The answer, he feels, will depend on the mass of the universe itself. Students of comparative religions will enjoy reading these millennial views of Francis Crick, the prophet.

He admits (p. 72) that it would be easier to explain the origin of life if only one family of molecules had been involved instead of two — both nucleic acids AND proteins! One must heartily agree with Crick on this point and add that it is highly unreasonable that any type of naturalistic evolution will ever account for the fact that the nucleotide triplets of DNA would somehow start to code for amino acid sequences in proteins, through the agency of RNA!

Creationists will likewise learn by reading *Life Itself* that the author challenges the usual reducing atmosphere assumptions of abiogenetic events, believing that life might have arisen anyway (p. 80). And while discussing Crick's views of the Urey-Miller research, we find his comment interesting that with all of these experiments, evidently no worker has ever tried to use the Urey-Miller "soup" as a bacterial growth medium. Possibly Crick thought of this by way of supposing that if the bacterial spaceship had landed on earth when something like a Urey-Miller "brew" prevailed, the bacteria might have been happily greeted by an ocean full of culture medium to serve as their primordial food!

But if this is Crick's idea and if oxygen had been present (as Crick admits might have been the case) there is little reason to believe our itinerant microbes would have found much nourishment upon descending because the presence of oxygen does not favor the synthesis of anything (not even amino acids!) in a Urey-Miller experiment — to the best of my knowledge.

On page 81 he unwittingly and perhaps unwillingly gives support to special creationism when he asserts that "... we have no evidence whether nucleic acids came first, or protein came first, or whether both evolved together." Then again concerning DNA and RNA on page 86 Crick writes:

... it is difficult to see how any accurate system could have arisen easily from such a complex mixture, and even more difficult to figure out the exact components needed and the exact steps followed.

On page 88 we also find that:

An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going.

Do problems like these cause Crick at last to manifest more charity toward Creationists or even to backslide a bit from his faith in abiogenesis? Not yet — as the reader will discover in the very next sentence:

But this should not be taken to imply that there are good reasons to believe that it [life] could *not* have started on the earth by a perfectly reasonable sequence of fairly ordinary chemical reactions. p. 88.

Consider too this statement (p. 93) against “gut reactions”;

A ‘gut reaction’ may be useful in business or politics or in our personal lives because it represents an unconscious generalization of previous experience, either our own or those of our ancestors expressed in our genes, but in considering the origin of life we have effectively no experience to guide us in this way, so that any gut reaction is likely to be superficial and misleading.

Then notice on that same page how Crick (even though admitting the multiple problems associated with abiogenesis) offers a gut reaction of his own:

Perhaps there are many places in the universe suitable for the origin of life, some of which may have conditions even more favorable than those we find here.

The reader will discover that the very evidences Crick marshals as support for DP instead of orthodox abiogenesis are evidences that give even stronger support to special creationism! Thus the apparent uniformity of the genetic code (which the author proposes as an evidence favoring DP) would certainly fit the belief that a Designer incorporated the same code into each of many distinct types. Crick indicates (p. 144) that if DP had occurred, we might expect to see that life showed up suddenly without fossil intermediates. Here too, however, absence of linking fossils is even stronger support for creationism than it is for DP!

He deals in Chapter 7 with what he calls a “statistical fallacy.” Here Crick asserts that it is fallacious to say (as some evolutionists undoubtedly say) that if life started once on earth, chances are pretty good it must have gotten going on some other planet somewhere in space as well. It is to Crick’s credit that he here labels such reasoning illogical and goes ahead to illustrate the same. To generalize from this one instance (supposed abiogenesis of life on earth) to affirm that it undoubtedly happened somewhere else Crick says is “superstitious.”

Once again let’s ask if Crick follows his own well-chosen advice? Evidently not, because on page 106 (although not being highly dogmatic) he falls into the

“statistical fallacy” to some extent himself when he concludes that “Planets with a suitable soup are likely to be fairly common in the galaxy.” As Crick plainly states, there is only one line of scientific support (slowly rotating stars) even to suggest that other planetary systems may exist around other stars. And there is, I might add, no support whatsoever to believe that a “soup” is or ever was present on such theoretical planets!

In conclusion, creationists have repeatedly suggested that the study of experimental data, with the theories which can be directly based thereupon, should be called “science”; whereas the philosophy, religion, psychology, and gut reactions inevitably involved in trying to see how things might have come into being long ago should be called “origins” to distinguish it from science. As an origins book, *Life Itself* is superb but if it is intended as a work of “science,” it falls *flat*. If only Crick and his evolutionary colleagues would appreciate and admit this difference between science and origins, this field of study would be greatly enhanced.

Life Itself is a fascinating origins treatise in which Crick shows that his DP origins scenario has some real advantages over orthodox abiogenesis. But at the same time, he fails to show why any thinking person should embrace DP instead of special creation. This latter view, which Crick has neglected as a mere “nuisance” presents the greatest challenge to Directed Pan-spermia. Perhaps Crick will discover from the words of another that it is possible “. . . the stone which the builders have rejected . . .” may become “. . . the head of the corner . . .”!

NOTICE OF BOOK

Endless, Boundless, Stable Universe (University of Tasmania Occasional Paper 9), by Grote Reber, 1977. 18 pages; price, two Australian dollars. (Available from the University of Tasmania, Hobart, Tasmania, Australia.)

In this work are described some observations by the author, who is an eminent radio astronomer, and some deductions from them.

The points seem to be these: interstellar space is not a void; matter is there, albeit in a very tenuous form. (This is somewhat like the conclusion reached, on quite different grounds, by Velikovsky and his followers.) The author, pooh-poohing the expanding universe and the big bang, believes that the true explanation of the red shift is the interaction of the light with this matter. There seems to be a hint, not fully developed perhaps, that the origin of the microwave background lies in the same kind of thing.

Readers might be interested in comparing a letter by Dr. Reber: “Big-Bang Creationism” in *Physics Today* 35(11):108 & 109, 1982, in which he suggests that big-bang cosmology has become a religion; and that the true source of the microwave background may be nearby interplanetary space, the Earth’s atmosphere, or the equipment.

As the title suggests, the author seems to hold a steady-state view of the universe (but not like Hoyle’s). Even those who do not agree, however, will find some stimulating thoughts here.

CONVECTION CURRENTS

(Continued from page 132)

introduced the interesting concept of the transform fault to explain fracture zones. If, however, the oceanic ridge is a zone in which the convection current rises (keeping in mind the stable regular cell structure of convection currents) one would expect a fairly smooth curve, if the model of the mantle as a fluid is correct. Some of these fracture zones involve displacements of hundreds of kilometers, and quite a few geophysicists have come to the conclusion that this phenomenon is not compatible with the convection mechanism for plate tectonics and sea-floor spreading.

Much of the evidence now points against the convection current hypothesis as a mechanism for continental drift. No satisfactory theory exists to explain how the current could be maintained for tens of millions of years. Thus far, the difficulties with its mechanism remains one of the major problems of modern plate tectonics.

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LETTERS TO THE EDITOR

A Thought on Radioactivity and Ages

As a Christian I find it increasingly difficult to comprehend why so much of mankind so vehemently denies the existence of its Creator. Why are we all offered long tortuous explanations by evolutionists in their efforts to explain away such Biblical parallels as the Mayan myth of a tower which was built to protect against another flood, or to explain how jellyfish managed to lie undisturbed and undecomposed for millennia waiting to be covered by the slow uniformitarian accretion of sediment?

I have long felt that the only real argument against Creation was the apparent ages indicated by radiometric dating techniques. While we all recognize that no one knows the zero (i.e., apparent) age of the earth at Creation, it still can be (and is) said that there is a strong correlation of the indicated age of a stratum with its depth within a column of rock. To put it in another way, the deeper a sample of rock is within the whole body of rock, the greater is the indicated age of that sample.

A possible explanation may be that the rate of aging of radiometric material is strongly influenced by the specific density of the rock at the place where the material is located. In other words, samples from a deeper place in the column, having a higher specific density, would also have a higher rate of radioactivity (and thus of decay of radioactivity). This increased decay, if it should have gone on for any appreciable time, would result in an older apparent age.

A nuclear reactor, as a case in point, requires a fairly high density of nuclear fuel in order to react effectively.

As is well known, reactor scientists control the rate of reaction by introducing non-fissionable "moderators" into the core to slow the rate of the reaction. This has the same effect as reducing the density of the nuclear core. An alternative method, in principle, would be to control the separation between the fuel rods, thus in effect raising or lowering the density of the core and controlling the rate of reaction. In practice, the high temperatures, and large size of the reactor, make such a means of control too complex, and impracticable.

Within a column of sediment containing intrusions of radiometric material, however, both possibilities exist. The denser samples near the bottom of the column would contain more fissionable materials per unit volume than the intrusions near the top. This would result in a higher rate of decay and correspondingly a greater apparent age.

I welcome any comments on this thought, and especially any experimental evidence which those who have the facilities may be able to obtain.

Sincerely in Christ,

Daniel Chapman

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Yuma, Arizona 85365.

Received 14 February 1983.

(Editor's note.) Might there be another matter involved here? The deeper a radiometric material is, the less readily, one would suppose, it could lose gaseous products; and the less it would be affected by such processes as leaching. There may be a whole field for investigation here.

QUOTABLE QUOTE

"... there is a universal cause of real things by which all other things are brought forth into actual being... this view... can be demonstrated by three arguments, of which this is the first. If some one item is found in common in many things, it must be caused in them by some one cause... because... one thing... is different from another thing. Different causes produce diverse effects. Therefore, since the act of being is found in common in all things... the act of being must necessarily be assigned to them, not as arising from themselves but from some one real cause....

The second argument is this. When anything is found to be shared in different ways by many things, it must be attributed to all those subjects in which it exists imperfectly by that subject in which it exists most perfectly.... If this item belonged to each of

them because of each thing itself, there would be no reason why it would be found more perfectly in one than in another.... So, we should grant one being that is most perfectly and truly a being....

The third argument is this. Whatever exists by virtue of another being may be traced back to a cause that exists by virtue of itself.... Now, we have to admit a being that is itself its own act of being.... Hence, from that one being all others must be....

And so, that all things are created by God is demonstrated by reason and held by faith."

St. Thomas Aquinas,

Disputed Questions on the Power of God.

Translated by V. J. Bourke. This is contained in *The Pocket Aquinas*,

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Washington Square Press, New York.

Pp. 293-295.

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Activities The Society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible.

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Statement of Belief Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms.

We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity*, through Zondervan Publishing House, Grand Rapids, Michigan 49506. Subsequently a Revised Edition (1974), a Teachers' Guide and both Teachers' and Students' Laboratory Manuals have been published by Zondervan Publishing House. All members of the Society subscribe to the following statement of belief:

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

2. All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The great Flood described in Genesis, commonly referred to as the Noachian Flood, was an historic event worldwide in its extent and effect.

4. We are an organization of Christian men of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Saviour for all mankind. Therefore, salvation can come only through accepting Jesus Christ as our Saviour.

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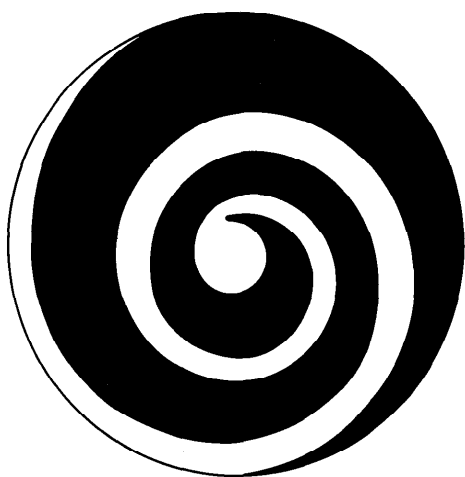
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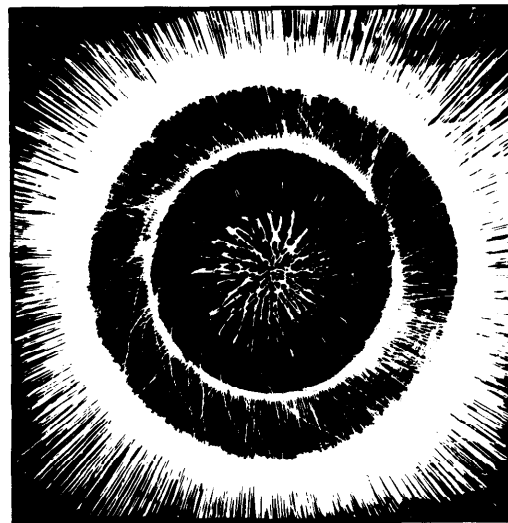


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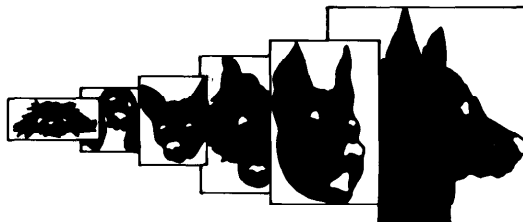
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