ARCHAEOLOGY AND CREATION SCIENCE

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ABSTRACT

In order to integrate Biblical creation science with the modern discipline of archaeology, creation science itself must become unified, specific, sequential, and definitive. Only then can it provide a basic geochronological framework for interpreting archaeology. This paper will explore three Biblical creationist models: a development of the post-Flood Ice Age, a treatment of continental separation, and a mathematical equation which translates carbon-14 age data into real-time equivalents. It will apply these models to uniformitarian ages of ancient cultures, using a Biblical chronology, to begin the process of re-evaluating prehistoric archaeology from the perspective of Biblical creation science.

INTRODUCTION

To develop a complete, systematic, Biblical creation science paradigm requires defining the various aspects of the general model with a view toward integrating it with other disciplines and sciences. We recognize that these disciplines have already become fairly well developed from quite a different perspective. One distinctive of Biblical Creationism is its insistence on a young earth. The present structure of prehistoric archaeology is built on a framework of long ages. In order to reinterpret archaeology from a Biblical perspective, we must radically revise conventional timescales for human cultural development and migration during the Holocene. To accomplish this, we must set forth definitive proposals regarding Biblical chronology, the relative sequence of major geological events, and causative mechanisms for the succession of those events.

The modern discipline of archaeology is the study of the remains of specific objects fashioned by human hands, from prehistoric to modern times. This study requires a careful examination of the antiquities, which is seldom controversial; and then a thoughtful interpretation of the evidence, which is often very controversial! To interpret archaeological artifacts in the light of Biblical creation science, we must first establish a reasonable chronology which both satisfies the requirements of young-earth creationists and allows sufficient time for the necessary geological and archaeological developments to occur. Within that chronology, we will see that some of the epochs or periods into which archaeologic prehistoric time has been divided are contemporary with each other. In fact, they are not epochs at all, but merely different patterns of material culture, grouped for technological convenience, some of which are successive in certain geographic localities.

UNIFORMITARIAN PREHISTORIC ARCHAEOLOGY

One's view of the past is conditioned not only from material evidence, but from the presuppositions one accepts. Meaningful arrangements of the data can only be made within the framework of some sort of conceptual model which will permit their interpretation. Standard prehistoric archaeological models are largely evolutionary in their presuppositions. However, we can take the same human artifacts that have been interpreted from an evolutionary perspective and set them forth in a Scriptural perspective. This demonstrates that accepting evolution as a world view is a choice that one makes, rather than an intellectual imperative. We can develop a new, more compressed interpretation of pre-history. We can re-think the generally-accepted chronology and develop a system that is compatible with the chronological data in Genesis. This will require a revision of some widely-accepted

interpretations, but would be a significant advance in the development of a complete creation paradigm.

DISCORDANCE IN CHRONOLOGY

Since archaeology deals with man-made artifacts, the junction between creation science and archaeology is basically the immediate post-Flood environment. A Biblical creationist looking at the past four or five thousand years in archaeology, will generally be content with the findings and their proposed dating schemes, since many interpretations are supportive and illustrative of the Biblical narrative. But, moving back in the past, the closer one comes to the time of the Genesis Flood, the more discontented the creationist will be. He can co-exist reasonably happily with the Egyptologist and the Sumerologist, but will find great difficulties in relating to the observations and conclusions of the pre-historic archaeologist.

An international symposium held in La Jolla, California in January, 1993, brought together prominent Biblical archaeologists and prehistorians from Israel, England, France, Canada, and the United States. These scholars presented 31 papers covering, in chronological order, the "history of the Holy Land from 120,000 B.C. to the present" [24]. This illustrates our basic difficulty. The problem is not the raw data, the actual physical remains that are discovered, nor really with the relative sequence into which these artifacts are placed. It is simply the inflated ages assigned to early artifacts.

This is particularly obvious in the case of early villages and construction. On the face of it, any construction found anywhere in the world, must be declared "post-Flood" by a Biblical creationist, because the Deluge we postulate must have destroyed any pre-Flood buildings that existed. Therefore, as far as in-situ village sites and their associated artifacts are concerned, creationism will declare them all post-Flood. Furthermore, creationists declare the shallow Pleistocene deposits with their associated artifacts post-Flood as well. Depending on the date we assign to the Genesis Flood, then, we will find that we cannot accept a good number of the dates that evolutionary prehistoric archaeology assigns to various early discoveries.

If the only purpose of the Biblical creationist were to place the broad spectrum of prehistoric man within the larger framework of creationism, the safest position would be to rest content within the wider limits of the period between the Flood and Abraham. Simply left like this, there would be no danger of grave miscalculation. But the subject is of such interest and importance that it urges the student to attempt the risky task of placing events and cultures more exactly.

The modern discipline of archaeology is basically undergirded by four major dating methods. (There are various means, but they can fall into these classifications.) First is the historical method: actual written records supply human testimony to events and places. Second is the relative method supplied by typology and stratigraphy: younger cultures have lived on top of older cultures that were there before them. Third, archaeology has reference to certain geochronological constructs. The Alpine model, or the concept of the four Pleistocene ice ages, accommodates the entire Paleolithic [13]. And fourth is the method of radiocarbon dating, which supplies coherence and a measure of "proof" to the last stages of the model.

A Biblical creationist seeking to interpret archaeological data in a young-earth context will find it is possible to retain history and stratigraphy. He will, however, propose a different geochronological model, and re-evaluate radiocarbon ages, submitting all dates to the constraints and controls of a Biblical chronology, thus reaching a satisfying synthesis.

THE LOWER PALEOLITHIC

What, then, can we say about early evidences of human life and activity? Our creationist model does not make us think that every person born in the families of Ham, Shem, and Japheth stayed at home or settled nearby. Genesis 10, the Table of Nations, makes it quite clear that the families were rapidly dispersed; Genesis 11 tells us why. Towns, cities, kingdoms, nations, tribes, families, and lands are mentioned. We are led to predict that the evidence would show a population boom and a race towards new frontiers. If there were to be a creationist "Big Bang," this would be it. From one central point, men set out to colonize the earth.

The Lower Paleolithic of the Old Stone Age is represented by actual stone tools fashioned by human hands: African pebble tools, Western flint core bi-face and flake tools, and Eastern chopper-chopping tools. Many thousands of these have been excavated from open-air sites such as re-deposited gravel beds and deserts, and have been sorted into various tool-making traditions of standardized forms. Lacking organic material, they cannot be dated by ^{14}C methods, and so are placed into the standard prehistorical charts mainly by reference to the geochronological theories of glaciation imposed upon the particular glacial moraine, river terrace, or desert deposits involved. Therefore, we are justified in applying creationist interpretations of glaciation to this problem.

A CREATIONIST GLACIATION MODEL

If we envision gradual post-Flood glacial growth, and postulate a period of time with milder temperatures between the end of the Flood and the eventual development of a great ice sheet, we have what we need to explain the presence of the stone tools. Animals swiftly dispersed from the Ark. Shem, Ham, and Japheth, however, lingered and started their families. While some of the families stayed close to home, others did not. Intelligent, intrepid explorers fanned out from the nuclear area. As they migrated, they established campsites, made the tools they needed, and hunted and gathered their food.

We are indebted to Michael J. Oard for developing a model of the glacial epoch as a single post-Flood phenomenon. The Deluge, in Oard's model, terminated with a much warmer ocean, due to the volume of hot water added to the pre-Flood ocean from the eruptions of the "fountains of the great deep." Given an initially warm, uniform ocean temperature, the first century after the Flood would have been a century of mild but gradually cooling temperatures. Significant volcanic activity continued after the Flood, and volcanic dust and aerosols produced summer cooling over mid-and high-latitude continents. Oard suggests that the time to reach Ice-Age maximum was about 500 years, with a necessary melting time of only 100 years. (He does not say it must have melted that fast, but that it could have, and in some places did.) The range of ice depths is 500-840 meters for the Northern Hemisphere and 880-1850 meters for Antarctica. He presents evidence that a single, thinner, dynamic ice sheet that fluctuates widely at its margins can better explain the evidence than the conventional Alpine system of four ice ages with interglacial periods [21].

After a period of time of fairly moderate weather, those in northern Europe would have noticed that the animals they hunted were moving south, and it was getting colder. They would have moved south, too. An enormous sheet of ice was accumulating where they had been, and flowing a little under its weight, crushing, breaking, and plowing up everything on the surface, including their abandoned camp sites. Some rocks were ground to gravel, but hard tools of flint often remained whole. Debris and mud captured by the ice were either dropped where the ice melted, in "drift" or till, or carried off by melt water.

It is known that during and after the time of the glaciers in the higher latitudes, there was more rainfall in the lower latitudes than there is now. Even the deserts, including the Sahara, experienced pluviation, and maintained pluvial lakes and rivers for hundreds of years after the Genesis Flood. All the lakes and interior basins had higher water levels, and the world's rivers carried more water than today. So now, in the glacial gravels, or in river terrace gravels, or on the deserts, we find the stone tools that survived.

Due to the residual catastrophism of the post-Flood readjustments, with the coming of the glaciers, the weather became inclement, with cold temperatures, violent storms, and continued tectonic and volcanic activity. Storms tended to track parallel to the edge of the Laurentide ice sheet, and most moisture fell over the cold continents. Those who could find natural caves to move into, did so. Thus from the Middle Paleolithic we begin to find that generations of people called certain large and accommodating caves "home." The French Fontéchevade, and the Mount Carmel Kafzeh, are examples of stratified cave sites showing occupation by several generations. The bones of animals in the lowest layers are from animals that lived in a warm climate. Bones of animals that could stand cold weather, like the reindeer and the mammoth, are above them. The stone tool industries show a variety of mixtures of the different habits or traditions of tool-making. The caves seem to portray a variety of loosely-related cultures at about the same stage of development. [6]

GENESIS 11 SEPTUAGINT DATES

Although many scholars generally prefer the Masoretic text of the Old Testament, the Septuagint version of Genesis 11:10-19 may help us develop a more specific chronological picture of these events. Some Biblical creationist scholars have stated a preference for the Septuagint rendering of this passage, which is attested by the Samaritan Pentateuch, and used, it is thought, by New Testament authors. These scholars suspect a possible intentional corruption of the Masoretic chronology by later scribes to support apocryphal millennial theories. [9, pp. 57, 58] (It is most unfortunate that the Dead Sea Scrolls cannot help us here, for although the Septuagint, its Hebrew *Vorlage*, the proto-Masoretic, and the Samaritan Pentateuch are represented among them, chapter 11 of Genesis has not yet been identified among the fragments.) [22]

According to the Septuagint, Arphaxad was born to Shem two years after the Flood; we would expect that Cush was born to Ham soon after the Flood as well. When Arphaxad was 135 years old, Cainan was born to him. (Luke 3:36 agrees with the Septuagint in mentioning Cainan, whom the Masoretic text leaves out.) Cush likewise begat Nimrod; although we don't know just when, he was in the second generation. Nimrod could have been born as early as thirty years after the Flood, but in the Septuagint setting, 100 years after the Flood may be more consistent. When Cainan was 130 years old, Sala (or Salah) was born, now 267 years after the Flood. One hundred thirty years later, Eber (or Heber) was born, now 397 years after the Flood. Another 134 years later, Peleg (or Phaleg) was born, at 531 years after the Flood [23].

With a Hebrew sojourn in Egypt of 430 years, the data in the Septuagint place the end of the Flood at 3402 B.C., according to Dr. Robert H. Brown [8]. If we therefore postulate a date of 3402 B.C. for the Flood, then we have Peleg's birth, by the Septuagint chronology, in 2871 B.C.

In the quest for an absolute chronology, a preliminary, tentative, and suggestive harmonization model could put the Flood at about 3400 B.C. and the Babel episode at about 3275 ±50 B.C. (Nimrod may have come to what was left of Babel, or he may have started the colony there; Genesis is not conclusive.) If, say, Nimrod had been born 100 years after the Flood, a 3275 B.C. dispersion from Babel would have occurred when he was about 25 years old.

There may have been some pre-Babel migration away from the nuclear area by those who were willing to follow the Lord's will and re-settle the earth (Genesis 9:1), leaving only the rebellious to unite to prevent the dispersion. It seems unlikely that Noah or Shem participated in the Babel rebellion [17, pp. 267, 269]. In this model we would assume that families did not wait very long before they started migrating, because we presume they reached distant areas fairly soon. As will be discussed below, we will assume that a single supercontinent existed at this point (Pangaea). Nevertheless, it is a long way to South Africa. We can postulate that impenetrable jungles had not yet been re-established following the Flood, that the travelers followed animals, and that they used coastal and river routes.

HARMONIZATION CHRONOLOGY

We may therefore attempt a preliminary Biblical creationist chronology of early artifacts. We can assign some lower Paleolithic remains [2, 6, 7] to the first two centuries after the Flood when temperatures were moderate but cooling, generally keeping the relative stratigraphic and typological sequence into which they have been placed by archaeologists. Glaciation terminology is European. Standard uniformitarian dating, although not universally agreed on, is indicated in parentheses. The stratigraphic correlations of Dr. Bernard Northrup are included [20]. Our new proposed dates B.C. refer to the approximate inception of the industry in question, and are rounded, tentative, and relative:

EVENT	DATES B.C.
Disembarkation from Noah's Ark	3402
Arphaxad is born	3400
Post-Flood drainage, volcanic activity, pluviation	3400-3300
(Dr. Northrup: early Mesozoic winds, sand storms)	
First-Fourth Nile Terraces	3350-3280
(silting of Nile delta, and of Mesopotamian plain)	
Babel dispersion	3275
Cainan is born	3265
Pebble tools, choppers (south and east Africa)	3265
(potassium-argon 1.9-.5 million years BP)	
Abbevillian (Chellean) handaxe industry, Europe	3260
(Mindel glaciation: 475-435 thousand years BP)	
Fifth Nile Terrace, Abbevillian types	3255
Early Acheulian handaxe, Torralba & Ambrona, Spain	3250
(Late Mindel glaciation)	
Clactonian pebbles, choppers, flakes, No. Europe, England	3245
(Mindel-Riss interglacial: 435-230,000 BP)	
Middle Acheulian handaxe industry	3235
(Riss glaciation: 230-187,000 BP)	
Tayacian, Fontéchevade, France (similar to Clactonian)	3225
(Riss-Würm interglacial: 187-70,000 BP)	
Late Acheulian handaxe industry	3220
(Late Riss-Würm interglacial)	
Tayacian coarse flake tools, Mount Carmel	3220
(First cave deposits, France and Palestine)	
Sixth Nile Terrace (Acheulian flint)	3220
Jabrudian industry, Syria, Middle East	3220
(contemporary with Late Acheulian)	
Amudian blade and burin industry, Levant	3220
(coeval with Late Acheulian; pre-Aurignacian)	

As we approach the beginnings of written history our chronology will need to include traditional dates based, accurately or not, on written records as interpreted by archaeologists, in addition to the industries and archaeological sites for which the only dating is supplied by relating them to each other and to an assumed Alpine glacial scenario. This results in a model where we see tremendous differences in contemporaneous cultures that are developing in different geographical areas. This is not, of course, unlike what we observe even today around the world.

The inclusion of historically-based dating, as with the inclusion of the Septuagint chronology, can give us a series of controls to help in assigning prehistoric cultures to appropriate time-slots in the geochronologic picture. For example, the Mesolithic assemblages at Fayum and Merimde in Egypt, being pre-dynastic, give us a good point of tie-in between Mesolithic industries and the founding of the First Dynasty. Many Egyptologists put that at around 3100 B.C. [3] However, a number of researchers have disputed this date for good reasons [16; 17, p. 558; 27, pp. 178, 181]. As will be explained shortly, radiocarbon considerations will cause us to want to place the First Dynasty several centuries later.

Climatological notes and pollen zones in the list refer to Europe. Some Greenland Ice-core Project (GRIP) methane peaks and minima are indicated (dated by oxygen isotope) [25]. Now the developing ice sheet enters a more advanced stage:

EVENT	DATES B.C.
Levalloisian core-tool technique begins	3210
(extends through to Mousterian)	
Mousterian flint industry, Eurasia, No. Africa, Levant	3205
Neandertal (Riss through Würm, 70-32,000 BP)	
Seventh and Eighth (lowest) Nile terraces, Egypt	3200
Levalloisian-Mousterian paleoliths	
Châtelperronian (Périgordian) SW, central France	3175
(35-31,000 BP, Upper Paleolithic)	
Aurignacian flint industry, France to Palestine	3167
(pre-31,000 BP)	
Gravettian (Pèrigordian), France to Cent. Eur., Russia	3150
(28,000-20,000 BP)	
Invention of pictographic writing in Mesopotamia	3150
Sala is born	3135
Egyptian First Dynasty founded (traditional date)	3100
Solutrean, France and Spain	3058
(19,000-17,000 BP)	
Magdalenian, W. Europe and England	3015
(Würm Glaciation, 17,000-12,000 BP)	
cave art; bears, rhinoceros, mammoths	
Heber is born	3005
Lascaux, France cave painting (15,500 ± 900 BP)	2975
Oldest Dryas, pollen zone Ia; tundra, reindeer	2960
(Late Glacial, 15,000-12,500 BP)	
GLACIAL MAXIMUM REACHED	2900
GRIP methane low (12,700 BP)	2891
Peleg is born	2871

A CREATIONIST MODEL OF CONTINENTAL SEPARATION

Some creationists have proposed that continental separation occurred during the Flood, under water. They note the amazing similarity of sedimentary strata in the northeastern United States compared to those of Britain (Carboniferous coal strata and Devonian red sandstones) and the absence of these in the North Atlantic. The presence of such similar sedimentary strata seems to preclude a pre-Flood continental split. The Flood could provide a driving force to break the lithosphere into moving plates; for a short time they could overcome the viscous drag of the earth's mantle [18, 27]. A subduction of the pre-Flood ocean lithosphere during the Flood could explain the absence of Precambrian and Cambrian strata [4]. However, the lack of sedimentary Paleozoic and Mesozoic strata as well, in the bottom of the earth's great ocean basins, may indicate that the present basins with passive margins were formed after the Flood. It is worth exploring the idea that the rupture and subsequent movement of the twenty-mile-thick continental granitic crust, and the formation of most of the present ocean basins, took place after the Flood.

Dr. Northrup has discussed geological reports describing crustal movement in the Paleozoic, which he interprets as during the Flood. This expansion of the sea basins to hold the Flood runoff, is also viewed as the initiation of continental separation. The brief crustal movement quieted, only to begin again in earnest in the later Mesozoic, which he interprets as about five generations after the Flood. This is perhaps the Caledonian orogeny [19].

As the icecaps built after the Flood, the Poles became depressed by the weight of the ice. Dr. Melvin A. Cook, at the First International Conference on Creationism, presented a detailed treatment of the rupture and shifting of Pangaea due to overgrown ice caps resting in deep bowl-shaped depressions on the Poles. [12] One generally-accepted model of Pangaea puts Greenland in the Arctic Basin. Dr. Cook feels the maximum ice load was inside the boundaries of Greenland, and the primary brittle fracturing of the continental granite crust began there. A secondary fracture occurred under the southern ice cap by the combined effects of ice weight and seismicity. Ice drove into the primary crack fracture from north to south. Dr. Cook explains:

> While not considered quantitatively, the time required for most of continental drift was months or years, not megayears, based on the magnitude of the forces applied and terrestrial rheidity. Thus 'shift' is a better description than 'drift.' The splitting 'load' that initiated the breakup of Pangaea was in excess of 10^{13} tons based on at least 2000 feet average depth of the northern (ice cap) depression zone (not considering the elastic component) and a diameter of about 3000 miles. The forces responsible for continental drift were one or two orders of magnitude greater, telescoping thusly by ice driving into the fracture zones following the initiation of crack fracturing. [12, p. 70].

Sea water is very difficult to freeze and Michael Oard feels that even at the Poles the ocean would have remained ice-free until near glacial maximum, 500 years after the Flood [21, p. 165]. The idea, therefore, that with the collapse of the vapor canopy at the start of the Flood, an open Arctic Ocean would have immediately frozen over, is probably baseless. It is further negated by the proposition that juvenile or tectonic water released by the fountains of the great deep would have been hot, perhaps even 200°C. Dr. Cook's model of the rupture of Pangaea requires a thick buildup of ice over Greenland and Antarctica. One could adduce reasons explaining how this could happen during the Flood; but with at least a thousand feet of Flood water on top of Greenland, it is difficult to start freezing the North Pole then. The 2,000-foot icecap that Dr. Cook needs, seems to fit better with Michael Oard's proposal of a post-Flood glaciation.

GEOLOGICAL RESULTS OF THE DIVISION OF THE EARTH

The northeastern coast of Pangaea (which became the coast of Siberia) situated by the warm ocean, with much greater precipitation and more vegetation than at present, would have provided a good environment for cold-tolerant animals as the glaciation built up. After glacial maximum, the northern climate became colder and drier. Following the rupture of Pangaea, as Greenland moved out of the Arctic Basin, the open sea would have moved into the abyssal plain at the North Pole. Soon the new Arctic and Atlantic Oceans would have frozen over (see Job 38:30). Very strong cold fronts, with strong winds giving very cold wind chills, could have occurred. Some of the woolly mammoths near the coast of Siberia may have been quick-frozen at this time and entombed in the developing permafrost [21, p. 165]. Such strong, cold winds could perhaps have freeze-dried whatever Siberian and Canadian Arctic forests had been re-established since the Flood, desiccating the timbers and burying them in sand.

The opening of the Atlantic Basin involved hinging over the whole Aleutian Arc, a 41° dextral rotation, and a 600 mile translation of North America relative to Eurasia. Powerful seismic waves split off Australia from Antarctica perpendicular to the north-south fracture [12, pp. 73,78].

Dr. Cook proposes that ice driving into the primary crack fracture brought into effect the powerful Coriolis forces, oppositely directed rotations causing the Tethys Shear Zone: 4,000-mile fracture ridges from Mount Ararat (and the Atlas Mountains) to Panama. Later this zone was apparently rejoined by welding due to collisions when Africa drove into Eurasia. The initial stage of this collision built the Alps, Balkans, and Carpatheans. Arabia was squeezed between Africa and Asia in the continental shifting to build the Taurus, Ararat, Caucasus, and Zagros mountains. The collision of Africa with Eurasia and the squeezing of Arabia between them caused the Great African Rift Valley. Still later, when India collided with Asia to form the Himalayas, the initial 41° rotation was driven back about 6°. The weld between Africa, the Tethys Shear Zone, and Europe was broken, and the zone again separated from between Laurasia and Gondwanaland. The Earth Girdling Rift and Ridges (EGRR) occurred after both the rupture of Pangaea and its shifts, mainly following a path predetermined by compressions locked in by shock and plastic wave distortions, or in some places by prefractures [12].

SYNTHESIS OF MODELS

In this synthesis of the two models of Michael Oard and Dr. Cook, we consider that the single, rapid post-Flood Ice Age that Michael Oard proposes is the causative mechanism for the Pangaea rupture and shift that Dr. Cook proposes. However, the catastrophic events of continental division, violent mountain uplift, and vast volcanism with explosions of steam and volcanic ash, would have delayed the melting of the ice sheets. Thus the Pangaea

geologic events are both preceded and followed by the Ice Age. They begin soon after the time of Ice-Age maximum, which is about 500 years after the Flood, by Oard. Interestingly, this corresponds closely to the Septuagint date of the birth of Peleg, soon after which, Genesis 10:25 and I Chronicles 1:19 tell us, "the earth was divided."

The concept of a supercontinent existing for five hundred years between the Flood and this point, gives us an opportunity to consider some Ice-Age, pre-rupture colonizing of the Americas from Europe and Africa, as there was no Atlantic Ocean to stop them. We can also consider some American colonizing after the continental shifting but during the continued Ice Age, across the Bering Strait in the time of low sea level. One single, united land mass also makes other animal and human migration easier to understand.

Returning, then, to our archaeological scenario, based on a date of c. 3400 B.C. for the Flood, we have glacial maximum reached about 2900 B.C. and Peleg being born around 2870 B.C. In the time period of 2850 ±25 B.C. we can then logically place the rupture of Pangaea, the continental shifting, continental collisions, and then the formation of the EGRR. In the period of major adjustment that follows, we find Job trying to understand Divine providence.

POLAR UPLIFT

Dr. Cook refers to work done on the global correlation of uplifts at the poles and downwarping at the equator following sudden denudation in the loss of a great ice cap [12, p. 79]. "In other words, with Canada separated from Greenland and in turn from Fennoscandia, an ice cap of appreciable depth would simply flow down hill into the Atlantic Ocean" [12, p. 69]. "The initially rapid uplifts in Fennoscandia, at first immediate to relieve the elastic component of the total depressions, ...have decayed exponentially since their beginning in a manner characteristic of sudden unloading of the crust and in no possible way related to the melting of the ice cap in place." A mathematical analysis he refers to, based on classical physics, dates the beginning of the uplifts to 2550 B.C. [12, p. 80].

We note from the Septuagint that Peleg lived a total of 339 years, from 531 to 870 years after the Flood. Returning to our postulated date of 3402 B.C. for the Flood, Peleg's lifespan would then have been from 2871 to 2532 B.C. The Bible indicates that "in his days" the earth was divided. Polar uplifts at 2550 B.C., dramatically ending the Ice Age, therefore fit comfortably into this Biblical chronology.

A French analysis of historic evidence from Egypt concludes that there was somewhat more moisture than modernly all the way into historic times, especially closer to the Mediterranean, and the contemporary condition of aridity did not set in until after 2500 B.C. [15]

Our model indicates that at the time of Ice Age maximum, adaptable people living in caves began inventing stone tools to make tools. They made various specialized blade tools, weapons, and articles of other materials, such as bone and antler, which they decorated. Art began in the Magdalenian in terms of figurines, carvings, and cave paintings. As some organic material has survived, there is the possibility of using ^{14}C tests to attempt some age determinations on these man-made artifacts.

CHRONOLOGY BY CARBON-14 AGE CONVERSION

As we consider these early organic remains, we again encounter assigned dates which to the Biblical creationist are unacceptably expanded. However, we realize that these dates are based on interpretations of ^{14}C tests, which we may legitimately question, and in fact re-work, based on our creationist assumptions. Robert Whitelaw wrote an article reviewing 32 radiocarbon papers published from 1950 to 1990. He documents how creationists have grappled with the problem of establishing a method of quantitatively reconciling radiometric dates with creationist models [28]. Most of the creationists who have worked on this are happy with a traditional Biblical date for the Flood, using a non-equilibrium method of conversion.

A mathematical conversion of radiocarbon dates has been provided by Dr. Robert H. Brown, who presented papers in the First and Second International Conferences on Creationism. He has derived a conversion formula by which a ^{14}C age may be translated into a real-time equivalent that is consistent with the chronological data given in the Bible and also with ^{14}C age data for historic events [10].

A real-time equivalent age obtained by a mathematical conversion from a ^{14}C date carries uncertainty, both from the statistical uncertainty of the initial ^{14}C determination, and also from uncertainty due to fluctuations of the biosphere ^{14}C concentration about the average concentration trend. The scenarios presented by Michael Oard and Melvin Cook, with drastic ocean and atmosphere temperature changes and global post-Flood land movements, could provide fluctuations of ^{14}C activity from a smooth exponential trend. There are difficulties in assuming that all factors influencing the level of ^{14}C in the biosphere after the Flood can be satisfactorily represented by a first-order exponential function. A simplified mathematical representation may not adequately represent the

concentration at all points over the time range. Consequently, real-time conversions obtained from ^{14}C ages by a mathematical formula covering an extended time range are useful only for establishing broad features of time relationship, and in some cases may be anomalous. To fit this model, it appears that a steep slope must be maintained for a longer period of time than a smooth exponential trend set to begin at the end of the Flood would generally yield.

In Dr. Brown's judgment, the most suitable value for the date of the Flood is about 5,350 years before present, as measured from 1950, so 3400 B.C. He has found that amino acid racemization/epimerization rate constants for ^{14}C dated material are more consistent when computed with real-time age equivalents based on 5350 BP than on values a few hundred years less or greater. As much coal centers around a radiocarbon age of about 43,000 years, he associates the Flood with that value [10]. He feels that at the beginning of the Flood the biosphere had no more than about 1/100 of the present $^{14}C/^{12}C$ ratio. [9, p. 59]

According to his conversion, over the first ten years after the end of major Flood activity, radiocarbon age characteristics drop to about 34,000 years. By fifty years after the Flood a representative ^{14}C age is about 23,000 years. At 3050 B.C., the radiometric age is about 10,000 years before present, having decreased about 33,000 years in only 350 real-time years. This decrease represents a rapid buildup of the $^{14}C/^{12}C$ ratio in the biosphere during the post-Flood era. Applications of this conversion formula to a frozen musk ox, and ground sloth dung accumulation rates, demonstrate that the very steep initial slope of his equation is essentially correct [10] (See figure 1).

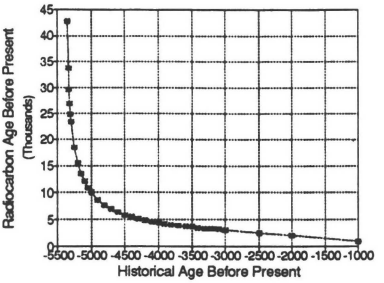

Figure 1. ***Plot of real time versus radiocarbon time from equation 1.***

What factors could contribute to such a rapid buildup of the carbon-14 concentration? A higher snow accumulation rate in the past could mean that the ice-core tests in Greenland are showing us a higher rate of ^{14}C production then [14]. A major decrease in geomagnetic field strength during the Flood, with post-Flood geomagnetic reversals and subsequent fluctuations before field strength recovery, could have encouraged that higher rate of production. Furthermore, if antediluvian atmospheric CO_2 were approximately 16 times greater than at present, decreasing after the Flood through a transitional period to the present value [26], an initially dilute amount of ^{14}C would have increased in concentration relative to the decreasing amount of atmospheric carbon dioxide. CO_2 solubility increases with lower water temperature, so at the conclusion of the Flood, if the ocean water temperature were high, atmospheric CO_2 would not be as soluble as at present in the surface water. As the oceans cooled, and vegetation was reestablished, the amount of atmospheric CO_2 would be reduced. Later, during the period of colder, dryer northern air (less precipitation) in an Ice Age climate, there would be a decrease in the rate of transfer of eroded material from northern land masses into the ocean; transfer of ^{14}C to inactive sediment would decrease. The rate at which CO_2 was taken out of the atmosphere by vegetation in mid- to high-latitudes would be depressed. We could also conjecture that due to the long half-life of radiocarbon (5,730 years) which compares with the length of our chronology (nearly 5,400 years since the flood), destruction of post-Flood ^{14}C by simple radioactive decay might not noticeably impact the ^{14}C inventory for some time following the Flood, during which period the rate of accumulation would be significantly higher. These altered production, mixing, exchange, and transfer rates provide support for a rapid post-Flood buildup of the $^{14}C/^{12}C$ concentration, reflected in a steep slope for our exponential equation that continues through the Ice Age.

Using Dr. Brown's equation as a basis, we can proceed to make some very useful inferences. With a trial setting of radiocarbon ages being 5% older than historical ages at 4000 BP, an initial fraction of equilibrium of .011, and placing the Flood at 5350 BP, his equation is as follows [10]:

$$R_k = T_k + 8.3\{\ln[1 - 0.989e^{-2.211(5.35-Tk)}](-1)\} \quad (1)$$

where:

R_k = radiocarbon age in thousands of years
T_k = historical age in thousands of years

It yields the following results for these sample assemblages:

Lascaux Cave, France (15,500 BP ±900 BP)	5200 BP or 3250 B.C.
Zawi Chemi Shanidar (10,850 ±300 BP)	5040 BP or 3090 B.C.
Hacilar, Turkey (7,450 BP)	4770 BP or 2820 B.C.
Fayum, Egypt, pre-dynastic (6390 ±180 BP)	4610 BP or 2660 B.C.

It appears that we need a steeper slope for the lower range. An initial equilibrium fraction of .017, a setting of radiocarbon ages being 5% older than real ages at 3156 BP, and setting the equation to run from 5132 BP, yield values for these assemblages which fit this model rather well. These values have the effect of depressing the equation in order to obtain a steep slope after the Pangaea break-up. (These values in the equation also yielded the above-quoted dates B.C. in the chart, from the Châtelperronian at 35,000 radiocarbon years BP to the cave at Lascaux, France at 15,500 years BP.)

$$R_k = T_k + 8.3\{\ln[1 - 0.983e^{-1.5106(5.132-Tk)}](-1)\} \quad (2)$$

THE CHALLENGE OF DENDROCHRONOLOGY

One really serious objection to a Flood date of 3000 ±500 B.C. seems to come from the field of dendrochronology. Dr. Gerald E. Aardsma vigorously contests this date. Because of purportedly extant continuous tree-ring series containing up to 11,300 growth rings, he feels we should look at the possibility of the Flood occurring more than 10,000 years ago [1].

In the 15 years following the production of the first dendrochronological calibration curve, a bewildering number of calibration curves appeared together with statistical interpretations and compilations of the curves. Of all these, in 1990 the international radiocarbon community was recommending the 1986 curves produced by Gordon Pearson and Minze Stuiver, for the period back to 2500 B.C. This is because two high-precision laboratories, Belfast and Seattle, using different radiocarbon techniques and different tree species, had independently produced curves in agreement to within a few years for each sample of corresponding twenty tree rings. Curves extending back beyond 2500 B.C. had been produced, but lacked verification by a second laboratory [5].

Considering the claimed longer tree-ring series, we should give particular consideration to possible mismatching by dendrochronologists in an effort to accommodate uniformitarian chronological views. Ring-patterns used to compare rings from living trees to older fallen logs, and from one log to another, have a certain statistical probability of being correctly matched, but are not perfect matches because they come from different trees. As Dr. Robert Brown observes:

> "A Biblical creationist developing a master dendrochronology would look for justifiable large overlaps between specimens, as a uniformitarian scientist with respect for the views of fellow scientists in other disciplines would look for minimal overlaps to develop a master chronology that would be least objectionable in professional circles" [11].

Biblical creationists also propose that unusual climatic conditions following the Flood gave rise to multiple ring growth per year in the tree-ring series, with the average number of growth rings per year decreasing after the end of the Ice Age. An atmospheric CO_2 level significantly higher than we find at present would have profound implications for the biomass accumulation rate of trees [25]. Even now, a tree under stress from drought or frost is quite capable of producing multiple ring-growth, as Dr. Walter Lammerts demonstrated experimentally in 1983 with bristlecone pine seedlings [27]. The model that we are proposing here protracts the unusual climatic conditions by nine centuries after the Flood--in fact, the earth does not really normalize and stabilize until after the polar uplift near the end of Peleg's lifespan. The polar uplift date of 2550 B.C., dramatically dumping the remaining ice-caps into the ocean, and ending the Ice Age as such, coincides remarkably well with the date of the end of the high-precision calibration curve, 2500 B.C. (as of 1986). It also roughly coincides with the establishment of our oldest bristlecone pine trees. The climatological considerations of our model could lead us to predict a number of multiple growth rings per year, with local variations, from trees growing between 3400 and 2500 B.C. (compared to wider, single-year rings in fossil pre-Flood specimens); and then a trend towards normalization of the growth patterns, reaching stability, as today, after 2500 B.C. This, combined with potential mismatches, would explain the existence of long tree-ring series.

A radiocarbon test run on material from the Egyptian tombs of Sneferu and Zoser (Djoser) gave a weighted average only 2% too old at 2650 B.C., compared to a theoretical calculated age [13]. If radiocarbon dates normalized before the trees did, it is clear why the dendrochronology series shows the radiocarbon dates as too recent in that period.

THE UPPER PALEOLITHIC AND MESOLITHIC

So it seems that, with the help of our conversion equation, we can continue assigning Upper Paleolithic and Mesolithic archaeological discoveries to this next period of time. Four-digit accuracy is not claimed but is indicated at times merely to indicate sequence:

EVENT	DATES B.C.
Peleg born; Pangaea ruptures (Dr. Northrup: late Mesozoic) [20]	2871
Ice drives into cracks, north to south	2870
Greenland moves out of Arctic basin; open sea moves in	2868
Late Magdalenean pollen zone Ib; park tundra, warmer (Bølling Oscillation, 12,500-12,100 BP)	2865
Antarctica separates from Africa and South America	2865
Australia marches north toward southeast Asia	2863
Arctic & North Atlantic Oceans freeze (Siberian coastal mammoths freeze)	2860
Older Dryas, pollen zone Ic; tundra, reindeer, subarctic (Late Glacial, 12,100-11,900 BP)	2855
Tethys Shear Zone, transverse to main crack fracture circum-global equatorial current warming	2850
Glacial ice begins melting (11,900 BP) (Dr. Northrup: begin Cenozoic...?) [20]	2850
Azilian, SW France, No. Spain, warmer (Allerød Oscillation, 11,900-10,900 BP) pollen zone II; park tundra to birch forest; giant Irish deer, elk, beaver, bear	2850
GRIP methane rise (11,550 BP)	2842
Africa drives into Eurasia, re-welds Tethys Shear Zone Alps, Balkans, Carpatheans built	2835
Arabia squeezed--Taurus, Ararat, Caucasus, Zagros built	2832
India drives into Asia, forms Himalayas, Tethys welds re-broken; 6º reverse rotation	2828
Younger Dryas, pollen zone III; sub-arctic, tundra to park tundra; reindeer, bison, alpine hare (10,900-10,300 BP)	2825
Zawi Chemi Shanidar, Northern Iraq; domesticated sheep (10,850 ±300 BP)	2824
Early Dynastic Mesopotamia	2815
Mehi, Baluchistan, Indus area in India	2815
Earth-Girdling Rift and Ridges open; ocean crust melting magnetic anomalies forming (polarity reversals)	2810
Pre-Boreal, pollen zone IV; birch forest, wild horse, reindeer, bison, aurochs, elk. Slow rise in temperature. (10,300-9700 BP)	2810
Maglemosian microlithic wood-working tools, No. Europe Mesolithic (9,950 BP)	2800

LATE MESOLITHIC, NEOLITHIC, CHALCOLITHIC

After about 10,000 radiocarbon years BP, again to retain a steeper slope of the curve, the equation needs to be re-set to yield values that are in accord with this model. Apparently the slope really doesn't start to level out until after 6,000 radiocarbon years BP. For converting radiocarbon years from ten to six thousand BP, the equilibrium fraction of .017 is retained, but the equation is re-set to run from 4770 BP with a 5% difference at 4672 BP.

$$R_k = T_k + 8.3\{\ln[1 - 0.983e^{-30.5(4.77-Tk)}](-1)\} \quad (3)$$

EVENT	DATES B.C.
Boreal, pollen zones V & VI; rising temperature, pine/birch forest to pine/hazel, start of mixed oak forest; aurochs, elk, deer, wild pig, beaver, bear, dog (9700-7500 BP)	2795
Natufian, Levant Late Mesolithic (9700-9500 BP)	2795
Lauricocha Caves, at 13,000 feet in Peruvian Andes (9450 BP)	2793
Old Cordilleran Culture, Oregon & Washington in USA (8950 BP)	2790
Jericho; Jarmo, Iraq Pre-pottery Neolithic (8700±200 BP)	2789
Nea Nikomedeia, Macedonia; ground stone axes, pottery Early Neolithic (8200±150 BP)	2785
Ayampitín, Argentina (7950 BP)	2783
Sarab, Iranian Kurdistan (7950 BP)	2783
Hassuna, Iraq (7550±250 BP)	2780
Atlantic, pollen zone VII, warm, moist; oak, elm, lime, alder; aurochs, deer, dog (7500-5000 BP)	2780
Hacılar, Turkey; pottery (7450 BP)	2779
Fayum and Merimde Mesolithic, Egypt (6390±180 BP)	2765
Sub-Boreal, pollen zone VIII, drier; introduction of cereals and weeds of cultivation. Oak forest, grasses, heather; tame horse, deer, wild pigs, domesticated sheep, goat, ox, pig,dog (5000-2500 BP)	2755
Egyptian Pre-Dynastic Cultures: Tasian, Badarian, Amratian, Gerzean, Semainean; earliest picture of a sail	2745
First Dynasty, Egypt	2720
Egyptian trading vessels ply the Red Sea, E. Mediterranean	2640
Pharaoh Djoser (Zoser), Third Dynasty, (Traditional date) step pyramid, Sakkara	2630
Icecaps slip off Scandinavia and Canada	2555
Polar depression uplifts, equatorial downwarping	2550
Higher sea level	2550
Death of Peleg	2532

Rather than taking Dr. Brown's equation down in three discrete steps, we could obtain a fairly good fit to the data points presented in the above tables, between the radiometric ages 30,000 and 6,000 BP with

$$R = 43{,}000 \{1 - 1.300e^{-0.062[T/(5350 - T)]}\} \quad (4)$$

where:

R = radiocarbon age
T = historical age

which places Fayum at 2716 B.C. (and therefore the First Dynasty somewhat later). [11] This relationship does not resort to any model for justification of the values of the constants, except for the Flood date. It is only useful where R > 6000, and functions badly in the R = 0, T = 0 region.

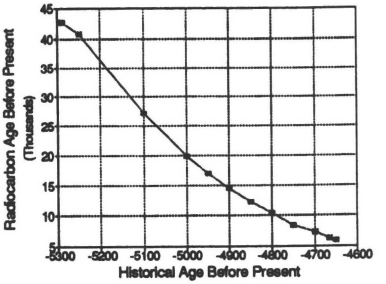

Figure 2. ***Plot of real time versus radiocarbon time from equation 4.***

A better fit in this region would require second-order terms in T/(5350 - T) [11]. The model significance for such terms, if any, would need to be explored.

CONCLUSION

The attempt to integrate the creationist model of origins with the modern discipline of archaeology is a necessary and important goal. Indeed, a general, systematized model, incorporating a radical revision of the chronology of the ancient world, would unite ancient earth history, prehistory, and recorded history in one continuous and understandable sequence. It could resolve many problems that still beset the honest investigator, correlate with other dating methods such as oxygen isotope, and open new areas of research. It would be interesting to develop a computer simulation based on this scenario. Many inferences from the model presented here should prove to be testable.

The diastrophic history of the earth is not a matter of opinion. Our planet, however inscrutable the evidence, has only followed one course of development through time. Likewise, human cultural development only happened once; but it is remarkable how many imaginative but confusing interpretations have been generated in the search for that one elusive course (due in part to the complexity and fragmentary nature of the available evidence). Confusion, mixed with the apparent inability of a brief timescale to adequately encompass the scope and range of the evidence, led past thinkers to the point where a naturalistic explanation attained the place of cultural dominance. However, this paper has demonstrated that it is theoretically possible to interpret archaeological prehistory in a young-earth context. We do seem to be on the right track, and getting closer in our search for a satisfactory Biblical creationist perspective on earth history and the data base of archaeology. From this presentation perhaps others will think it a worthy goal to pursue and refine. "...God...will have all men...to come unto the knowledge of the truth." (I Timothy 2:3,4)

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