A DILUVIAN INTERPRETATION OF ANCIENT CYCLIC SEDIMENTATION

JOHN WOODMORAPPE*

Received 9 June 1977

"No more fascinating field for research and speculation exists within the entire domain of stratigraphy."

—J. M. Weller

"But God remembered Noah and all the beasts and all the cattle that were with him in the ark: and God caused a wind to pass over the earth, and the water subsided. Also the fountains of the deep and the floodgates of the sky were closed, and the rain from the sky was restrained; and the water receded steadily from the earth, and at the end of the 150 days the water decreased."

—Genesis 8:1-3

The earth's water-laid rocks contain a repetitive type of stratigraphic layering known as cyclothems. Uniformitarian geologists have long debated the processes which formed them; but every theory proposed has failed to explain many basic properties.

In fact, uniformitarianism, which is not a scientific law or principle, has fostered an unnatural interpretation of cyclothemic rocks. Numerous properties of cyclothems are explained far more fully and simply in terms of catastrophic sedimentation. These properties include their world-wide distribution and "age"-transcendence, the shallowness of the deposition, vertical gradation, and evidence in them of contemporaneous tectonism. A detailed account is presented of the genetic relation between cyclothemic sedimentational and stratigraphic properties and the recessional phases of Noah's Flood.

Outline

I. Introduction

In beginning this article, may I make a suggestion, and then proceed to follow it myself? The suggestion is this: that in the future Flood geologists call themselves Diluvialists, not catastrophists, because of the fact that

*John Woodmorappe, B.A., has studied both Geology and Biology

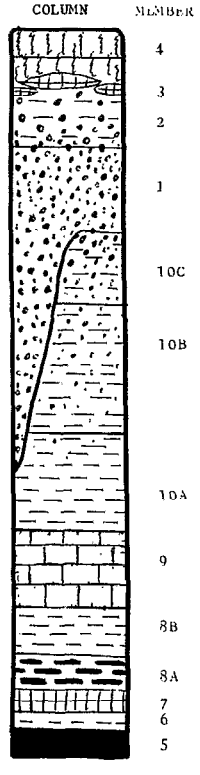

Figure 1. This shows an ideal Illinois cyclothem (See Reference 131.) Note that at no locality are all 10 listed members present; the most commonly found cyclothem has 1 (and, or 2), 4, 5, 8, 9, and 10. Nearer to the source area (Pennsylvanian and Ohio) fewer limestones and greater thicknesses of coal prevail, with thicker, more massive clastic material. In Kansas (farthest from the source area) there are thinner coals, and only think fine clastics and massive limestone beds.

The key to the letters and numbers is as follows: 4, underclay, nonbedded; root impressions, slickensides. 3, claystone, with or without limestone nodules and sheets. It grades into 2, siltstone or sandy shale. This grades into 1, sheet or channel sandstone, which is EITHER in sharp erosional contact with, OR grades into 10C, siltstone. This grades into 10B, sandy or silty shale. 10A, shale, gray, usually sandy in the upper parts, with ironstone nodules. 9, limestone, marine, fossiliferous or calcareous shale. 8B, gray shale. 8A, shale, black, fissile, with brackish or restricted marine fauna. 7, limestone, marine, fossiliferous, but rarely present. 6, shale, gray with plant fossils. 5, coal.

many orthodox uniformitarian geologists accept rapid sedimentation. Many others (Howorth, Velikovsky, etc.) accept catastrophes in the earth's past but do not accept the universality of the Deluge, or else do not accept the Divine Inspiration and complete factuality of the Biblical accounts, or else adulterate Scripture with claims of many other catastrophic occurrences—thus too often twisting Scripture to fit their presuppositions.

The term Diluvialist therefore refers to that scientist who accepts the historicity and factuality of the Biblical accounts of the Creation-Flood period (Genesis 1-10), without adding or subtracting any tenet which would constitute a twisting of the Inspired Word to fit any other world view or construction of claimed knowledge.

There exist among sedimentary rocks certain types which have very many types of rock, in thin layers, which lie one on top of another and repeat in a regular sequence. Much of the world's coal is found in such repeating layers. Each repetitive sequence (between coals and including one coal) is called a cyclothem. A diagram of an "ideal" or "complete' cyclothem found in Illinois is found in Figure 1. (The reader of this paper should continually refer to Figure 1 whenever the number or the lithological identity of a given member is described in this text.) The numbering and termination of the cyclothem differ, reflecting the disagreement among Pennsylvanina stratigraphers as to where one cyclothem "ends" and a superjacent one "begins." [Thus, some consider a new cyclothem to begin at the basal sandstone, member 1, while others consider a new cyclothem to begin with the coal (member 5)].

It must be hastily added that almost never in the earth does a "complete" cyclothem occur at any location as shown in Figure 1. A real field situation as exists might have this type of layering: members 1, 2, 4, 5, 10, 1, 2, 4, 5, 8, 10, 1, 2, 4, 8, 9, 10, 1, 2, 3, 4, 5, 6, 7, 8, 10, etc. The important fact to realize is that the relative order of the members always exists and that these members do repeat themselves consistently.

The cyclothems are asymmetrical, which means that the coal or shale (or any other member), may be vastly thicker or thinner than the corresponding member of the cyclothems above and below it. Furthermore, even within one cyclothem, the thickness or thinness of one member does not guarantee the thickness, thinness, or even presence of another member in that cyclothem at all. Six or more of the then members are usually found at any given locality and their relative order is always preserved. "The average thickness of a cyclothem is the central states is less than 50 feet[1]. . ."

Although cyclothems and their valuable coal beds are found in many parts of the world, this paper will concentrate on the cyclothems found in Illinois as far as their morphology and specifics are concerned. "The Pennsylvanian sediments in the basin cover an area of approximately 55,000 square miles, chiefly in Illinois, Indiana, and Kentucky, with minor areas in Missouri and Iowa.

The maximum thickness of Pennsylvanian sediments, more than 2800 feet, occurs in the southern part of the basin in Kentucky. Shale is the predominant lithological unit of the sequence with subordinate amounts of sandstone and much smaller amounts of limestone and coal. The presence of ordered lithological sequences or cycles is the most characteristic lithological feature of the Pennsylvanian sediments. More than 50 such sequences are recongized."[2]

Cyclothems are variable not only in terms of presence of members and thickness of members, but also in terms of lateral extent of each of the members. Some members can be traced for hundreds of miles while others wedge out (& thin out) in only a few miles or else grade into members elsewhere. "Many of the cyclothems are nearly as varied within a single county as within the entire state of Illinois.

For this reason, a detailed study of only a small area may leave the impression that the beds vary greatly, whereas a more general survey of almost the entire Eastern Interior Basin has revealed that the Pennsylvanian system throughout this region is remarkably uniform."[3] Cyclothems, like humans, are-paradoxically-so similar yet so different from each other.

The reason why the area of cyclic sedimentation has been chosen for this study is because "No more fascinating field for research and speculation exists within the entire domain of stratigraphy."[4] This writer has engaged in both "research and speculation" in the field of cyclic sedimentation to try to understand how the Universal Deluge caused cyclic sedimentation.

The uniformitarians have proposed a good number of theories to explain how the cyclothems formed, but "None of these theories has gained much following."[5] This is because "Recognition of the stratigraphic facts of cyclical repetition and distribution, and deduction of the causes responsible for them are unrelated, one to another. Evidence pertinent to the historical interpretation of cyclothems is incomplete, scattered, and not fully understood. Some of it has suggested different conclusions to different persons.

Also, several possible avenues of attack upon this problem have not been adequately explored. It is not surprising, therefore, that there is much disagreement regarding the basic cause or causes responsible for the development of cyclothems."[6] The Diluvialist will add that one of the "Avenues of attack" that has not been explored is that of the Deluge.

The very fact that uniformitarianists are having difficulty coming up with a universally appealing theory to account for the formation of cyclothems is evidence that the case for alternative, non-uniformitarian theories is far from closed. Therefore, a Diluvialist is completely justified intellectually in proposing his own theory.

II. Uniformitarian Theories Proposed to Explain the Cyclic Deposition[7,8]

Of the theories mentioned in the Outline, the first four, which are commonly admitted to encounter grave difficulties, will not be discussed here. The Diastrophic Control Theory contains some truth, and, when understood in the Flood setting, it is workable since logistic problems of timing are overcome, The Glacial Control Theory, since it works on a world-wide scale, deserves some thought; and the other two will be mentioned briefly.

F. GLACIAL CONTROL THEORY: This theory is speculative because of the near impossibility of demonstrating cause-effect in terms of claimed Paleozoic glaciations. A more serious objection has to do with the wedge shape of cyclothems; "Examination of sedimentary cycles at the margins of Carboniferous basins shows that they do not conform to the pattern that would be expected if the sea-level changes were eustatic. This is because eustatic rise in sea level must equally affect the margins and central part of the area of deposition. Deposits of this type are rare in the geologic column outside of the Quaternary . . . "They are unknown in the Carboniferous basins of deposition."[25] A modification of this theory postulates basinal subsidence, but this way of thinking only "patches up" the problem and makes the theory so nonfalsifyable and plastic as to be completely untestable.

Since the Diluvialist contends that the uniformitarian geologic age system is devoid of reality, supposed glaciations "plugged into" those "times" are also rejected. Whitcomb and Morris in their classic Diluvialist work[16] have written of suggested alternative explanations for claimed Paleozoic glaciation. It is significant that the Glacial Control Theory is the main theory among uniformitarians that attempts to come to grips with the worldwide occurrence of very similar cyclothems, because it elevates the riddle of cyclothem formation from local to worldwide proportions. It is up to the Diluvialist now to unify the worldwide aspects together with local morphology into a coherent Diluvian interpretation which is free from the limitations upon thinking created by the geologic dogma of uniformitarianism.

The two remaining minor theories are considered to carry very little weight. They are:

G. PLANT CONTROL THEORY[17] This theory sees cyclothems being formed by differential blockage of zones of sediment accumulation by means of levees. Needless to say, this theory is incapable of explaining the persistent lateral extent of many cyclothems, and also much less the striking similarity of the cyclothem phenomena across the globe.

However, this theory has value in explaining certain local variations in sediment thickness in therms of Diluvian processes. As Floodwaters cyclically retreated and transgresed vast inland areas during the recessional stages of the Deluge, levees must have played a great role in determining over what regions sediment would be carried and stranded by waning fluvial-like water currents.

H. COMPACTION CONTROL THEORY[18] This theory envisions the sedimentary basin being laden with sediments that can be compressed by vastly different degrees; this differential compaction accounting for sequences. For example, when sand is accumulated, the difficulty of compacting it would mean that it would fill up the basin faster than it would subside.

The basin being filled would lead to the area being constantly above water and consequently of peat accumulation. As peat accumulated it would be easily compressed, leading to the rate of subsidence exceeding the rate of accumulation. This would lead to new marine transgression drowning the swamp. The area being again underwater would lead to a repeat of sand accumulation. this entire process would continually repeat, forming cyclothems.

This hypothesis meets its nemesis because materials could not be compacted sufficiently to allow for superjacent cyclothems to be added. As so many other uniformitarian theories, this one also fails to account for cyclothems in their totality as well as to account for worldwide distributions and large extent of cyclothems.

CONCLUSION. It bears repeating that "none of these individual theories has gained much following."[5] It must be stressd once again that the Diluvialist, not restricted by uniformitarian philosophy, can unite the best elements of all these theories into a coherent view of cyclothem formation in terms of the Deluge. But before that venture is begun, an explanation of uniformitarianism and its control of geological theories, including theories of cyclothem origins, will be presented.

III. The Role of Uniformitarianism in Geological Interpretation of Sedimentary Rock Phenomena

PROPOSITION. The uniformitarian world view, which has dominated geologic thought since the 1830's, is not a scientific fact or deduction, nor a scientific law. It is based on the *a priori* decision to reject as invalid any Biblical, historical, or scientific evidence for any sedimentary process significantly different from those encountered today. The Diluvialist position, by admitting the possibility of catastrophes in the past, offers a fresh, new framework for earth history; and it leads to far more satisfactory explanations of sedimentary and stratigraphic phenomena that any theory which limits itself to consideration of present-day sedimentational phenomena.

A. THE ANTITHEISTIC, ANTIBIBLICAL NATURE OF UNIFORMITARIANISM. There is far more to geology in its implications than the study of our planet, "In its widest sense, geology covers the whole spectrum of human experience and understanding . . . few other disciplines have had and must have in the future a more profound influence on human thought."[19] Thus, there is room for various interpretations of geological thought.

Uniformitarianism is not a scientific law that was deduced from the study of the earth; it was and is an *a priori* viewpoint, "Strict uniformitarianism may often be a guarantee against pseudoscientific fantasies and loose conjectures, but it makes one easily forget that uniformity is *not a law, nor a rule established after the comparison of facts*, but a methodological principle *preceding* the observation of facts. (Italics added)."[20] The uniformitarian must therefore not claim that the study of rocks has disproved the Deluge and established that present-day sedimentary processes have produced the earth's sedimentary rocks precisely because it is his *a priori* presupposition that rejects that historicity of the Universal Deluge and assigns present-day sedimentation to be the guide of the study of the formation of sedimentary rocks.

Uniformitarian geologists may come to wear blinders which hide everything other than what is going on today in sedimentary environments, "Advocates of methodological uniformitarianism seem to view the classic formulation of the uniformity principle as a

tautology: our reconstructions of the past are bound to be determined by whatever we discover to be going on at present."[21] It is therefore obvious that even consideration of the Deluge will not get the slightest chance in uniformitarian geology because there are no worldwide floods going on at present. (And God promised Noah that there would never be another worldwide flood. (Genesis 8:21)] It is an exercise of highest futility to hope for geologists as a whole to ever consider the factuality of the Universal Deluge. ". . . our interpretations of prior events must necessarily consist of inferences based upon present observations,"[22] insist the uniformitarian geologists.

The religion of atheistic humanism dominates geology. Not only is no process not represented in kind today permitted, but God and His Word are specifically banned from geologic thought today, "What are our assumptions in such a procedure (Uniformitarianism)? Fundamentally, there are two: (1) We assume that natural laws are invariant with time. (2) We exclude hypotheses of the violation of natural laws by Divine Providence, or other forms of supernaturalism."[22] "Indeed, if I am correct, the residual issue between uniformitarianism and catastrophism comes down to the issue between *naturalism and supernaturalism* or at least between naturalism and anti-naturalism."[23]

That is where it is! Not a conflict between science (supposedly uniformitarianism) and religion (supposedly only Diluvianism) but a battle between one religion (atheistic, naturalistic, humanism) and another (Biblical Revelation); at one level. At the scientific level, it is a battle between interpreting non-observational, non-experimental, non-repeatable data in terms of the consequences of naturalistic, atheistic humanism vs. interpreting them in terms of the consequences of Divine action in human history and geologic history as revealed and recorded in Scripture. Both positions fit facts to theories. With Diluvialism, it is obvious; with uniformitarianism, it is also true: "We do not merely find facts and make theories; we fit facts to theories as well as theories to facts."[24]

B. CHRONOSTRATIGRAPHIC FACETS AND CYCLOTHEMS

1. The Uniformitarian Geologic Column and Cyclothems

It is well known that the earth's sedimentary strata is pieced together into a vast system of supposed ages of the earth's past; the fossiliferous rock being alleged to go back 600 million years. Yet the basis for this age-column is evolution. Certain fossil forms are supposed to spell a long sequence of evolutionary events. Various forms of these index fossils are found in fossiliferous rocks and a chronology of rock layers is built upon this and similar fossil-recording-evolution progressions.

Thus, if some fossil form evolves from form A to D, then any rock containing A will be older than B which in turn will be older than C, etc. Yet a rock C lying on top of A will be assumed to either have had B on top of A before C was deposited (B being "eroded away" before C's deposition) or else not have been an area of sedimentation during the time B supposedly evolved.

That is how a geologic column some 130 miles net sedimentary thickness spanning some 600 million years is constructed by the evolutionists-uniformitarians in spite of the fact that at no location on earth is the complete sequence found and nowhere on earth does the sedimentary rock cover exceed some 7 miles.

The uniformitarian geologic column is the exact antithesis of the Diluvialist position, which sees practically all of the fossiliferous sedimentary rock laid down during Noah's Flood or shortly afterward. Diluvialists have long noted how artificial and specious this column is. They have exposed the underlying foundation of evolution, and have particularly stressed the innumerable gaps and distinct, abrupt appearances of complex fossils without evidence of any evolution from "lower" forms. This column, a biologic onion-skin theory as stated by the noted late Diluvialist, George McCready Price, ignores, for the most part, other data. Thus, there is no difference between a Cambrian shale or a Cretaceous shale except the claimed age difference. Only fossils and supposed evolutionary stages delineate the rocks and their ages.[26] There are specific examples of fossils of different "ages" mixed together. One example is the finding of Devonian fossils in Pleistocene sediment.[27] Another is the finding of plant spores in coal (or in rock) outside their "ranges" with the result of there being "no consistent pattern" in these assemblages."[28] In both these cases, the protective concept invoked is that of "reworking" whereby an old sedimentary rock is eroded and its fossils included in much younger rock.

However, the prima facie (raw, face value, pre-interpreted) evidence of mixed fossils indicates one fatal flaw in uniformitarian thought. Another example found is that of Eocene and Pennsylvanian fossils coexisting in a rock in Alaska.[29] The rock was labelled Eocene and the other fossil dismissed as a "striking homeomorph (look alike)" of *Annularia*, a Pennsylvanian fossil. The claim of earlier misidentification may have to be granted, but in any case the weak basis for uniformitarian "age" designations is fairly evident.

Divisions of geologic periods, predictably, are quite weak: "I have already indicated something of the difficulty in fixing both upper and lower boundaries of the Upper Carboniferous rocks . . . The division between Namurian (lower Pennsylvanian) and Westphalian (middle Pennsylvanian) is quite arbitrary . . . The boundary between Stephanian (upper Pennsylvanian) and Westphalian is even less objective."[30]

Even whole geologic periods in places are invented to keep fostering the illusion of long ages and evolution: "Definition of the boundary between rocks classed as Pennsylvanian and Permian in the Kansas region has led to much debate and disagreement . . . (It was) . . . proposed to avoid the difficulty by not recognizing the Permian at all . . . This procedure might be defended on the basis of the stratigraphic succession in the midcontinent area, but it is evidently unsuited to world-wide application."[31]

In other words, the rock evidence (stratigraphy, gradational nature of rocks) is deliberately forced to conform to evolutionary-uniformitarian thought. The Diluvialist rejects outright these artificial, unnatural divisions of these FLood-deposited rocks, because, "Judgement has been generally expressed that any

adopted boundary is measurably arbitrary."[32] The Diluvialist can grasp the idea of continuous, nearly contemporaneous deposition of these cyclothemic rocks by the Universal Deluge.

Unnatural age divisions of Flood-laden rock inevitably lead to flagrant contradictions between the forced rock delineation and its stratigraphic properties which must be resolved by illogically segmenting continuous rock bed masses. Into this situation cyclothems enter: "Paleontological and physical evidence seem to conflict, the paleontological evidence favoring Weller's correlation and the physical evidence favoring that of the writer."[33] Also, ". . . laterally continuous lithologic units may be of different ages in different positions in the basin. Matching of the depositional cycles may demonstrate the lateral facies equivalence despite the chronological difference."[34]

In the final analysis, the entire uniformitarian geologic column is admitted to be arbitrarily divide rocks: " . . . the stratigraphic column does not naturally divide itself into sharply defined systems of world-wide extent."[35] "A . . . source of confusion and controversy lies in preconceived notions on stratigraphic classification handed down from the early stages of the development of stratigraphy . . . As an example is the tendency to believe that the classic time-stratigraphic divisions (systems, series, stages) established largely in Europe during the last century constitute "natural divisions" of the earth's stratigraphic column which can be recognized as such around the world . . . Although few would now openly subscribe to this extreme segmentation of the stratigraphic record, nevertheless many almost unconsciously endow the boundaries of these original time-stratigraphic units with a world-wide significance far beyond their real nature of quite *arbitrary* . . .divisions of . . . the earth's sedimentary strata.[36]" (italics added).

2. Unconformities Versus Continuous Deposition.

A most important ramification of the Diluvian notion of continuous deposition is the gradational nature of sedimentary rock beds. Scientific Diluviology scrutinizes superposed rock beds of widely different "ages" and notes the gradational nature between them with no evidence of any buried erosional surface and consequent hiatus of deposition. Erosional surfaces, or unconformities, definitely exist but are not as widespread as the uniformitarians would have them be.

As a result, uniformitarianism collapses in its claim of that 130-odd mile thick, 600 million year geologic rock-time continuum. On the other hand, the absence of worldwide erosional surfaces, the gradation of every formation somewhere into another, etc., all strongly argue for the Noachian Deluge.

There are various unconformities related to cyclothems. One is the unconformity (buried erosional surface supposed to indicate a considerable span of time) between cyclothem "stacks" and the underlying, noncyclothemic "older" rock. The other is the unconformity which is supposed to divide one cyclothem from the next one above; considerable time is variously ascribed between individual cyclothems.

The Silurian-Devonian in Kansas underlying the cyclothems is ". . . poorly distinguished[37]. . . "

The unconfirmity between the cyclothemic Pennsylvanian and noncyclothemic lower Paleozoic material is considered to be ". . . one of the most important unconformities in the Paleozoic of the east-central U.S.[38]. . . " Yet there are very many locations where there is no compelling evidence for any stoppage of deposition, and erosion, between Pennsylvanian and pre-Pennsylvania rocks.

For example. Lower Carboniferous rocks," . . . overlap the Devonian formations, but no noticeable discordance has been observed between the two formation.[39]" Eocene cyclothems rest on top of Cretaceous: ". . . these were previosuly thought to be of Cretaceous age. These beds rest with no marked discordance on the Cretaceous[40]. . ."

The Mississippi-Pennsylvanian unconformity in the U.S. is very interesting. In attempting to distinguish Mississippian and Pennsylvanian rocks, Siever[41] notes that: "The chief difficulty is that many Chester (Mississippian) beds resemble Pennsylvanian beds in lithological character, texture, and minerology.[41]" "Even with this detailed lithological study there will be many drill holes in which it is impossible to ascertain the exact depth of the contact. Under such conditions, and where the stratigraphy is doubtful, the best method is to make an intelligent *guess* substantiated by any information available.[42]" (italics added)

The Mississippian-Pennsylvanian in Virginia is now seen as "partly contemporaneous.[43]" In Oklahoma: ". . . the unconformity separating Mississippian and Pennsylvanian strata disappears into the basin. No evidence of truncation or missing stratigraphic intervals either above or below the unconformity can be demonstrated . . . At other places local unconformities may be identified at the base of a particular sandstone unit, but no regional erosional surface can be recognized.[44]"

Quite recently the uniformitarians have come around to recognizing gradation and intertonguing of different "aged" rocks: ". . . the unconformity concept is largely subjective and is based to some degree upon preconceptions concerning modes of origin.[45]" "Finally, it is evident that the regional systemic unconformity between "Pennsylvanian" and "Mississippian" strata . . . (is) no longer valid.[46]" However, the uniformitarians have come up with a new way of explaining away the gradation-intertonguing of different "aged" rocks. They call it a "time-transgressive relation" where some sedimentary basin is filled in a time spanning geologic periods or from sedimentation of continuous sedimentary environments.

However, no amount of assigning new names can cover up the fact that these ages never existed, and that corroboration of the fact of the Flood is offered by gradational-intertonguing relations in massive sedimentary rock beds. Also noteworthy is the fact that Upper Mississipian cyclothems grade directly unto the Pennsylvanian ones.[47]

Much the same non-division noted in the Mississippian-Pennsylvanian also exists in rocks unnaturally divided into the Pennsylvanian and Permian "periods." In the U.S.S.R., for example," Problems remain with the Devonian-Carboniferous and Carbon-

iferous-Permian boundaries.[48]" Also, "The Carboniferous-Permian boundary has long been a puzzle in the Upper Paleozoic in Japan and in the extensive area covering Korea, Manchuria, and North and South China.[49]" In the U.S., "Cyclo-phase deposition crosses the systemic bounday of the Pennsylvanian-Permian.[50]"

Not only do the sedimentary rocks reveal their *prima facie* nature of being continuously Flood-deposited, but rocks layered in "reverse age" sequences create additional embarrassment for the uniformitarian position: "Another problem, more difficult to explain, is that in some localities carbonates and red and green shales with "Mississippian" faunas overlie "Pennsylvanian" orthoquartzites . . . In such cases, the "Pennsylvanian" orthoquartzes are assigned to the "Mississippian" . . . Thus, however awkward, the tabular-erosional explanation has been consistently applied in absence of any viable alternative explanation.[51]" Diluvialists have continually exposed the fantastic explanations offered by uniformitarians to escape the fact of glaring contradictions to their geologic time scale.

In summary, the *de facto* gradation, in some (most) locations of Silurian into Devonian, Devonian into Mississippian, in turn into Pennsylvanian, in turn into Permian, all suggests that this span represents a continuously-deposited sequence of rock. The artificial geologic age designations collapse in futility, some 190 million years of nonexistent time evaporates, and the rocks give powerful testimony to the fact of the Noachian Deluge as causing their origin. It will now be shown that the cyclothem layers within them also were continuously deposited and also show no compelling reason to believe that there was any significant time span between their formation.

The two places where cyclothems are divided are the sandstone and underlying siltstone (members 1 and 10C, Fig. 1) and the coal and overlying member (member 5 and whatever is superjacent).

"The prominence of the basal sandstone unit and its channel aspect in the typically limited outcrop areas of the Eastern Interior have led workers to stress the important of this unconformity. However, unconformities appear to be present in less than 20% of the area of any cyclothem in Illinois, and for some cyclothems no unconformities are known[52]. . ." Hence, in the majority of cases, there is a gradation[53] between the basal sandstone and the underlying siltstone. Furthermore, the unconformity vanishes almost completely basinward in the Kansas region.[54] Even where an erosional surface below the sandstone does exist, "No evidence of weathering was observed beneath the contact.[55]

The artificiality of this sandstone-siltstone transition being used as a depositional-stop is admitted: "The importance of the discordant surfaces present beneath some sandstone bodies . . . has been exaggerated . . . In such a classification system, the products of a single pulse of clastic deposition are unnaturally split between two adjacent units.[56]"

The other position in the cyclothem where a cyclothem is thought to "end" and the superjacent one "begin" is the coal bed. However, this practice of dividing is subjective like the sandstone-siltstone contact: "Nor does it matter whether the cyclothems are separated at the base of the sandstone . . . or at the top of the coal, as is preferred by some others, including most European stratigraphers. The selection of this boundary is a matter of *opinion*[57] . . ." (italics added). It must be realized that the coal grades into whatever is above it.

Specifically, the coal grades into or intertongues with limestone[58] and also often grades into the black shale, even to the point of making it ". . . difficult to remove it from the coal during mining operations.[59]" It could similarly be shown that every cyclothemic member grades into superjacent and subjacent members at least somewhere. It can therefore be concluded that there is no substantial time gap between cyclothemic formation, that uniformitarian notions which claim time intervals between cyclothems can be justifiably rejected, and that cyclothems can be understood in terms of uninterrupted Flood action.

The calling attention to the gradational nature of the rock beds is not meant at all to imply that there are no buried erosional surfaces, on the contrary, there are vast areas possessing unmistakeable erosional surfaces. The point was that there is no universal unconformity that points to any significant stoppages of deposition.

The localized nature of the unconformities can be viewed as regions which were covered with Flood water, exposed, then re-inundated. This is eminently reasonable when one considers how shallow several hundred feet of Floodwater are in relation to tectonic changes in topography and their effects. Some erosional surfaces may result simply from very rapid lithification of Flood-laden rock.

"Certain colloids tend to aggregate very quickly; even in minutes . . . For example, polymerization of silica occurs most rapidly and produces an extremely powerful, irreversible cohesion. Such effects are very important in sediments, particularly the clays[60]. . ." Hence some non-gradations, predictably local as is actually the case, can be accounted for by this rapid lithification and later erosion during the overall continuous deposition of the Flood.

An interesting situation exists between some areas of Mississippian rock and overlying Pennsylvanian. The localized erosional surface that has been chosen as the boundary possesses buried valleys whose walls have collapsed (slumped)[61]. In some places this slumping is so profound that it ". . . amounts to virtual collapse of the valley wall.[62]"

How an ordinary river could produce such slumped valley walls is a puzzle to the uniformitarian: "Presumably stream action erodes and destroys most bank materials subsequent to their failure. The fact that structures produced by stream bank failure are preserved is, thus, seemingly an enigma.[63]" The Diluvian position can amply explain this situation as being caused by poorly consolidated sediment laid down earlier in the Flood being eroded into during the recessional stages of the Flood, with consequent slumping of weakly consolidated sides of gorges.

Thus localized erosional surfaces, when properly understood, do not justify the uniformitarians' extrapolation of them into regions of gradation. Flood ac-

tion operates as local erosion superposed over continuous deposition.

3. Radiometric Dating and Cyclothems

The familiar use of radioactive decay parent-daughter element ratios has been taken by many to have proved the uniformitarian contentions of extremely long geologic ages.

Diluvialists, on the other hand, have stated repeatedly that the geologic column and its inherent long-age claims were decided long before even the discovery of radioactivity. Diluvialists also noted the independence of the previously-discussed paleontological dating from radiometric dating, and uniformitarians also concur: "The development of an absolute time scale has been of immense importance to geology but it is not accurate and complete enough to replace the standard methods of classical stratigraphy. The geologist who works within a certain system still relies entirely on relative dating. Indeed, many practising stratigraphers regard absolute time as not very essential and absolute ages are mentioned with great care, if not suspicion.[64]"

Diluvialists often cite examples of how uniformitarians accept only those dates which agree with their preconceived notions. A recent example of this is where "The $^{87}Sr/Sr^{86}$ and $^{87}Rb/SR^{86}$ ratios are positively correlated, but this relationship is the result of mixing and does not reflect the age of the provenance nor the time of deposition of the sediment.[65]" If "mixing" indeed accounts for consistent ratios, then the Flood can account for much mixing.

The scrutiny of radiometric dating methods has uncovered the degree of subjective bending of data: "There is no really valid way of determining what the initial amonts of Sr^{87} in rocks were. There is much juggling of numbers and equations to get results in agreement with the U-Th—Pb "clocks." In all these radioactive clocks, all methods are made to give values that fit the evolutionist's belief as to the age of the earth and the ages of the various geological events.

The reason that the various dating methods give similar ages after "analysis" is that they are made to do so. In the case of the initial Sr^{87}/Sr^{86} ratios, these values can be adjusted so that any age desired is obtainable.[66]" A vivid portrayal of this action is offered by recent radiometric dating of inclusions in cyclothemic sandstones: "An initial Sr(87/86) ratio of 0.706 has been CHOSEN for the Rb-Sr calculations. A higher value would make the Rb-Sr age for M1117a lower than the K-Ar age, a phenomenon very unusual in nature and certainly NOT TO BE EXPECTED from a simple detrital muscovite. If muscovites have been weakly metamorphosed, then the K-Ar age may be lower than the Rb-Sr age because of the greater loss of radiogenic Ar^{40} relative to radiogenic Sr^{87}. If an initial ratio of 0.703 (low for a granite; but hypothetically possible) is CHOSEN ages of 378 and 411 Million years (for M1117a and M1125, respectively) result. This brings the K-Ar and Rb-Sr dates for M1117a to within 1 million years for M1125; hence our *preference.* is for the 0.706 value. The K-Ar ages are the mean of duplicate analysis, whereas the Rb-Sr ages are single determinations only[67]. . ." (emphasis added)

Not only do uniformitarians take great liberties in bending data to suit their presuppositions, but also there is a growing body of radiometric evidence for the extreme youthfulness of the earth. Recent findings of radiohalos in Triassic and Jurassic coals, presumed to be 140 to 230 million years old, are an exciting example: "If remobilization is not the explanation, then these ratios raise some crucial questions about the validity of present concepts regarding the antiquity of these geological formations and about the time required for coalification.[68]" Furthermore, "Such extraordinary values admit the possibility that both the initial infiltration and coalification could possibly have occurred within the past several thousand years.[69]" The notion of coalification only "several thousand" years ago is in complete agreement with Scriptural dating of the Universal Deluge.

CONCLUSION: The uniformitarian position, which is intrinsically anti-Biblical and rejects the Deluge, falters gravely in its major tenets of long-ages, extensive stoppages of deposition, various artificial and arbitrary subdivisions of Flood-laden strata, etc. Figuratively speaking, the rocks testify to the reality of the Flood and cry out vociferously against uniformitarian attempts to avoid it.

IV. Ramifications of the Deluge in Cyclothem Formation

PROPOSITION: A variety of factors which are properties of cyclothems are neglected in uniformitarian circles, but these are extremely pertinent as ramifications of The Universal Deluge. Other sedimentological factors are implied to support ideas of present-day type sedimentation, but these can be understood as types of localized Flood action instead.

A. THE WORLDWIDE OCCURRENCE AND "AGE"- TRANSCENDENCE OF CYCLOTHEMS

Many types of cyclothems exist. Among these are carbonate-evaporite cyclothems[70] which may be ascribed to early Flood action. However, this paper concentrates on coal-bearing cyclothems which are ascribed to the recessional stages of the Deluge.

Some coal-bearing cyclothems have been traced along outcrops for 400 miles or more.[71] Cyclothem members have been claimed to have been correlated between basins (which could imply a cyclothem continuity of nearly 1000 miles) but these correlations aren't observable in continuity and therefore cannot be proven. Nevertheless, cyclothems in North America and Europe, from ". . . Texas to the Donetz (Russia) coal basin[72]. . ." are extremely similar. This is understandable in terms of the worldwide Flood producing similar worldwide results.

Although the Pennsylvanian-Permian cyclothems are the most widespread, there are cyclothems of "ages" between Devonian and Miocene, or even more recent. Because Diluvialists are completely free from the uniformitarian Geologic-Column age designations, all coal-bearing cyclothems of the world can be viewed as having formed virtually contemporaneously as the Flood-waters receded everywhere on earth. Thus, the Pennsylvanian-Permian cyclothems of the East and Midwest could be contemporary with the Tertiary cyclothems of the Phillipines and with the short Mesozoic cyclothems of the Rocky Mountain states.

The differences that do exist between "younger" and "older" cyclothems of different regions can be accounted for by differences resulting from ". . . greater slope of the depositional surface.[73] "The situation of Jurassic cyclothems overlying Upper Paleozoic cyclothems in the U.S.S.R.[74] can also be viewed as being continuous recessional Flood deposition.

Cyclothems exists in every niche of earth's surface. Cyclothems are found in North America, Europe, Africa[75] and Madagascar,[76], South America,[77] Australia;[78] western Asia inlcuding China,[79] India;[40] New Zealand,[80], Japan, [81], Antarctica.[84]

The uniformitarians sense the unity and universality of cyclothems, but cannot grasp their testimony to the universality of the Flood and its recessional sedimentary-tectonic operation (because of their belief in geologic ages): ". . . it is held that comparison of the different types of cyclothems developed in rocks of many different ages strongly suggests a common cause.[82] "The occurrence of some coal-bearing sediments in all Systems from the Devonian to the Late Tertiary might be held to suggest that the pulsations causing the cyclic deposition were continuous or nearly so (and not in themselves periodic) giving rise to rhythmic deposits wherever other conditions were favourable. But the time-distribution of important carbonaceous deposits appears to be too irregular to support this suggestion.[83]

Thus, if geologic ages are accepted, cyclothems appear in the geologic column too irregularly for any regular cause to be discerned: Diluvialists, obviously rejecting all geologic ages, can therefore consider all "age" cyclothems all over the world being formed contemporaneously by the Universal Deluge with its universal, and similar, effects everywhere on earth.

B. PALEOHYDROLOGICAL PARAMETERS AND CYCLIC SEDIMENTATION

1. Shallow, Intracratonic, Eipcontinental Seas Versus Flooding of Continents.

One of the first things which a testbook on historical geology mentions is the claim that most of Paleozoic sedimentation occurred in "shallow, intracratonic, eipcontinental seas." Cyclothems are likewise believed to have been deposited in very shallow seas: "it is generally agreed . . . that the seas in which thin fossiliferous black shales and limestones formed were very shallow and resulted from short-lived inundations of large areas.[85]"

However, uniformitarianism breaks down in its attempts to find *bona fide* examples of such shallow seas today. Although Hudson's Bay has been proposed, the fact remains the the familiar statement, "'The present is the key to the past,' may be a misleading one when considering epeiric sedimentation. There simply is no existing models of epeiric sedimentation to guide our investigations, and although it is true that many similarities do pertain between the past and the present, it is equally true that many differences exist as well.[86]"

This fact can be used to raise questions as to whether the "epeiric seas" were seas at all. In other words, instead of the present time being considered unusual because of its virtual absence of extensive shallow seas, the past sedimentation can be considered the unusual situation consisting of extensive Flooding of all the continents. Hence, when properly understood, the Paleozoic and some Mesozoic "shallow marine" sedimentary blankets covering major portions of all the continents can be seen as the direct result of the Universal Deluge. The absence of such sedimentation today reflects the fact that Noah's flood is ended and no longer will oceanic waters transgress over continents.

The exact depth at which the epeiric waters covered the continents is a matter of controversy in uniformitarian circles. There is some evidence of extremely shallow water. This is ". . . evidence of local dessiccation, brecciation, and inclusion of clastic grains in the very widespread Ames limestone that indicates shallow water or local emergence. The only conclusions possible at present are that these marine members did represent maximum submergence but that this submergence may be as little as 5 feet or as much as 180 feet.[87]" The blanketing of continents with variably deep, but extremely shallow, water is precisely in accord with the Flood.

2. Specific Evidences of Cataclysmic Sedimentation in Cyclothems.

The time ascribed to cyclothem formation by uniformitarians varies from 20,000 to 350,000 years.[88] However, even uniformitarians now acknowledge that ". . . average rates of sedimentation are meaningless[89]. . ."

One of the family of *prima facie* evidences for rapid burial is the nearly universal presence of clastic inclusions and plant/tree/coal debris in the cyclothem sandstones: " Log casts, carbonized plant debris, and shale fragments are locally abundant in the sandstone[90]. . ." Diluvialists have noted countless evidences of cataclysmic burial in rocks and that only such burial can preserve fossils; and uniformitarians are beginning to agree: ". . . it is generally accepted that rapid burial in a protective medium is necessary for fossil formation . . . anastrophic events may be considerably more important in the formation of fossil assemblages than currently is recognized.[91]"

Many sandstones contain the same type of debris in widely separated geographical areas, such as Illinois,[92] Virginia-West Virginia,[93] Tennessee-where the sandstone debris is stated to have been "transported into the area by currents[94]. . .", and Pennsylvania-where coal inclusions ". . . occur(s) as angular, elongate fragments up to several inches long and as discontinuous seams up to half a foot thick and 8-10 feet long.[95]"

The evidence points to rapid deposition of the shale and sandstone members[96]. . ." "Many sandstones must have accumulated with considerable rapidity.[35]" The poorly-lithified nature of many cyclothemic sandstones in another evidence supportive of rapid sedimentation because poorly consolidated sediments are indicative of having been rapidly accumulated.[97] One sandstone breccia "represents a catastropic sedimentary event, such as a flood.[98]" The sandstone-shale transition also shows evidence of rapid sedimentation; ". . . the change from dark shale to sandstone occupies no more than a few inches of strata.[99]"

The presence of polystrate fossils is a classic example of rapid sedimentation.[100] "Tree casts are not rare in coal-bearing rocks.[101]"

Another example of a polystrate fossil is an upright tree trunk in the cyclothemic Francis Creek Shale in Illinois.[102]

Another family of evidences for rapid burial involves transported rocks interbedded with sediments. rocks have been found all over the world (in coal) including the U.S.S.R.[103] Equally important is the finding of Pre-Cambrian rock pebbles in limestone in Illinois,[104] some 250 miles from their source. Copious limestone fragments also reflect the Flood's violent episodes: ". . . it is unusual for pebbles or angular fragments of limestones to be transported by streams without being pounded to a powder by abrasion in transport, or dissolved.

Nevertheless, there are instances where this has actually happened, and there has been an accumulation of limestone pebbles and boulders of considerable thickness but of local areal distribution[105]. . ." Rapid flood erosion-deposition could generate so many such fragments that the waters would not be able to abrade-dissolve them all.

The non-sandstone and non-shale members also show evidence of rapid burial: "Pyrite concretions are often preserved in coal, under clay, or grey shale over coals . . . Pyrite concretions form as a result of a high concentration of reduced organic matter. This may occur as a result of rapid burial[106]. . ." The presence of bivalve-escape tunnels in shale (member 8B) is further evidence of the rapid deposition of the shale.[107]

The universal presence of evidences of cataclysmic burial at all cyclothem levels coupled with the aforementioned *de facto* gradation of all cyclothem members along with cyclothem-cyclothem gradation and cyclothemic rock-noncyclothemic rock gradation provides the total picture of Flood action.

3. A Critique and Re-interpretation of Uniformitarian "Sedimentary Environment" Concepts as Applied to Cyclothems.

Not only do uniformitarians segment the Flood-laden strata into a system of vast ages, but also inherent in their thought[108] is the concept of "sedimentary environment." In this scheme, modern-type environments (as rivers, deltas, lakes, seas) are supposed to have produced all of the earth's sedimentary rocks. Cyclothems are ascribed to ancient deltas.[52] Deltas have different laterally-contiguous zones of deposition called facies. As the delta progrades seaward, the facies migrate seawards also, causing a net seaward overlap of facies. The end result is that the lateral facies are preserved as vertical rock units; or so it is claimed by uniformitarians. This is Walther's Law, but "it does not state the the vertical sequence always reproduces the horizontal sequence, but that ". . . only those facies . . . can be superimposed . . . which can now be seen developing side by side.[109]

"Yet "The interpretation of stratigraphic sections is an intricate mixture of *speculation* and observation . . . The model constructor *assumes* some situation in the past and tries to develop the sequences of processes which lead to the rocks which are found in the present.[110]" (emphasis added.)

This situation provides the setting for the first of several uniformitarian circular arguments employed when deducing "sedimentary environments." Here the use of present-day facies relationships is justified in its use on ancient strata because the ancient rocks were formed in present-type environments: and the claim of them forming in present-type environnments is justified on the basis of their facies relationships. (Figure 2A) The Diluvialist sees various conditions of Floodwater action producing different suites of sedimentary rocks.

The Diluvialist School of Geologic Thought should be aware of the subjectivity of uniformitarian thought as pertaining to "sedimentary environments." "The human element is an undeniable, highly subjective component of earth science . . .[111]," but it plays a large role in claim "sedimentary environment" identifications. "It is a common failing with geologists that at the conclusion of an endeavor based on data assiduously gathered and assessed, they permit themselves to indulge in ill-founded prognostications, half-true generalizations and even virtual fantasy . . .[112]" Yet "Recognition of ancient environments is not a mathematical problem; it also involves much *hypothetical* thinking.[113]" (emphasis added.

In claiming that ancient sediments were formed by present-type sedimentation, the uniformitarians see only what they want to see in the rock and ignore contrary evidence: "Even though rocks in Tennessee and in other adjacent areas of the Appalachian coal field have been mapped and studied in considerable detail, they have not been adequately examined for fossils. This is probably largely due to the *unwarranted assumption* that most of these beds are non-marine, hence barren of fossils.[114]" (emphasis added) Hence uniformitarians failed to see the fossils that they didn't want to see.

Controversial factors exist in studying strata: ". . . realization of the awesome complexities involved, the number and variety of variables which may be invoked to explain, for example, so simple an observation as that of a bed of sandstone. . . The more experienced the stratigrapher becomes, the greater the wealth of observation at his command, the more rapid is the pace at which unifying principles and generalizations appear to recede from his grasp.[115]" The uniformitarians confidently assert that they can identify sedimentary environments in rock, yet they fail to be able to distinguish between widely different alleged environments: "The state of our knowledge of ancient sedimentation is indicated by the Pennsylvanian sands of the Mid-Continent about which much has been written but on the deposition of which little is known.

The same Pennsylvanian shoestring is interpreted by different writers as an offshore bar or a channel, an ancient river, or a marine feature.[116]" The Diluvialists can appreciate the situation of trying to classify a Flood deposit according to present-day sedimentation. The large, widespread cyclothems (allocyclic) are considered to be deposited by processes explained by theories explained earlier. The short, choppy cyclothems (autocyclic) are thought to be caused by delta-lobe switching. However, the best (by far) studied delta-the Mississippi, fails to provide evidence of cyclothem generation by lobe subsidence: ". . . the stratigraphic evidence requires rapid subsidence between cyclothems . . . It is difficult to understand the stratigraphy in terms of steady, slow subsidence. The

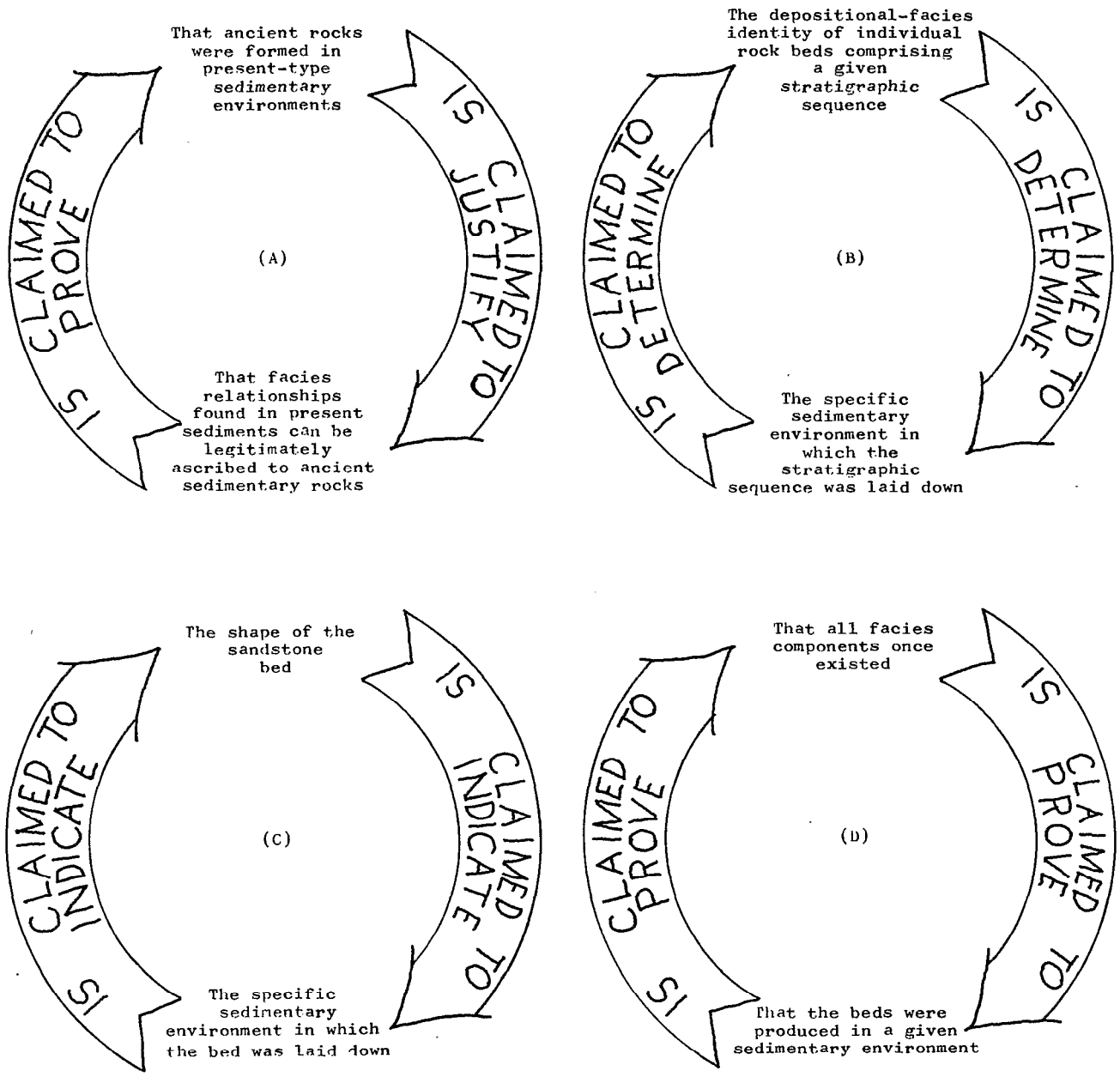

Figure 2. This shows schematically four of the types of circular argument employed by uniformitarians in putting forward their claims to have detected analogies of modern sedimentary environments in the earth's sedimentary rocks.

authors do not consider that there is an analogy to be made with the Mississippi delta.

It is significant that the seven known courses formed during the last 5000 years are all at the surface at the present day and these changes have not caused extensive cycles of sedimentation to be laid down.[117]" The cycles that do exist were glacial-eustatic, and—as previously mentioned—glacial-eustasy can't account for Pennsylvanian cyclothems.

Although the present is supposed to be the key to the past, ". . . the better known recent sediments may have no equivalents in the geologic record . . .[116]" There would be differences between Flood deposits and contemporary sedimentation.

The uniformitarians use circular reasoning in establishing the identity of "sedimentary environments." For example, it is observed that only under "unusual circumstances[118], are entire deltaic sequences prserved. Yet "any stratigraphic correlation based upon the lateral relationship between the various deltaic facies must assume that all facies were originally present and will be preserved, unless removed by erosion.[119]" Circular reasoning (D, Figure 2) results.

Sandstone thicknesses judged to be capable of dilineating components are admitted to be arbitrary.[120] and "A misconception of the geometry of the rock unit leads to a misconception or misinterpretation of the environmental conditions of deposition.[121]" Circular

reasoning is used (C, Figure 2) when the original shape is unknown[121] due to erosion or poor outcrop-drill hole information, In "sedimentary environment reconstruction," "Individual facies, however, cannot be interpreted by themselves: it is too difficult to draw a unique interpretation from the petrological character of any single facies . . .[109]" and only can the "deltaic environment" be "reconstructed" by use of ". . . knowledge of facies relationships drawn from the study of modern environments . . .[109]" Circular reasoning (B, Figure 2) results.

"Although the term "delta" is not difficult to define in modern sediments, ancient ones are not readily so identified . . .[122]" and the famous model for an ancient delta, the Catskill Delta,[123] is now questioned as to whether it was a delta at all. That the contention of fossil assemblages proving ancient environments is unprovable is admitted,[124] as is the fact that fossil assemblages are a ". . . matter of interpretation . . .[125]" as to what environments they purportedly indicate. A great deal of bioturbation (as traced fossils: "worm burrows, raindrop prints, worm trails,") can be explained as bubble imprints.[126]

That short cyclothems were generated by delta-lobe switching-subsidence can be questioned for various reasons, including the wide area of even short cyclothems.[127] "The wide lateral uniformity of some cyclothem members (particularly the coals) is hardly consonant with the switching of several discreet delta complexes. The existence of all-alluvial cycles also seems difficult to explain by delta switching, as does the sequence of different limestone and shale types in the marine phase.

The development of cyclothems across facies boundaries—e.g., alluvial, deltaic, and lacustrine—appears incompatible with this theory, since the cyclic fluctuations should create the facies, not be imposed upon them.[128]" "Taken individually few of the cyclothem members can be definitely associated with a single environment of deposition: present evidence indicates that each represents some one of a series of environments that produce similar lithologic, structural, and fossil characteristics.[129]" To claim that cyclothems are formed by deltas is therefore to resort to circular reasoning (B, Fig. 2)

The uniformitarians greatly contradict themselves in their claims of sedimentary environment identifications: "Some students have attributed a marine origin to most of the sandstone, underclay, and unfossiliferous shales, but others have considered them to be fluviatile, deltaic, or eolian.[130]" Also: "When Pennsylvanian sandstones are critically examined . . . their non-marine character is fairly evident . . . some European stratigraphers continue to regard similar strata as marine.[131]" In fact, "Very few Pennsylvanian strata possess perfectly diagnostic characteristics which are not duplicated at other horizons.[132]" Since few outcrops usually exist in plains regions, drill holes and mechanical log correlations are employed; yet these data are known to contradict other observable data.[133]

The Diluvialist can reject these uniformitarian "sedimentary environment" designations because of illogical reasoning behind them (circular reasoning, also known as *petitio principii*, or begging the question, is one of the classic logical fallacies). The fact that the Diluvialist is free from the assumption that present-type processes are the sole (or even most important) guide to interpreting sedimentary rocks enables him to see the aforementioned circular reasoning, doubtful (if not invalid) extrapolations, contradictory identifications, etc., as clear indicators of the fallacy of the uniformitarian claims of being able to identify modern-type environments (present-day sedimentary processes) in ancient rock.

No erroneous opinion, however, is successful without some major half-truth behind it. The half-truth is the unquestionable similarity that does in fact exist between ancient and modern sediments. However, this similarity does not mean that modern-type sedimentary processes have produced the ancient rock, but rather that the physics of water flow/deposition is the same today as it was during the Flood. The fact that many sedimentary features are present in all modern environments, and that features associated with a given environment may be absent[134] is further indication of the similarity of hydrologic behavior under different conditions.

Two Diluvian conceptual terms are now coined: *F*loodwater *M*ass *M*ovement (FMM), and *F*loodwater *D*epositional *M*ilieu (FDM). For illustrative purposes, it may be stated that a long, thin, narrow sandstone (which uniformitarians claim was laid down by an ancient river; hence—by definition—is a fluvial sedimentary environment) was actually laid down by a swift, longitudinal FMM; the sandstone therein deposited in a torrential FDM. The fact that an "ancient river" is described as being ". . . broad, shallow, and highly sinuous . . .[135]" accords well with the idea of it not being a "river" at all, but rather a torrential FMM. Also, since it is claimed that "Ancient alluvial plains" may have ". . . wide lateral extent.,[136]" it can mean that, in reality, it was a wide, swiftly moving FMM which laid down that sedimentary rock.

The previously-discussed "shallow Paleozoic seas" were actually extremely-widespread but stagnant FMM's. Cyclothems were formed in zones of transitional FDM's (that is, the front of torrential FMM's colliding with stagnant FMM's.) The aforementioned absence of some "deltaic facies" reflects the difference between true deltas (operating only before and after the Flood) and transitional FDM's. The fact that cylcothemic sandstones possess certain "marine" and certain "fluvio-deltaic" properties in reality reflects certain "riverlike" and "shallow-sea type" properties coexisting in the FMM. That ". . . statistical textural studies of ancient sediments have largely proven an unsatisfactory method of environmental diagnosis.[137]" is understandable in terms of variously acting FMM's.

The uniformitarians admit that "It should be apparent . . . that sedimentary environment analysis is *at best* an inprecise art rather than a deterministic scientific discipline.[138]" Diluvialists must remember that uniformitarian ". . . sedimentary models remain ill-defined and subjective . . . Some kind of conceptual model is essential for any IMAGINATIVE kind of interpretation . . .[139]" (emphasis added). Since "sedimentary environments" in ancient rock are "Imaginative," the

Diluvialist can justifiably reject the entire uniformitarian concept of "Sedimentary Environment," and view ancient rock as being Flood-laden under varying conditions. An example of this, using the two coined Diluvialist concepts, was applied to the cyclothemic Francis Creek Shale/Purington Shale/Oak Grove Limestone[140] facies of North Central Illinois (See Table 1.)

CONCLUSION. The fact of the amazing, world-wide occurrence of cyclothems, together with their transcendence of the specious uniformitarian geologic column, is significant attestation to the universality (in both area and effect) of the Deluge. At the other extreme—the very local-level-uniformitarian ascription of cyclothems to present-type sedimentary environments is based on: graet personal subjectivity, demonstrably illogical reasoning, fantastic extrapolations, and contradictory identifications. The Diluvialist rejects these fallacies and views of rocks as being directly formed by the Deluge.

V. The Diluvian Tectono-Sedimentary Generation of Cyclothems

PROPOSITION. Cyclothems were generated by irregular tectonic activity superposed upon steadily retreating Flood waters.

A. THE TECTONIC OF CYCLOTHEM GENESIS. "The earth strives for gravitational equilibrium, or in other words for a minimum of free potential energy of the rotating globe . . .[141]" Disturbance of this equilibrium causes spontaneous compensation manifested by crustal tectonics. The Flood would, unquestionably, cause massive disequilibrium. This disequilibrium would be compensated for by mountain building as well as basin formation by downwarp. Only a basin can collect and preserve sediments,[142], protecting them from erosion. The cyclothem-filled Illinois basin subsided irregularly[143] while "pulsatory nature[144]" of mountain building are jointly held responsible for cyclothem formation according to some previously-discussed diastrophic theories. It is obvious that only a minor elevational change will ". . . inundate vast areas and shift the shoreline by perhaps hundreds of miles.[145]"

A major causal factor is sought for the pulsatory diastrophic events. As mentioned, the chief problem of the diastrophic explanations of cyclothem origin is the incredible nature of "tectonic hiccups;; which would have to repeat regularly, at long intervals of time, and be nearly identical to each other. Continental Drift/Plate tectonics (or Mobilism) has been called upon as an explanation for diastrophic pulses[146] causing cyclothems, but both uniformitarians and Diluvialists are divided on this question, and ". . . it is too early to choose a single favored theory of global tectonics.[147]"

In any case (whether Mobilism or Fixism), geophysical studies have shown[148] that basinal subsidence can be caused by mantle material flowing into the adjacent newly-uplifting mountains. Pertaining to cyclothem formation, "Recent studies on the strength of the crust suggest that subsidence to form basins commonly takes place in sudden steps along fault lines. Repeated movement along fault lines bordering a basin or shelf region is the primary cause of intermittent subsidence and the formation of sedimentary cycles.[149]" To this may be added that ". . . the stratigraphic evidence requires rapid subsidence between cyclothems . . .[117]" and that the Bible (Psalm 29:6) mentions mountains "skipping like calves" during the Flood. See also Psalm 104:6-8.

For every basin-wide cyclothem, there are found many local, short cyclothems or cyclothem parts which wedge into it and/or grade into it. (Fig. 3; Profile, basinwide coals A, B, C, D, with local cyclothemic coals splintering downward). "Their presence complicates the problem of cyclothemic classification, for what appears to be a typical cyclothem in one area may easily be subdivided into two, three, or four in other areas . . . They are more common in basins nearer highlands with tectonic activity.[150]"

Cyclothems were most probably formed during the recessional phase of the Flood. Mountains were uplifted while water was receding (Psalm 104:6-9) and their pulsative increase (Psalm 29:6) generated the few basinwide cyclothems (Fig, 3; Profile, A, B, C, D). The resultant basinal downwarp occurred assymetrically and suddenly, with only local areas subsiding at a time, forming "basinettes" (Fig. 3) which, when filled, became local cyclothems branching out from the basinwide ones. Tectonic megawaves helped cause selective downwarping. Several dozen diastrophic pulses in the last few months of the Flood is reasonable (because both orogenic pulses and selective basinal downwarp operate on threshold values of activation), whereas the notion of a diastrophic pulse every 400,000 years going on for 35 million years is clearly fantastic. If Illinois is taken as the "average" basin tendency with its 50 cyclothems, about 5 of which are extremely widespread; one diastrophic pulse every three weeks would generate the widespread, basinwide cyclothem; with the 9 short ones in between caused by local "Basinette" subsidence. In mountain regions, where there is more tectonism and subsidence, there are 250 cyclothems (in Virginia) but they are short (the same 5 basinwide cyclothems with 30 very short ones in between every basinwide one.)

In sum, diastrophic control of cyclothems as caused by the Deluge in both Scriptural and reasonable (because of time-element, threshold values, etc.) whereas the uniformitarian version stands untenable due to its time encasing. Every cyclothem represents a movement of Floodwater. The short cyclothems form when most basinal areas are not sufficiently downwarped: ". . . most sediment in transit would by pass the area continuing on until a region of active downwarping is reached . . .[151]"

B. SPECIFIC EVIDENCES OF CATACLYSMIC TECTONISM CONTEMPORARY WITH CYCLOTHEM FORMATION

The fact of crustal paroxysms associated with the Flood's formation of cyclothems is attested to by the wealth of evidence found amidst cyclothemic rock; much of it clearly occurring contemporaneous with cyclothem deposition. "Deformed rocks interpreted as the result of penecontemporaneous slump and mud flow are common in rocks of Pennsylvanian age in the Appalachian Plateau . . . Mud flows include strata

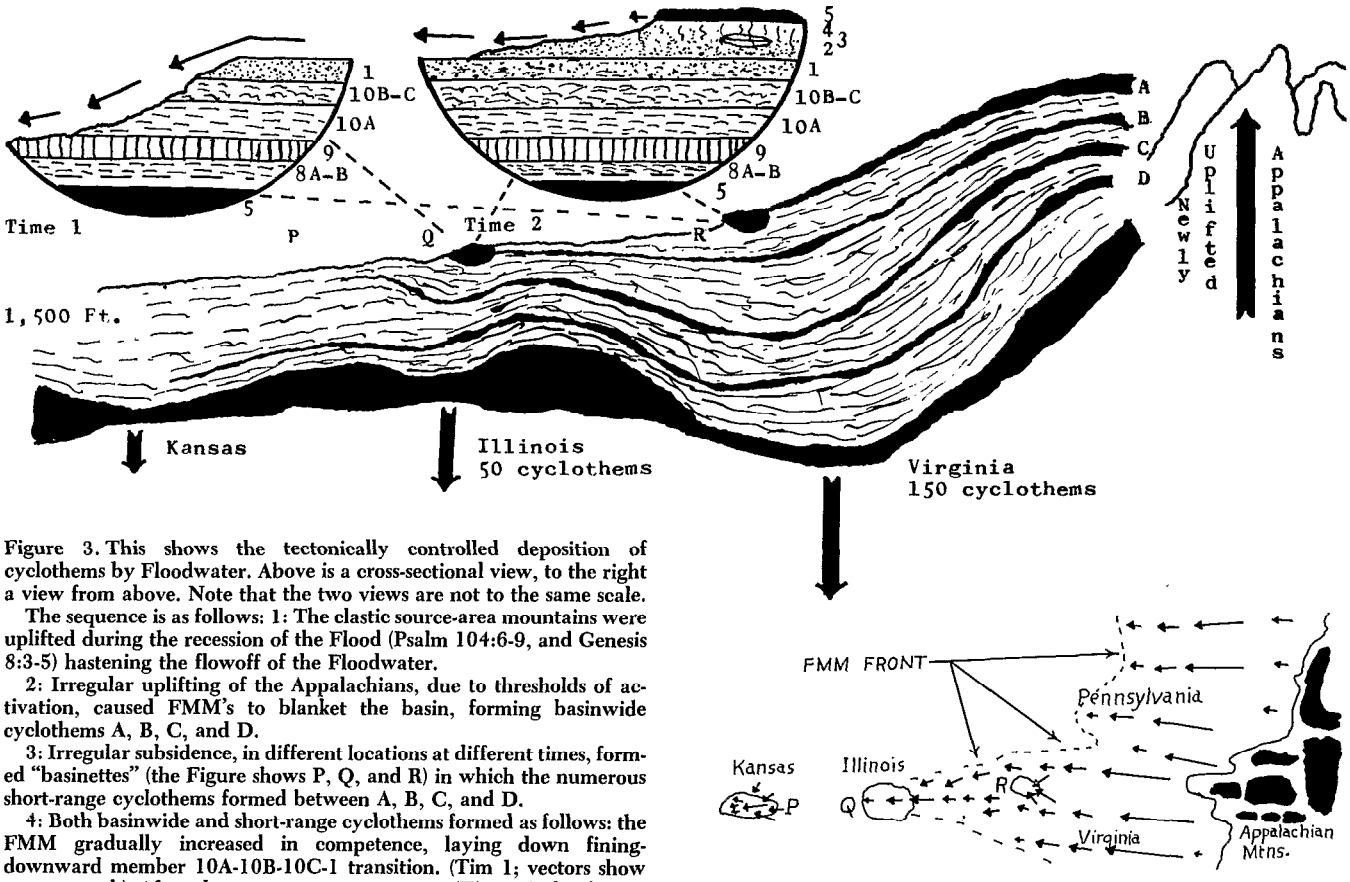

Figure 3. This shows the tectonically controlled deposition of cyclothems by Floodwater. Above is a cross-sectional view, to the right a view from above. Note that the two views are not to the same scale.

The sequence is as follows: 1: The clastic source-area mountains were uplifted during the recession of the Flood (Psalm 104:6-9, and Genesis 8:3-5) hastening the flowoff of the Floodwater.

2: Irregular uplifting of the Appalachians, due to thresholds of activation, caused FMM's to blanket the basin, forming basinwide cyclothems A, B, C, and D.

3: Irregular subsidence, in different locations at different times, formed "basinettes" (the Figure shows P, Q, and R) in which the numerous short-range cyclothems formed between A, B, C, and D.

4: Both basinwide and short-range cyclothems formed as follows: the FMM gradually increased in competence, laying down fining-downward member 10A-10B-10C-1 transition. (Tim 1; vectors show water speed.) After the momentum was spent (Time 2) the fining-upward member 2-3-4 transition was deposited. Then followed tangled masses of vegetation (Member 5), and the flow-off broth (incorporated in member 8A).

which deformed mainly as fluids and partly as plastics.[152]" "Decollement within Pennsylvanian rocks occurred when the rocks were hydroplastic.[153]"

Some volcanic rocks associated with mountain cyclothems were formed with "large amounts of water.[154]" Some widespread, thin clay layers amidst coal may be of volcanic origin.[155] "Coalification patterns . . . reflect (1) Depth of burial . . . and (2) regional thermal disturbances . . .[156]" German cyclothems reveal ". . . an extensive magmatic upwelling . . .[157]" as revealed by coal grade. Most volcanic activity, however, had passed by the time the Floodwaters receded (Genesis 8:2); the sedimentation of cyclothemic rocks occurring during Flood recession supported by the general distribution of volcanic inclusions: ". . . with the exception of the Eocene of the Pacific Northwest, pre-Cretaceous graded sequences tend to have greater volumes of volcanic rocks associated with (and volcanic detritus in) the sandstone and conglomerate . . .[158]"

Even in relatively undeformed basinal cyclothemic strata, there is considerable evidence of tectonism, as growth faults, for example: "growth faults . . . result from tension, caused partly by subsidence of the basin floor, and partly by the *rapid compression* of the *recently deposited* sediments.[159]" Such growth faults, which-by definition—form contemporaneously with sedimentation, are found in southern Illinois cyclothems.[160] In Missouri, ". . . many structures that exist as folds in younger Paleozoic rocks project downward into faults or fault zones in subsurface rocks.[161]" A tectonic graben exists in Illinois.[162] Other clear fault zones occur in Pennsylvania,[163] southern Illinois,[164], Kansas,[165] to name a few locations. Great fissures in cyclothemic rocks occur in Ireland[166]; these are clastic dykes. Such fissures occur also in the Appalachian Plateau,[167] and in Illinois, where a description of these joints states that: ". . . the strata were pulled apart laterally in almost every direction . . .the clay veins exhibit no signs of having been formed at different periods.[168]"

The entire earth bears the scars of God's judgement during the Flood, and violent tectonism during cyclothem sedimentation is attested to by these contemporaneous-with-sedimentation occurrences.

C. THE SEDIMENTATIONAL COMPONENT OF CYCLOTHEM GENESIS. Some Diluvialists have proposed that cyclothems were formed by tidal incursions upon the continents during the beginning stages of the Flood. This paper, on the other hand, proposes a recessional-Flood cyclothem formation and a tectonic mechanism. While the matter is still open, there seems to be no evidence of substantial tidal movement associated with cyclothems,[169] and furthermore, it seems unlikely that tides could form in such shallow water.[169]

The cyclothems reveal the following sedimentational trends as they are traced further from the source areas: Strata thinning of cyclothems,[170] thinning of coals,[170] decrease in grain size of clastics.[170] increase in limestone

thickness, repeated presence, etc. The decrease in clastic grain size reflects the net decrease in availability of suspended sediment as Floodwaters flow ever further from the newly-uplifted mountain source areas. Likewise, the progressively basinward thinning and frequency of absence of coals (Fig. 3, Profile A, B, C, D, coal, basinward (Kansas ward) trends reflects the decrease in available (still not stranded) floating plant-tree masses. The limestone increase towards the basin is explicable in terms of the decline of clastics allowing greater freedom of chemical reactions between colliding FMM's possessing different ions in solution.

The *modus operandi* of Diluvian cyclothemic sedimentation is as follows: Receding Floodwaters flow into the regional downwarp of "basinette," (Fig, 3) or else inundate the entire plains area (in the case of the few basinwise cyclothems). The resulting surge of Floodwater passes given geographical points with ever increasing velocity. At first there is no clastic deposition; only the widespread "marine limestone" (Member 9) is formed as the advancing FMM's ions react with those of the stagnant FMM being displaced. When the stagnant FMM is steadily being displaced and the FMM gains progessively greater momentum, this Fore FMM (Table 1) deposits progressively coarser clastics (Member 10A-1]B-10C-1 sequence).

Eventually, the deposition exceeds grade, and erosion begins, forming (in many areas) the characteristic channels (gulleys) Members 10C-1). From then on, the FMM having spent its flow momentum and clastics, the flow becomes progressively weaker and the progressively finer clastics (Members 2, 4) are deposited. The stagnant water grows shallow enough for limestone to precipitate (Mem. e) and for the floating plant-tree debris to settle out and blanket the terrain. The percolating waters emanating from the rotting debris create reducing conditions for the initial shale deposition of the subsequent FMM, and the (Member 8A-8B transition forms.

Varying local conditions cause some missing members of every cyclothem: lack of chemical conditions cause missing limestones (especially members 3 and 7); differential availability of clastics causes varying types of fining-upward, fining-downward clastics to be deposited (with varying shape, thicknesses, and channel erosion from differing grade), and varying amounts of coal (presence, purity, and thickness) are caused by varying amount and presence of floating tree masses. The previously-discussed tectonic mechanism generates varying types of cyclothem: regional tectonic factors being responsible for "extra" members (as coals and limestones (as the uncommon member 7) as well as occasional abrupt thickenings, thinnings, and fade-out of members. Thus is explained the differences superposed upon the profound similarity of all cyclothems.

Every cyclothem is thus the product of increasing FMM velocity competence (Members 9 through 10C) followed by decreasing competence (Members 1 through 4) and ending up with stagnant FDM (Members 6 through 8B). The stratigraphic properties of cyclothem members is explicable in terms of Flood sedimentation. That limestones are ". . . geographically extensive . . .[171]" is caused by their independence of clastic supply and reliance upon the chemistry of mixing FMM's.

The fining-upward Member 1-2 transition[172] has probably been overrated at the expense of the much-sharper fining-downward Member 1-10A transition, but now fining-downward sequences are no longer considered uncommon.[173] The author of this article studied 15 drill-hole core logs of Illinois cyclothems and counted 29 (21 sharp and 8 weak) fining-downward sequences and 26 (13 sharp and 13 weak) fining-downward sequences.[174] The change of FMM speed during sedimentation is confirmed by pentrology (detrital interstitial material.)[175]

Clearly, then, the prominent fining-downward trends show ". . . depositional conditions ranging from low velocity suspension at the base to high velocity traction sedimentation in the upper sandstones.[176]" The fining-upward sequence, which extends to the underclay,[177] on the other hand, ". . . can be produced . . . by deposition in the last phases of a heavy flood . . .[178]" The ". . . extensive mixing of detritus . . .[179]" in sandstone reflects certain mixing properties of the FMM, whereas the ". . . similar sorting . . .[179]" of widely-separated sandstone regions attests to the widespread overall similarity of Flood action. "In general lithological respect, the sandstones are homogeneous over several now separated basins from Missouri to Pennsylvania. Thus we have a picture of current activity whose intensity varied greatly in time and space within certain average limits. But the limits and degree of variability were *remarkably uniform* over much of the North.[180];; (emphasis added). That sandstones have various shapes and ". . . thicken . . . basinward . . .[181]" reflects their upmost sensitivity to FMM velocities.

At the other extreme (showing the least dependence upon FMM velocities), "The most persistent elements are the coal beds and overlying black shales.[182]" Their widespreadness results from their having been formed from floating tree-plant masses and hence being quite independent of Floodwater velocity. The underclays are somewhat widespread because of the fineness of the particles and their near-universal presence in even the slowest FMM.

Since water flows only downhill, the source areas for the clastics in cyclothems must have been the newly-uplifted mountains: ". . . the tectonic borderlands of the northern Appalachian mountains . . .[183]" Diluvialists must view "source area" claims skeptically, because under "extremely different conditions . . .[184]" (from today, as the Flood was) mature and supermature sands can form in one cycle, and because there is some ". . . intense chemical weathering . . .[185]" observed in fact. The Flood must have brought down material from ". . . a series of point sources, rather than from one uniform source.[186]" Hydrogeochemically, the flood contained silica waters which percolated through Illinois sandstones,[187] cementing them, and caused contemporaneous-with-plant-matter silicification of Antarctic coals.[188]

D. THE RELATIONSHIP BETWEEN INDIVIDUAL CYCLOTHEM MEMBERS AND THE FLOOD.

Every cyclothem member reflects some FDM.

1. The Coals (Member 5)

Member	Outstanding Sedimentary Structure	Hydrologic Characteristic Indicated	Uniformitarian Interpretation (Deltaic facies)		Diluvian Interpretation (FDM facies)
1	Oscillation ripples Current ripples Ripple drift Cross-laminae Scour and fill Small-scale folding Convolute laminations	Orbital wave motion Moving current Continuous traction deposition Turbulent variable current Turbid flow of sediment Fast flow, flood	Delta front sub-aqueous levee Point bars	PROGRADING DELTA FRONT	FMM at its fastest. Violent, torrential flow capable of carrying sand grains. Localized erosion of gullies, making channel sandstone bodies. Possible wind-generated waves. (Genesis 8:1)
10C	Regular layers Oscillation ripples Small-scale folding Convolute laminations Compactional deformation	Fluctuating velocity Orbital wave motion Turbid flow of sediment Fast flow and/or flood Deposition on irregularities	forest and prodelta bottomset beds		Subdued velocity of FMM capable of carrying only silt and finer. Possible wind-generated waves. (Genesis 8:1)
10B	Regular layers Irregular layers Mottles	Fluctuations of water velocity Small-scale slump, bioturbation Mostly slumping inclusions	Shallow waters surrounding deltas		Slumping caused by early tectonic activity. Slow but variable FMM velocity
10A	Mottles Homogeneties Concretions (Siderite)	As above. Also clastic inclusions No textural variations of sediment Iron-rich water from coal	Tidal channels		Slowest, most frontal component of FMM. So slow the finest clastics are left; and they can settle out.
9	Irregular layers Mottles Homogeneties Concretions (Siderite)	Slumping (tectonic?) bioturbation Mostly slumping clastic inclusions No textural variation of sediment Iron-rich water from coal			Further evidence of early tectonic activity at the start of sedimentation. Most frontal non-clastic component of FMM. Chemical reactions of colliding materials.

Table 1. Here are proposed the Diluvian interpretations of the cyclothem facies.

Although it is well known that coalification occurs rapidly,[189] the majority of uniformitarians hold on to the autochthonic (in-situ deltaic peat-forming swamp) position of coal formation as opposed to the allochthonic (transported) position. "Some of the arguments for this autochthonous development are: (1) the great lateral extent of many seams; (2) the purity . . . of many seams; (3) the presence of upright tree stumps in coal measure strata: and (4) the presence of underclay (or "seat earths") beneath many seams. The last two arguments are no longer especially strong ones. Tree stumps are only occasionally found actually penetrating or within a coal seam, but are usually above the seam or in sandstones of shales associated with the seams.

In addition, there is a growing body of evidence . . . to suggest that "seat earths" are not soils, but are themselves allochthonously derived.[190]" The underclays will be discussed separately; the last two arguments are admittedly weak, but the first two in actuality reflect the narrowness of the uniformitarian position. Certainly in any local flood or sedimentary process ". . . there would be no available source for the vegetation whose detritus was to cover such vast areas.[191]" The global Flood easily denuded the entire earth and blanketed significant portions of continents with layers of floating (on recessional FMM's) vegetation. The purity of coals is not difficult to understand in terms of early-Flood rains washing the floating vegetable detritus free of any (soil) material which would not float.

Furthermore, the coals do show trends of thickness reflecting the thickness of members beneath,[192] suggesting minor FMM's currents nudging floating detritus away from slightly higher areas. More importantly, "The coals thin and become impure over anticlines with maximum structural relief . . . This phenomena is also observed in other Allegheny cycles.[193]" The Floodrain-cleaned floating vegetal detritus became contaminated in shallower waters over anticlines owing to the greater likelihood of mixing of muddy, underclay-depositing waters with the detritus.

One of the vast lines of evidence for the allochtonic formation of coal is the presence of ". . . waterworn . . .[194]" fusain (plant matter) fragments, as is the vast extent of clay layers in coal: "A principal problem to explain in any case is how the forest vegetation of a swamp could be so completely bevelled as to permit accumulation of a continuous layer of clay . . .[195]" Some coals are magnitudes thicker than any imagined peat

swamp condition could accumulate: "Ekibastuz. The thickness of coal seams in this field is unique in the USSR. There is a coal seam which, including thin intercalations of shale is 150M (487.5 ft.), and must have been produced as the result of the accumulation of 450-600m (1462.5-1950 ft.) of peat.

Present-day peats, however, are on average 6-8m (19.5-26 ft.) thick, reaching 20-24m (65-78 ft.) in isolated instances.[196]" Coals follow patterns of sedimentational filling (thickening) in some channel sandstones[197] and possess everwhere stratigraphic properties consistent with local variations of vegetal-floating conditions: ". . . coals thicken and thin, change in character, and not uncommonly pinch out entirely . . .[198]" That coals not only have minerological trends similar to underlying underclay[199] but also (in areas without underclay) ". . . grade down into laminated shales, siltstones, and sandstones.[200]" further confirms their *prima facie* nature of being part of continuous, rapid FMM sedimentation.

2. The Underclays (Member 4)

These were long considered to be fossil soils of deltaic swamps, but recent studies reveal that the most powerful inherent evidence for this position, root impressions, is invalid: "For the last 150 years, *Stigmaria*, the rootlike base of Paleozoic lycopods has been interpreted as occurrence in situ . . .[201]" "The preferred orientation of specimens of *Stigmaria* . . . can only be explained by transportation . . . *Appendices* attached to *Stigmaria* are sometimes found to be cracked, broken, or twisted in a way difficult to explain from a functional point of view . . . the rapid accumulation of the stigmarian beds in a short time interval, as indicated by the well-preserved upright trunks, rules out the possibility of forest growth in situ.[202]"

The fact of root orientation in current direction observed in superjacent beds[203] reinforces claims to their allochthony. It is most important to note that underclays "lack . . . a soil profile similar to modern soil . . .[204]" that ". . . coals and underclays are not genetically related . . .[205], that the undisputably-allochthonic ". . . clay partings . . . possess most of the characters of underclay . . .[206], and that underclays contain detritus preservable only by rapid sedimentation: ". . . well-preserved leaf impressions and tiny coal veinlets are common.[204]"

The homogenity and absence of bedding in underclays is explicable in terms of homogenity of the finest sediment remaining at the end of the cyclothem-generating FMM flow as an alternative to the root-turbation explanation, and ". . . the best explanation of slickensides in underclays is the hypothesis of compaction of a sediment deposited in a loose, hydrous condition.[207]" The underclays can therefore be considered to be the finest of the (rapidly-deposited by (waning) FMM) clastics: "It seems reasonable that the gradation of shale or sandstone upward into an underclay may simply represent conditions of transitional sedimentation from coarse to fine particle sizes. It appears that this evidence may be used to explain the detrital origin of underclay.[208]"

3. The Limestones (Members 3, 7, 9)

The cyclothemic limestones formed during clastic-poor FDM periods of stagnation prior to underclay-coal deposition (Mem. 3)) and, more prominently, as a result of chemical reactions between colliding FMM's (Mem, 9, 7): "If carbonate ions are continuously added to a solution containing several metallic ions, the pH of the solution will rise and the metallic ions will precipitate in the order in which the solubility products of their carbonates are exceeded.[209]" The uniformitarian position, in contrast, claims limestone formation by lime-secreting organisms inhabiting the bottoms of shallow seas, but there is admission of the chemical aspects of limestone formation being given " . . . little or no attention.[210]"

Certain widespread, abrupt, clastic-mixed limestone bed thickenings admittedly mitigate the necessity of alleged marine incursions.[211] "The Pennsylvanian limestones vary greatly in character. Some of them are earthy, shaley, or impure, but others are quite pure and dense.[212]" also is observed the ". . . massive, blocky nature of some beds and thin, wavy bedding of other limestones.[213]" The Flood-blind uniformitarian position is perplexed by the variations: "The significance of some types of deposits is not understood. For example, the cause of variation in types of limestone . . . is largely unknown.[213]" The observed limestone variations are much better explained in terms of locally-variable chemically-reacting FMM's rather than monotonous, tranquil shallow seas of old. The gradation of limestones into clastics[212] and ". . . common . . . intraformational conglomerates . . . and . . . sandstone lenses . . .[214]" within them further confirm their FMM origin (because of definitely transported clastic lenses in them).

4. The Sandstones (Member 1)

Of the water-sorted clastics, these are the thickest in grain size, Geometrically, the sandstones have several basic shapes; namely, the sheets (relatively wide areal extent but less than 20 feet thick) and elongates (much thicker 20-105 ft.) but narrower (25 ft. to 2-3 miles), filling channels (or gullies)[215] "Virtually all Pennsylvanian sandstones contain both sheet and elongate sand bodies.[92]" The elongates fill channels (gulleys) which ". . . range from small cut-and-fill structures within the formational boundaries to large channels that were eroded into the underlying formations.[216]" Thus, while Fig. 1 portrays the channel terminating in Member 10A, the channels frequently cut into 2 or more subjacent cyclothems.

As previously discussed, the uniformitarians stumble in attempting to understand the sandstones in terms of presently-operating sedimentary environments: "Opinions have varied as to whether the infilling of the channel was alluvial, part alluvial and part marine, or exclusively marine.[217]" The fact that ". . . the sandstones have a dendritic pattern, thicken in the direction of the dip . . .[218]" is claimed to indicate fluvial sedimentaiton whereas ". . . equidimensional quartz grains . . .[219]" orientation trends contraindicatively reveal a would-be upstreamward water flow. The channels have been also ascribed to deltaic distributary systems ". . . but their abrupt entrenchment and the absence of any indication of natural levees suggest that they do not mark

distributaries of aggrading streams in a deltaic area.[220]"

Just as an individual believing only in apples and cherries would have difficulty telling which of the two a strawberry, is, so analogously the Flood-rejecting, present-process believing uniformitarian has difficulty assigning these Flood deposits to presently-operating sedimentational processes.

FMM dynamics easily explain the different sedimentary/stratigraphic properties of sandstone. For example, the waxing-in-competence cyclothem-generating FMM lays down the fining-downward sequence and then, at maximum competency (contemporaneous with or immediately following sandstone deposition), the FMM torrents sometimes erode gulleys into the just-deposited sandstone (and below), forming the channel sandstones. The observed coexistence of tributary and distributary filled-channel patterms[221] and other above-mentioned phenomena are caused by local-slope variations giving rise to differential direction FMM bifurcation or coalescing.

That erosion of the gulleys was admittedly ". . . rapid . . . [222]" and that neither local increase in slope[223] nor emergent conditions[224] were necessary for FMM gulley erosion further clarified the nature of the FDM at that part of the FMM flow. Of utmost importance, however, is the fact that local floods readily erode gulleys in (especially unconsolidated) sediment.[225] The sandstone sheets grade into elongates,[226] reflecting the continuous tempo of FMM erosion-deposition, whereas the usual fining-upward trends in filled channels reflect the initiation[227] of the waning phase of the cyclothem-generating FMM flow.

5. The Shales (Members 6, 8A-B, 10A)

". . . the shales comprise by far the larger part of the sedimentary lithological column . . .[228]" and also of cyclothems, portraying the awesome magnitude of chemical weathering of the anteDiluvian supracratonic material. That ". . . shales differ from clays . . . only in being bedded or laminated.[229] attests to the fact of rapid-flowing fore-FMM properties in contrast to the stagnancy and particle-sameness of underclay deposition. The shales have a layer which is black and fissile (member 8A), reflecting reducing conditions, but also these "Black shales probably are more a function of *rapid deposition* than of restricted chemical circulation.[230]" (emphasis added).

Pertaining to these very-persistent black shales, there are ". . . several lines of evidence pointing to a widespread mat of vegetation covering the surface of the water.[231]" and ". . . these beds extend without appreciable change far to the west and far beyond the coal beds of their cyclothems[232]" These properties suggest that FMM's washed reducing vegetal "broth" (and plants) from the previous FMM-deposited pre-coalified vegetal surficial layer, incorporating it in the shale above the coal and downcurrent into Kansas (forming the black shale stratigraphic equivalents of coal there). The observed grading-upward of black shale into the main gray shale[233] (members 8B, 10A) marks the point where reducing conditions caused by the subjacent vegetal mass ceased having their chemical effect, whereas the ". . . fairly well preserved impressions of land plants and somewhat MACERATED land plant remains.[234]" found in black shales further corroborates their rapid deposition and origin from precoalified-material flowoff. (Emphasis added.)

CONCLUSION: The basic sedimentary, stratigraphic, and tectonic properties observed in cyclothemic rock provide a picture of the recessional aspects of the Flood.

VI. Epilogue

Diluvialists must always remember that uniformitarianism is not a scientific fact, but an *a priori* atheistic worldview controlling disciplines studying origins. This viewpoint must be balanced by Diluvialists who work from the polar-opposite pro-God worldview. The rise of uniformitarianism (and consequent denial of the Creation and the Flood) is a striking fulfillment of Biblical prophecy (2 Peter 3:3-9). The Diluvian position is just as scientific (if not far more so, because it explains data more fully and simply) as any uniformitarian application. It is hoped that this work will greatly enrich the Diluvian position.

REFERENCES

AAPG—American Association of Petroleum Geologists Bulletin
AJS—American Journal of Science
CONG—18th Interntional Geological Congress (Great Britain) Report, part 4
DIS—Developments in Sedimentology
EPC—Elsevier Scientific Publishing Company: Amsterdam, London, New York
FGM—Fieldiana, Geological Memoir: Natural History Museum, Chicago
GM—Geological Magazine
GSAB—Geological Society of America Bulletin
GSAP—Geological Society of American Abstracts and Programs (Annual Meetings)
GSASP—Geological Society of America Special Paper
GSL—Quarterly Journal of the Geological Society of London
IGS—Illinois State Geological Survey Circular
IGSRI—Illinois State Geological Survey Report of Investigations
JG—Journal of Geology
JSP—Journal of Sedimentary Petrology
JWS—John Wiley and Sons, New York
KGS—Kansas State Geological Survey Bulletin
MM—MacMillan and Co., London
OB—Oliver and Boyd, Edinburgh, London
PGS—Pennsylvania State Geological Survey Bulletin, 4th Series
SEPM—Society of Economic Minerologists and Paleontologists Special Publ.
SV—Springer-Verlag, Berlin, Heidelberg, New York

[1]Weller J. M. 1956. Argument for diastrophic control of late Paleozoic cyclothems. *AAPG* 40(1)38
[2]Potter P. E. 1962. Regional distribution patterns of Pennsylvanian sandstone in Illinois Basin. *AAPG* 46(10)1890
[3]Wanless H. R. and J. M. Weller. 1932. Correlation and extent of Pennsylvanian cyclothems. *GSAB* 43(4)1006.
[4]Weller, 1956. *op. cit.*, p. 48
[5]*Ibid*, p. 17
[6]*Ibid*, p. 18
[7]*Ibid*, pp. 17-50
[8]Beerbower J. R. 1961. Origin of cyclothems of the Dunkard Group (Upper Pennsylvanian, Lower Permian) in Pennsylvania, West Virginia, and Ohio. *GSAB* 72:1029-1050.
[9]Simeons G. 1918. First contribution to the study of the coal measures' classification of the South Wales coal field, based on the theory of sedimentary cycles. *Tonypandy* 83pp..
[10]Stout W. 1923. Theory of The origin of coal formation clays. *Ohio Geological Survey Bulletin* 26, Series 4, pp. 533-568
[11]Hudson, R. G. 1924. On the rhythmic succession of the Yoredale Series in Wensleysdale. *Proceedings Yorkshire Geological Society* 20:125-135.

[12]Brough J. 1928., On rhythmic deposition in the Yoredale Series. *Proceedings of University of Durham Philosophical Society* 8:116-26
[13]Weller J. M. 1930. Cyclic sedimentation of the Pennsylvanian period and Its Significance. *JG* 38:97-135
[14]Weller. 1956. *op. cit.* pp. 44-50.
[15]Wanless H. R. and F. P. Shepard. 1936. Sea level and climatic changes related to late Paleozoic cycles. *GSAB* 47:1177:1206.
[16]Whitcomb J. C. and H. M. Morris. 1961. *The Genesis Flood* Baker, Mich. p. 245-8.
[17]Robertson T. 1948. Rhythm in sedimentation and its interpretation with particular reference to the Carboniferous sequence. *Transactions Edinburgh Geological Society* 14:141-75.
[18]VanDerHeide S. 1950. Compaction as a possible factor in upper Carboniferous rhythmic sedimentation. *CONG* p. 38-45.
[19]Rhodes F. H. T., *et.al.* 1971. Undergraduate geology: a strategy for design of curricula. *American Geological Institute CEGS Publication* 8, p. 11.
[20]Albritton C. C. J., ed., 1967. Uniformity and simplicity; a symposium on the principle of the uniformity of nature. *GSASP* 89, P. RONDO.
[21]*Ibid.*, p. 1, 2
[22]Hubbert M. K. 1967. Critique of the principle of uniformity *GSASP*, 89, pp. 29-30
[23]Goodman N. 1967. Uniformity and simplicity, *GSASP* 89, p. 95.
[24]*Ibid.*, p. 99
[25]Bott, M.H.P. and G.A.L. Johnson. 1967. The controlling mechanism of Carboniferous cyclic sedimentation. *GSL* 122:421
[26]_____ 1965. American Commission on Stratigraphic Nomenclature; Definition of Geological Systems. *AAPG* 49(10)1966.
[27]Spencer, R.S. and W.S. Rogers. 1970. Reworked Paleozoic Fossils in Pleistocene sediments of southeastern Virginia. *GSAB* 81:263-6.
[28]Peppers, R.A. 1964. Spores in strata of late Paleozoic cyclothems in the Illinois basin. *IGS.* 90, p. 9.
[29]Scholl, D.W., Greene, G.H., and M.J. Marlow. 1970. Eocene age of the Adak "Paleozoic(?)" rocks, Aleutian Islands, Alaska. *GSAB* 81:3598.
[30]Trueman, A.E. 1946. Stratigraphic problems in the coal measures of Europe and North American. *GSL* 102:1i
[31]Moore, R.C. 1949. Division of the Pennsylvanian system in Kansas. *KGS* 83:19
[32]*Ibid.*, p. 21.
[33]Wanless, H.R. 1939. Pennsylvanian correlations in the eastern interior and Appalachian coal fields. *GSASP* 17, p. 71.
[34]Sabins, F.F. 1964. Symmetry, stratigraphy, and petrography of cyclic Cretaceous deposits in San Juan basin. *AAPG* 48(3)316.
[35]Trueman. 1946. *op.cit.*, p. 1i
[36]Hedberg H.D. 1959. Towards harmony in stratigraphic classification. *AJS* 679:257
[37]Moore, R. C., *et. al.*, 1951. The Kansas rock column. *KGS* 89, p. 117.
[38]Wanless H.R. 1955. Pennsylvanian rocks of eastern interior basin. *AAPG* 39:1764-5.
[39]Lee J.S. 1939. *The geology of China.* Thomas Murby & Co., London, p. 276.
[40]Wadia D.N. 1953. *The geology of India.* MM: p. 338.
[41]Siever R. 1951. The Mississippian-Pennsylvanian unconformity in southern Illinois. *AAPG* 35(3)547.
[42]*Ibid.*, p. 548.
[43]Englund K.S. and H.L. Smith. 1960. Intertonguing and lateral gradation between Kentucky, Tennessee, and Virginia. *GSAB* 71:2015.
[44]Vischer G.S., Saitta S.B. and R.S. Phares. 1971. Pennsylvanian delta patterns and petroleum occurrences in eastern Oklahoma. *AAPG* 55(8)1208-9.
[45]Milic, R. C. 1974. Stratigraphy and depositional environments of upper Mississipian and lower Pennsylvanian rocks in the souther Cumberland Plateau of Tennessee. *GSASP* 148, pp. 120-1.
[46]Horne J.C. Ferm J.C. and J.P. Swinchatt. 1974. Depositional model for the Mississippian-Pennsylvanian boundary in northeastern Kentucky. *GSASP* 148, p. 113.
[47]Wanless and Shepard. 1936. *op.cit.*, p. 1180.
[48]Dutro J.T. 1976. Carboniferous geology examined. *Geotimes* 21(3)18.
[49]Takai, *et.al.*, ed. 1963. *Geology of Japan.* Tokyo University Press, Tokyo. p. 45.
[50]Jackson W.E. 1964. Depositional Copography and cyclic deposition in west-central Texas. *AAPG* 48(3)328.
[51]Horne, *et.al.* 1974. *op.cit.*, p. 98.
[52]Pryor W.A. and E.G. Sable. 1974. Carboniferous of the eastern interior basin. *GSASP* 148, p. 309.
[53]Siever R. 1957. Pennsylvanian sandstone of the eastern interior coal basin.*JSP* 27(3)231.
[54]Moore R.C. 1936. Stratigraphic classification of the Pennsylvanian rocks of Kansas. *KGS* 22, p. 21.
[55]Beutner E.C. *et.al.* 1967. Bedding geometry in a Pennsylvanian channel sandstone. *GSAB* 78:911.
[56]Swann D.H. 1964. Late Mississippian rhythmic sediments of Mississippi valley. *AAPG* 48(5)652.
[57]Weller. 1956. *op.cit.* p. 30.
[58]Beerbower. 1961. *op.cit.*, p. 1033.
[59]Gentile R.H. 1968. Influence of structural movement on sedimentation during the Pennsylvanian period in eastern Missouri. *University of Missouri Studies* Volume XLV, p. 10.
[60]Dott R.H. 1963. Dynamics of subaqeous gravity depositional processes. *AAPG* 47:107
[61]Bristol H.M. and R.H. Howard. 1974. Sub-Pennsylvanian valleys in the Illinois basin and related Chesterian slump blocks. *GSASP* 148, p. 315.
[62]*Ibid.*, pp. 321-4.
[63]Laury R.L. 1971. Stream-bank failure and rotational slumping: preservation and significance in the Geologic record. *GSAB* 82:1251.
[64]Schwarzacher W. 1975. Sedimentation models and quantitative stratigraphy *DIS* 19, EPC, p. 17.
[65]Schaffer N.R. and G. Faure. 1976. Regional variation of $^{87}Sr/^{86}Sr$ ratios and mineral composition of sediment from the Ross Sea, Antarctica. *GSAB* 87:1491.
[66]Slusher H.S. 1973. *Critique of radiometric dating. ICR Technical Monograph* 2, p. 32.
[67]Brookins D.G. and S.D. Voss. 1970. Age dating of muscovites from Pennsylvanian sandstones near Wamego, Lansas. *AAPG* 54(2)356.
[68]Gentry R.V. 1976. Radiohalos in coalified wood: new evidence relating to the time of uranium introduction and coalification. *Science* 194(4262)317.
[69]*Ibid.*, pp. 316-7.
[70]Winston G.O. 1972. Oil occurrence and lower Cretaceous carbonate-evaporite cyclothems in southern Florida. *AAPG* 56(1)158-60.
[71]Moore R.C. 1950. Late Paleozoic cyclic sedimentation in central U.S. *CONG*, p. 11.
[72]Ager D.V. 1973. The Nature of the stratigraphic record. *JWS* pp. 6-7.
[73]Beerbower. 1961. *op.cit.*, p. 1031.
[74]Nalivkin D.V. 1973. *Geology of the USSR.* OB. p. 271.
[75]Haughton S.H. 1963. *The Stratigraphic history of Africa south of the Sahara.* OB. p. 203, 230, 221.
[76]*Ibid.* p. 235.
[77]Flores-Williams H. 1968. Chilean, Argentine, and Bolivian coals. *GSAP* 1968, p. 209.
[78]Hill D., ed. 1961. Geological results of petroleum exploration in western Papua. *Journal of the Geological Society of Australia* 8(1)10-11.
[79]Lee (1939) *op.cit.*, pp. 139-40.
[80]Kangma J.T. 1974. *The geological structure of New Zealand.* JWS pp. 132-3, 5.
[81]Takai *et.al.*, ed. 1963. *op.cit.* p. 70, 152.
[82]Wells, A. J. 1960. Cyclic sedimentation; a review. *GM* 97:401.
[83]Trueman A.E. 1948. The telation of rhythmic sedimentation to crustal movement. *Science Progress* 36:202-3.
[84]Long W.E. 1965. Stratigraphy of the Ohio Range, Antactica. *American Geophysical Union Publication* 1299, pp. 79, 107-8.
[85]Wanless H.R. Tubb J.B. Jr., Gednetz D.F. and S.L. Weiner. 1963. Mapping sedimentary environments in Pennsylvanian cycles. *GSAB* 74:438.
[86]Irwin M.L. 1965. General theory of epeiric clear-water sedimentation. *AAPG* 49(4)445.
[87]Beerbower. 1961. *op.cit.*, p. 1041.
[88]Duff, M. Mc. L., Hallam, A., and Walton, E. K., 1967 Cyclic sedimentation DIS 10, EPC, p. 250.
[89]Carss B.W. and N.S. Neidell. 1966. A Geological cyclicity detected by means of polarity coincidence correlation. *Nature* 212:137.
[90]Beutner, *et.al.* 1967. *op.cit.* p. 911.

[91]Kranz P.M. 1974. The anastrophic burial of bivalves and its paleoecological significance. *JG* 82:237.
[92]Potter. 1962. *op.cit.*, p. 1894.
[93]Englund K.S. 1974. Sandstone distribution patterns in the Pocahontas formation of southwest Virginia and southern West Virginia and *GSASP* 148, p. 37.
[94]Wilson. C.W. and R.G. Stearns. 1960. Pennsylvanian marine cyclothems in Tennessee. *GSAB* 71:1457.
[95]Schlee J. 1963. Early Pennsylvanian currents in the southern Appalachians. *GSAB* 74:1442.
[96]Wells. 1960. *op.cit.*, 391.
[97]Dott. 1963. *op.cit.*, p. 10.
[98]Milici R. 1969. Nonmarine deposition of basal Pennsylvanian strata in the southeast Cumberland Plateau of Tennessee. *GSAP* 1969, 1(4)53.
[99]Duff, *et.al.* 1967. *op.cit.*, p. 41.
[100]Wanless, 1939. *op.cit.*, p. 9.
[101]Broadhurst F.M. and D. Magraw. 1959. On a fossil tree found in an opencast coal site near Wegan, Lancashire. *Liverpool Manchester Geological Journal* 2:156.
[102]Shabica C.W. 1970. Depositional environments in the Francis Creek shale. *Illinois State Geological Survey Guidebook Series #8*, pp. 48-9.
[103]Zaritskiy P.V. Erratic boulders in coal of the Donbas. *Doklady: Earth Science Sections* (American Geological Institute Translation) 213:156-7.
[104]Fansa L.F. and A.V. Carozzi. 1970. Exotic Pebbles in LaSalle limestone (Upper Pennsylvanian), LaSalle, Illinois. *JSP* 40:693.
[105]Miller B.L. 1934. Limestones of Pennsylvania. *PGS* M20, p. 57.
[106]Shabica C.W. 1977. Sedimentary structures from the Carbondale formation (lower Pennsylvanian) of northern Illinois. *FGM* (in print), p. 15.
[107]*Ibid.*, p. 27.
[108]Reineck H.E. and I.B. Singh. 1973. *Depositional sedimentary environments* SV p. 154.
[109]Middleton G.V. 1973. Johannes Walther's law of the correlation of facies. *GSAB* 84:983.
[110]Schwarzacher. 1975. *op.cit.*, p. 39.
[111]Frey. R.W., ed. 1975. *The study of trace fossils.* SV., p. 31.
[112]Burton C.K. 1970. Lower Paleozoic rocks of Malay Peninsula: discussion. *AAPG* 54(2)357.
[113]Reineck and Singh. 1973. *op.cit.*, p. 412.
[114]Wilson and Stearns. 1960. *op.cit.*, pp. 1457-8.
[115]Sloss L.L. 1962. Stratigraphic models in exploration. *AAPG* 46(7)1050-1.
[116]Passega R. 1962. Problem of comparing ancient with recent sedimentary deposition. *AAPG* 46(1)117.
[117]Bott and Johnson. 1967. *op.cit.*, pp. 440-1.
[118]Carrigy M.A. 1971. Deltaic sedimentation in Athabasca tar sands. *AAPG* 55:1155.
[119]Glaeser J.D. 1974. Upper Devonian stratigraphy and sedimentary environments in northeastern Pennsylvania. *PGS General Geology Report* 63, pp. 6-7.
[120]Manos C. 1967. Depositional environments of Sparland cyclothem (Pennsylvanian), Illinois and Forest City basins. *AAPG* 51)9)1847.
[121]Martin W.D., Henniger B.R. 1969. Mather and Hockingport sandstone lentils (Pennsylvanian and Permian) of Dunkard basin, Pennsylvania, West Virginia and Ohio. *AAPG* 53:296.
[122]Jansa L. 1972. Depositional history of the coal-bearing upper Jurassic-lower Cretaceous Kootenay Formation, southern Ricky Mtsn, Canada. *GSAB* 83:3200.
[123]Walker R.G. 1971. Nondeltaic depositional environments in the Catskill Clastic wedge, (upper Devonian) of central Pennsylvania. *GSAB* 82:1305.
[124]Johnson R.G. 1962. Interspecific associations in Pennsylvanian fossil assemblages. *JG* 70:49-50.
[125]Hedberg. 1959. *op.cit.*, p. 677.
[126]Cloud P.E. 1960. Gas as a sedimentary and diagenetic agent. *AJS* 258A:43.
[127]Shabica C.W. 1971. Depositional environments in the Francis Creek shale and dissociated strata. *University of Chicago PhD Thesis*, p. 174.
[128]Beerbower, 1961. *op.cit.*, p. 1043.
[129]*Ibid.* p. 1036.
[130]Wanless and Shepard. 1936. *op.cit.*, p. 1187.
[131]Weller. 1956.*op.cit.*, p. 28.
[132]Wanless. 1939. *op.cit.*, p. 6.
[133]Roux W.F. Jr. and S.F. Schindler. 1973. Late Mississippian cyclothems of Heath Formation, western North Dakota. *AAPG* 57(5)961.
[134]Vischer G.S. 1965. Use of vertical profile in environmental reconstruction. *AAPG* 49(1)43.
[135]Padgett G.V. and R. Ehrlich. 1976. Paleohydrologic analysis of a late Carboniferous fluvial system, southern Morocco. *GSAB* 87:1104.
[136]Wheeler H.E. and H.H. Murray. 1957. Base-level control patterns in cyclothemic sedimentation. *AAPG* 41(9)1988.
[137]Selley R.C. 1970. *Ancient sedimentary environments.* Cornell University Press, Ithaca, New York., p. 6.
[138]*Ibid.* p. 212.
[139]*Ibid*, p. 217.
[140]Shabica. 1977. *op.cit.*, p. 3.
[141]Van Bemmelen R.W. 1972. *Geodynamic models.* EPC, p. 21.
[142]Dickinson W.R., ed. 1974. Tectonics and sedimentation. *SEPM* 22:2.
[143]Zangerl R. and E.S. Richardson. 1963. The paleoecological history of two Pennsylvanian black shales. *FGM* 4:22.
[144]Trueman. 1948. *op.cit.*, p. 203.
[145]Wells. 1960. *op.cit.*, p. 391.
[146]Johnson J.G. 1971. Timing and coordination of orogenic, epiorogenic, and eustatic events. *GSAB* 82:3263.
[147]Keith M.L. 1972. Ocean-floor convergence: a contrary view of global tectonics. *JG* 80:273.
[148]Bott M.H.P. 1964. Formation of sedimentary basins by ductile flow of isostatic origin in the upper mantle. *Nature* 201 (4924)1082-4.
[149]Bott and Johnson. 1967. *opcit.*, p. 433.
[150]Wanless H.R. 1964. Local and regional factors in Pennsylvanian cyclic sedimentation. *KGS* 169(2)604.
[151]*Ibid.* p. 603.
[152]Ferm J.C. and J.W. Huddle. 1955. Slump and mud flows of Pennsylvanian age in the Appalachian plateau. *GSAB* 66:1557.
[153]Stearns R.G. and R.C. Milici. 1967. Structure of the southern Appalachian coal field and its origin. *GSAP* 1967, p. 212.
[154]Koenig J.B. 1956. The petrography of certain igneous dikes of Kentucky. *Kentucky Geological Survey Bulletin* 21, Series IX, p. 52.
[155]Spears D.A. 1970. A kaolinite mudstone (tonstein) in the British coal measures. *JSP* 40:386.
[156]Damberger H.H. 1974. Coalification patterns of Pennsylvanian coal basins of the eastern U.S. *GSASP* 153, p. 53.
[157]*Ibid.* p. 56.
[158]Dott. 1963. *op.cit.*, p. 124.
[159]Koinm D.N. and P.A. Dickey. 1967. Growth faulting in McAlester basin of Oklahoma. *AAPG* 51(5)718.
[160]Hunt S.R., Nelson J.W., and G.G. Treworgy. 1976. Soft-sediment deformation in the Pennsylvanian strata of southern Illinois. *GSAP* 1976 18(6)933.
[161]Gentile. 1968. *op.cit.*, p. 46.
[162]McGinnis L.D. 1966. Crustal tectonics and PreCambrian basement in northeast Illinois. *IGSRI* 219:20.
[163]Koppe E.F. 1967. Petrography of coal in the Houtzdale quadrangle, Clearfield County, Pennsylvania. *PGS* M55, p.3.
[164]Weller J.M. and A.H. Sutton. 1940. Mississippian border of easter interior basin. *AAPG* 24(5)852.
[165]Frye J.C. 1950. Origin of Kansas great plains depressions. *KGS* 86(1)3.
[166]Brandon A. 1972. Clastic dykes in the Namurian shales of County Lutrim, Republic of Ireland. *GM* 109:366.
[167]Nichelson R.P. and V.N.D. Hough. 1967. Jointing in the Appalachian plateau. *GSAB* 78:624.
[168]Gresley W.B. 1898. Clay veins vertically intersecting coal measures. *GSAB* 9:50.
[169]Shaw A.B. 1964. *Time in stratigraphy.* McGraw Hill, New York., p. 7.
[170]Wanless and Shepard. 1936. *op.cit.*, p. 1186.
[171]Wanless. 1955. *op.cit.*, p. 1800.
[172]Weller. 1956. *op.cit.*, p. 34.
[173]Bishop D.G. and E.R. Force. 1969. The reliability of graded bedding as an indicator of the order of superposition. JG 17:351.
[174]Unpublished Illinois Geological Survey drill-bore stratigraphic logs of cyclothems in north-central Illinois.
[175]Broadhurst F.M. and D.H. Loring. 1970. Rates of sedimentation in the upper Carboniferous of Great Britain. *Lethaia* 3:1-9.
[176]Shabica. 1977. *op.cit.*, p. 32.
[177]Weller. 1956. *op.cit.*, p. 35.
[178]Reineck and Singh. 1973. *op.cit.*, p. 104.

[179]Siever. 1957. *op.cit.*, p. 247.
[180]*Ibid.* p. 246.
[181]Wheeler and Murray. 1958. *op.cit.*, p. 445.
[182]Moore. 1950. *op.cit.*, p. 8.
[183]Potter P.E. and W.A. Pryor. 1961. Dispersal centers of Paleozoic and later clastics of the upper Mississippi valley and adjacent areas. *GSAB* 72:1195.
[184]*Ibid*, p. 1227.
[185]Williams E.G. 1960. Relationship between the stratigraphy and petrography of Pottsville sandstone and the occurrence of high-alumina Mercer clay. *Economic Geology* 55:1301.
[186]Schlee. 1963. *op.cit.*, p. 1448.
[187]Siever R. 1959. Petrology and geochemistry of silica sedimentation in some Pennsylvanian sandstones. *SEPM* 7:78.
[188]Schopf J.M. 1970. Petrified peat from a Permian coal bed in Antarctica. *Science* 169(3942)276.
[189]Davis, *et.al.* 1960. High-temperature-pressure studies of wood. *GSAP* 1960, p. 80.
[190]Cohen A.D. 1970. An allochthonous peat deposit from southern Florida. *GSAB* 81:2477.
[191]Wanless H.R. 1931. Pennsylvanian cycles in western Illinois. *IGS* 60, p. 173.
[192]Gray H.H. 1962. Sedimentary barriers and the deposition of coal-bearing rocks. *GSAP* 1962, p. 62A.
[193]Swinehart J.B. and E.G. Williams. 1970. Influence of the continental and marine paleotopography on the continental and marine cycles of the lowest Conemaugh and Allegheny, western Pennsylvania. *GSAP* 1970 2(1)38.
[194]Kope E.F. 1963. Petrography of the upper Freeport coal. *PGS* M48, p. 29.
[195]Wanless. 1931. *op.cit.*, p. 172.
[196]Nalivkin. 1973. *op.cit.*, p. 470.
[197]Koppe. 1967. *op.cit.*, p. 15.
[198]Weller. 1930. *op.cit.*, p. 108.
[199]Gluskoter A.J. 1965. Clay minerals in Illinois coals. *GSAP* 1965. p. 63.
[200]Wilson and Stearns. 1960. *op.cit.*, p. 1455.
[201]Rupke N.A. 1969. Sedimentary evidence for the allochthonous origin of stigmaria, Carboniferous, Nova Scotia. *GSAB* 80:2109.
[202]*Ibid*, p. 2112.
[203]Rupke N.A. 1970. (same title): Reply. *GSAB* 81:2536.
[204]Schultz L.G. 1958. Petrology of underclays. *GSAB* 69:391.
[205]Weller. 1930. *op.cit.*, pp. 123-4.
[206]Weller. 1956. *op.cit.*, p. 33.
[207]Schultz. 1958. op.cit., p. 382.
[208]O'Brien N.R. 1964. Origin of Pennsylvanian underclays in the Illinois basin. *GSAB* 75:829.
[209]Zeller E.J. and J.L. Wray. 1956. Factors influencing the precipitation of calcium carbonate. *AAPG* 40(1)143.
[210]*Ibid*, p. 150.
[211]Harbaugh J.W. 1964. Significance of marine banks in southeast Kansas in interpreting cyclic Pennsylvanian sedimentation. *KGS* 169(1)199.
[212]Weller. 1930. *op.cit.*, p. 127.
[213]Moore. 1950. *op.cit.*, p. 14.
[214]Miller, 1934. *op.cit.*, p. 40.
[215]Potter. 1962. *op.cit.* p. 1910.
[216]Mudge M.R. 1956. Sandstone and channels in upper Pennsylvanian and lower Permian in Kansas. *AAPG* 40(4)654.
[217]Duff, *et.al.* 1967. op.cit., p. 108.
[218]Friedman S.A. 1957. Distribution, thickness, and origin of sinuous sandstone lenses of the Allegheny series, Vigo County, Indiana. *GSAB* 68:1731.
[219]Wanless. 1955. *op.cit.*, p. 1778-1800.
[220]Weller. 1956. *op.cit.*, p. 29.
[221]Potter P.E. 1962B. Shape and distribution pattersn of Pennsylvanian sand bodies in Illinois. *IGS* 339:14.
[222]Weller. 1930. *op.cit.*, pp. 116-7.
[223]Trueman, 1946. *op.cit.*, p. 1x
[224]Beerbower. 1961. *op.cit.*, p. 1040.
[225]Scheideggar A.E. 1975. *Physical aspects of natural catastrophes.* EPC, pp. 197-8.
[226]Potter. 1962B., *op.cit.* p. 8.
[227]*Ibid*, p. 3.
[228]Krumbein W.C. 1947. Shales and their environmental significance. *JSP* 17(3)101.
[229]Grim R.E., Bradley W.F. and W.A. White, 1957. Petrology of the Paleozoic shales of Illinois. *IGSRI* 203, p. 5.
[230]Krumbein. 1947. *op.cit.*, p. 106
[231]Zangerl and Richardson. 1963. *op.cit.*, p. 30.
[232]Weller. 1956. *op.cit.*, p. 32.
[233]Gentile. 1968. *op.cit.* p. 25.
[234]Moore. 1950. *op.cit.*, p. 8.

A Remarkable Bit of Foresight

"If you drop any science out of the circle of knowledge, you cannot keep its place vacant for it; that science is forgotten; the other sciences close up, or, in other words, they exceed their proper bounds, and intrude where they have no right. For instance, I suppose, if ethics were sent into banishment, its territory would soon disappear, under a treaty of partition, as it may be called, between law, political economy, and physiology; what, again, would become of the province of experimental science, if made over to the Antiquarian Society; or of history, if surrendered out and out to Metaphysicians? The case is the same with the subject-matter of Theology; it would be the prey of a dozen various sciences if Theology were put out of possession; and not only so, but those sciences would be plainly exceeding their rights and their capacities in seizing upon it. They would be sure to teach wrongly, where they had no mission to teach at all . . . The human mind cannot keep from speculating and systematizing; and if Theology is not allowed to occupy its own territory, adjacent sciences, nay, sciences which are quite foreign to Theology, will take possession of it. And this occupation is proved to be a usurpation by this circumstance, that these foreign sciences will assume certain principles as true, and act upon them, which they neither have authority to lay down themselves, nor appeal to any other higher science to lay down for them."

J. H. Newman, in Discourse IV of his discourses later collected in his *The Idea of a University*, about 1852-1855. This is given in the selections *The Uses of Knowledge*, edited by Leo L. Ward, published by Appleton-Century-Crofts, New York, 1948.

Good and Very Good

". . . in the Book of Genesis it is said: 'God saw all the things that He had made, and they were very good', each one of them having been previously said to be good. For each thing in its nature is good, but all things together are very good, by reason of the order of the universe, which is the ultimate and noblest perfection in things."

St. Thomas Aquinas, *Summa Contra Gentiles*, Book II, Chapter 45.