Dating Adam

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The time of Adam's creation has long been a contentious issue in Christianity. The Scripture indicates that fallen human beings possess certain traits. These traits are language, pain in childbirth, sweat, clothing, religion, and murder by the use of tools. They can be connected with various forms of human behavior that are capable of leaving physical evidence in the fossil record. Using this evidence as proxies, the anthropological record is examined for evidence of behavior consistent with fallen human beings' existence on earth. It is concluded that the anthropological record would support the existence of fallen humans having been on earth for 400,000 years and very likely for as long as two million years. The evidence is inconsistent with an apologetic that limits human spirituality to the past 100,000 years.

Early in Genesis, the Bible lays out some very profound differences in the behavior of humans vs. the behavior of animals after the Fall. These features are language, clothing, the pain of childbirth, sweat, the need for a relationship with God, and murder. These unique behaviors are seen in the following verses:

"... and whatever the man called each living creature, that was its name" Gen. 2:19 (NIV).

"Then the eyes of both of them were opened, and they realized they were naked; so they sewed fig leaves together and made coverings for themselves" Gen. 3:7 (NIV).

"To the woman he said, 'I will greatly increase your pains in childbearing; with pain you will give birth to children. Your desire will be for your husband, and he will rule over you.' To Adam he said, 'Because you listened to your wife and ate from the tree about which I commanded you, 'You must not eat of it,' Cursed is the ground because of you; through painful toil you will eat of it all the days of your life. It will produce thorns and thistles for you, and you will eat the plants of the field. By the sweat of your brow you will eat your food until you return to the ground, since from it you were taken; for dust you are and to dust you will return.' Adam named his wife Eve, because she would become the mother of all the living. The LORD God made garments of skin for Adam and his wife and clothed them" Gen. 3:16–21 (NIV).

"But in the course of time Cain brought some of the fruits of the soil as an offering to the LORD" Gen. 4:3 (NIV).

"... Cain attacked his brother Abel and killed him" Gen. 4:8 (NIV).

These traits can be used regardless of whether one believes that the Genesis 3 and 4 account is relating actual history or merely conveying a list of traits possessed by fallen humans. In this paper, we will examine the fossil record for these traits and determine what the data imply for various theological positions on the origin of humans. This paper does not claim to be a comprehensive review of the many excellent previous attempts at harmonizing fossil humans with Scripture. Those interested in how the views advocated here fit into the geographic and cultural description of Eden given in Genesis should consult the author's previous article that answers many of those questions.[2] This article's aim is to lay out, as clearly as possible, the implications of the anthropological data to the various widely-held apologetical positions.

Fossil hominids have been divided into two genera, *Australopithecus* and *Homo*. Since there is very little cultural information about the lifestyle of the Australopithecines, they will not be discussed further.[2] The genus *Homo* contains several species, the exact number depending upon the taxonomist. In general, the genus *Homo* can be divided into *Homo habilis*, *Homo erectus*, and *Homo sapiens*. *Homo sapiens* is further subdivided into archaic *Homo sapiens*, *Homo sapiens neanderthalensis*, and *Homo sapiens sapiens*. Under this officially sanctioned taxonomy, archaic *Homo sapiens*, Neanderthals, and modern humans are members of a single species. This is the

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taxonomy we will use. For the purposes of this paper, the distinctive morphological features between the three species and subspecies of *sapiens* are not relevant because we will be examining cultural remains.

Homo habilis is found only in Africa and lived between 2.5 and 1.5 million years ago. The cranial capacity of the various specimens ranges from 500 to 800 cc. *Homo erectus* is found throughout the Old World (Java, Asia, Africa and Europe). *Erectus* attained heights of up to six feet and his cranial capacity ranged from 775 cc to 1225 cc. *Erectus* fossils are found in strata dating between 1.8 million years and 30,000 years old.[3] Archaic *Homo sapiens*, found throughout the Old World, and Neanderthals, found only in Europe and the immediately adjacent regions, were all within the modern human range of variation in both cranial capacity and height. Archaic *Homo sapiens* are found in strata dating from around 400,000 years ago to as young as 33,000 years ago. Neanderthals date between 230,000 years and 30,000 years ago.[4]

The Various Positions

Many Christians hold that all fossil humans are descendants of Adam. Whitcomb and Morris[5] and Lubenow[6] represent this position. Generally, this inclusion only applies to members of the genus *Homo*. *Australopithecus* is usually relegated to the status of an ape with Morris[7] and Gish[8] advocating this. This view would expect to find no evidence of language, religion, clothing, murder, and pain of childbirth in deposits associated with *Australopithecus* but would expect to find them in deposits associated with *Homo habilis*, *Homo erectus*, and the various forms of *Homo sapiens*. While this view is generally held by young-earth creationists, this author has presented an old earth view that would also require that the various members of the genus *Homo* be descendants of Adam. This old earth version leaves open the possibility that some australopithecines might be Adam's descendants, too.[9]

The second view, widely held by Christians accepting an old universe, restricts the attribution of spirituality to anatomically modern humans who first appeared around 130,000 years ago. David Wilcox advocates such a view.[10] Phillip Johnson appears to hold to a similar limitation.[11] Hugh Ross is even more restrictive, limiting spirituality to anatomically modern humans who lived *no longer ago* than 60,000 years.[12] This limit is based upon his view of the genealogies. Dick Fischer and E. K. V. Pearce would place Adam only 10,000 years ago.[13] While Pearce seems to separate Adam's descendants from hominids who lived earlier,[14] Fischer believes in genetic continuity.

The final view is that humankind's spirituality arose gradually. This can be either an evolutionary or a nonevolutionary process. This view is often held by those who interpret the early Genesis account as fully allegorical. Fischer allows for the gradual arising of many "human" traits, among them a religious sense.[15] He views spirituality as being only applicable to modern humans who lived after 8,000 B.C. and who are descendants of Adam. The inclusion of Gentiles at the time of Christ modified this restriction.

These are the three views we will examine and seek supportive evidence from the fossil record. The data we seek will come from both cultural and anatomical data. Surprisingly, there are much data that bear on this problem.

Language

A human being is the only creature on earth that possesses language. Can one conceive of worship without the symbolic language with which to convey religious concepts? Since ritual requires symbolism, my cat, lacking the ability to use symbols, would appear incapable of worship. Without language, there can be no worship, no prayer, and no communion with God. Without language there could have been no command to Adam and Eve to

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avoid eating the fruit of the tree; without that command, there would have been no Fall. While one can train a cat not to eat the anchovies on a pizza, this can be taught only via negative consequences learned from already having eaten them several times before. This does not seem to be the way God taught Adam and Eve not to eat the fruit. Language is crucial to everything that makes us human. Evidence for the existence of language is powerful evidence of the existence of humanity. As noted above, the Bible seems to indicate that God taught Adam to speak and implies that this is the reason for the uniqueness of language. The naming of the animals is somewhat reminiscent of the sudden thirst for knowing the names of objects that Helen Keller experienced when she finally understood what her teacher was trying to convey.

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Human language differs from all forms of animal communication in four ways. First, human language can produce an almost infinite variety of thoughts as opposed to animal communication systems that, in the wild, rarely exceed forty different displays or calls.[16] When attempts are made to teach a language to a chimpanzee, the vocabulary limitation quickly becomes apparent. Even after six years of training, Kanzi the chimp had mastered only 150 words.[17] By contrast, a six-year-old child will have mastered about 13,000 words and a high school graduate, 60,000.[18]

Secondly, animal communication lacks grammar and complexity. This is even true of language-trained apes. They use no articles, auxiliaries, and prepositions in their language-like communication.[19] Pinker notes that the average length of a chimpanzee "sentence" remains constant even after years of training.[20] A human child rapidly moves from one- or two-word sentences to complex, multi-word statements.

Thirdly, Deacon points out that the uniqueness of human language lies in its symbolic reference; all nonhuman communication is nonsymbolic.[21] Human language is a symbol-based communication system. The word stands for a concept, not really an object. The concept of a farmer in the American language is quite different from the concept of *nong ming* in Chinese. While both produce food from the soil, in America the farmer is an independent businessperson while in China the farmer represents a potent political idea as the representative of the proletariat. Some have tried to say that some animals have mastered symbolism in their calls. They cite the three unique alarm calls made by vervet monkeys to alert their comrades of dangers from leopards, snakes, or eagles. Each call is applied only to the specific danger and elicits a unique response. But this is not a symbolic system. Deacon notes the invariant response evoked by each of these calls and shows that the behavior is instinctual.[22] In all examples of nonhuman communication, only two apes, after years of intensive training, have shown any sign of symbol use.[23]

Finally, human brains are structured differently from animal brains in ways related to language production. Humans use a different part of the brain for communication than animals do.[24] Animal communication is controlled in the brain stem and limbic system, while human language is controlled by the left cerebral cortex. Humankind does produce vocalizations from the brain stem and limbic system but these are usually in response to stubbing our toe or smashing a hammer into our thumbs. Such vocalizations from our more "animal" region are usually not socially acceptable. Another difference between the structure of human and animal brains is an enlarged Broca's area. Only human brains possess this enlarged area on the left temporal lobe. Broca's area has long been associated with speech since damage to this region produces a curious inability to communicate called Broca's aphasia. Another difference between human and animal brains is connected with speech. The different hemispheres of the human brain control different functions. The left hemisphere is more involved in language control than the right hemisphere. This lateralization of function produces slightly different shapes between the left and right hemisphere of the brain and, most importantly, Clive Gamble notes that brain lateralization is a requirement for language.[25] While some other animals do possess brain lateralization, none are quite as strongly lateralized as human brains.

Recently a report claimed that chimpanzee brains have an enlarged planum temporale, which is a small part of Wernicke's area.[26] Damage to Wernicke's area creates language difficulties. But such proof has not been forthcoming for the planum temporale *alone*. Even so, it often has been claimed to be involved in language. This report has raised some speculation that chimpanzees have a language. Unfortunately for this hypothesis, the authors admit that this area may have nothing to do with language;

Deacon noted that thirty out of one hundred humans do not have an enlarged planum temporale yet they use language like everyone else.[27]

The above information yields three objective criteria that can be applied to the fossil record to shed light on the language abilities of the ancient hominids. First, we can examine the interiors of the skulls looking for evidence of brain lateralization. Secondly, we can examine fossil skulls looking for an enlarged Broca's area. Their existence in an ancient hominid skull would suggest speech. Thirdly, the relationship between brain lateralization and handedness yields other ways to look for language abilities. There is a clear statistical correlation between having a larger occipital lobe on the left hemisphere and having a larger frontal lobe on the right hemisphere with right-handedness. Most animals have a 50/50 ratio of right- vs. left-pawed individuals while humans have a 90/10 ratio.[28] Because of the way a person manufactures a stone tool, one can determine if it was made by a right- or a left-handed individual. Stone tools can be studies to determine handedness and thus they become a proxy for brain lateralization and speech.

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The fossil record can only tell us the earliest evidence for language. It cannot tell us when that language actually appeared. The earliest evidence of speech comes from the skull KNM-ER 1470. This specimen is that of a *Homo habilis* and dates to nearly two million years ago.[29] The skull clearly has an enlarged Broca's area, unlike the Australopithecines' skull that preceded it. Since an enlarged Broca's area is found only in humans and is associated with speech, most authorities feel that *Homo habilis* was the first creature on earth for which speech abilities can be documented.

Secondly, morphological evidence of strong brain lateralization is also found in all hominids who lived during the past two million years. These include *Homo habilis*, *Homo erectus*, Neanderthal, archaic *Homo sapiens* and anatomically modern humans.[30] This finding is consistent with the archaeological data from stone tools that were clearly made by predominantly right-handed individuals over that same period. Schick and Toth explain:

> Let's look at what a right-handed tool maker typically does during hard-hammer percussion. As outlined above, a right-handed individual normally holds the hammer stone in the dominant right hand (which gives more precision and power to the flaking blows and lessens the chance of hitting one's fingers) and the core to be flaked in the more passive left hand. The left hand essentially acts like a vise to securely grasp the core during repeated blows from the hammer stone, orienting the core properly for each successive impact.
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> Now, what effect does this setup have upon the flaking process? If a sequence of flakes is removed from one face of a core, there is a tendency for the left hand holding the core to rotate it in a clockwise direction as the flakes are removed. One hits off a flake, rotates the cobble a little, and strikes off another to the right of the first, rotates it slightly again and flakes again, and so forth. If the core is made on a cobble or thick cortical flake, we can see this clockwise rotational bias by examining the flakes that have been produced. Successive flakes tend to have part of a flake scar on the left (where the previous flake had been struck off) and part of the cobble's cortex on the right. Thus, large samples of these flakes can tell us something about handedness: whether the cobble was being rotated in this way, as would a right-handed person, or whether it was being turned by a left-handed person, in the opposite hand and producing the opposite pattern. Experiments show that right-handed tool makers produce significantly more oriented flakes. In our experiments, (we being right-handed), a ratio of 57–43 of right-oriented flakes was produced.
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> This is an experimental result that can be applied directly to early Stone Age artifacts. So far, every site we've examined from the early Stone Age, including those at Koobi Fora dated from about 1.9 to 1.5 million years ago, shows exactly the same pattern. Thus it appears that by the time of early tool making in the archaeological record, these ancestral hominid populations may have already become preferentially right-handed. For whatever reason or reasons, right-handedness seems to be an ancient trait in humans.[31]

This would also imply that language is an ancient trait in humans. Was *Homo habilis* the first being who could speak? One of the foremost authorities on the structure and evolution of the brain published a theory that advocates that Broca's area is the result of the development of language, not the cause of it.[32] If this were the case, then some *Australopithecus* would have to have been able to speak. While *Australopithecus* speech cannot be proven, we could not reject him from the human family if he could speak.

One final objection to speech among all hominids over the past two million years concerns the sup-

posed inability of Neanderthal to speak. This was based upon the hypothetical reconstruction of the Neanderthal larynx in a position that would inhibit the formation of certain vowels. This view was disproved by the discovery of a hyoid bone which demonstrated that the Neanderthal larynx was identical to modern humans and thus Neanderthal could speak.[33] Deacon notes that Neanderthals were probably our linguistic and intellectual equals.[34]

Sweating, Clothing, and Pain in Childbirth

These three issues are all interrelated and cannot be addressed separately. The line of reasoning is as follows: large brains tend to overheat requiring a cooling system like sweating. Efficient heat removal by sweating requires hairlessness which, in turn, produces the need for clothing. The large head required to house this large brain causes pain in childbirth. Here are the details.

The brain is a huge consumer of energy. Human adults use about 20% of their metabolic energy running the brain.[35] Without an efficient cooling system, the brain would quickly overheat and die. Even modest increases can be fatal; raising the brain temperature to 106° Fahrenheit causes brain damage. This fact means that the brain must be cooled and the temperature stabilized. One must be clear to distinguish temperature from heat production—heat production only raises the temperature of an object if the heat is not removed. Temperature, a measure of heat content not production, can remain stable if the heat is removed as rapidly as it is produced.

Physically, there are several ways to accomplish the temperature stabilization of the brain: heat conduction, fluid convection or a fluid coolant system. Heat conduction through the skull is too slow to maintain the brain's temperature. Convection works only in fluids; the brain is not fluid. The only real solution is a coolant system like an automobile uses. Dean Falk advanced a theory in which the hominid brain could not grow any bigger than the cooling system attached to it. The theory originated from a comment by her mechanic, who had said that her car's engine could not be bigger than what the radiator could cool.[36] The brain, like an engine, can only be as big as the cooling system it has. In the brain, the blood acts as the coolant.

The brain has several emissary veins that go from the interior of the skull to the skin of the face. These veins are part of the "radiator" system. When a person is cold, blood flows from the cranium outward in these veins. But when a person exercises and becomes overheated, the blood flow reverses and blood flows into the cranium. The reason for this reversal is that the skin of the face (the brow included) acts as a radiator, cooling the blood, which then enters the brain to cool that organ. These veins are preserved in the skulls of hominids as emissary foramina (a foramina is a hole in the skull).[37] Thus a record of the size and number of emissary foramina in ancient skulls is available for anthropologists to examine. Falk notes that over the past two million years as the brain size has increased, the number of emissary foramina increased in proportion.[38] But emissary veins are only part of the cooling mechanism in humankind.

Large brains tend to overheat requiring a cooling system like sweating. Efficient heat removal by sweating requires hairlessness which, in turn, produces the need for clothing. The large head required to house this large brain causes pain in childbirth.

An efficient sweating system cools not only the face but also the rest of the body and blood. The human sweating system is uniquely capable of performing that function. Bernard Campbell describes the function of sweat glands:

> The sweat glands fall into two groups: the apocrine and eccrine glands. The apocrine glands secrete the odorous component of sweat and are primarily scent glands that respond to stress or sexual stimulation. Before the development of artificial scents and deodorants, they no doubt played an important role in human society. In modern man these glands occur only in certain areas of the body, in particular in the armpits, the navel, the anal and genital areas, the nipples, and the ears. Surprisingly enough, glands in the armpits of man are more numerous per unit area than in any other animal. There is no doubt that the function of scent in sexual encounter is of the greatest importance even in the higher primates and man.
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> The eccrine glands, which are the source of sweat itself, have two functions in primates. Their original function was probably to moisten friction surfaces, such as the volar pads of hand and foot to improve the grip, prevent flaking of the horny layer of the skin, and assist tactile sensitivity. Glands serving that function are also found on the hairless surface of the prehensile tail of New World monkeys and

on the knuckles of gorilla and chimpanzee hands, which they use in quadrupedal walking. Glands in these positions are under the control of the brain and adrenal bodies, and in modern man an experience of stress may produce sweaty palms.

The second and more recently evolved function of the eccrine glands is the lowering of body temperature through the evaporation of sweat on the surface of the body. The hairy skin of monkeys and apes carries eccrine glands, but they are neither so active nor so numerous as in man. Modern man is equipped with between two and five million active sweat glands, and they play a vital part in cooling the body. The heat loss that results from the evaporation of water from a surface is enormously greater than that which could be expected to occur as a result of simple radiation. The fact that sweat contains salt necessitates a constant supply of the mineral if man is to survive in a tropical climate.

It has been observed that like almost all mammals, primates sweat very little. Even hunting carnivores, such as dogs, lose heat by other means, such as panting. Sweating has evolved as a most important means of heat loss in man, a fact that is surely correlated with the loss of his body hair. The apparent importance in human evolution of achieving an effective means of heat loss indicates without doubt that early man was subject to intense muscular activity, with the production of much metabolic heat; he could not afford even the smallest variation in body temperature. With such a highly evolved brain, the maintenance of a really constant internal environment was a need of prime importance in human evolution.[39]

With this need to dissipate heat in order to maintain a constant brain temperature, hair becomes a problem. Hair traps the sweat and hinders evaporation. Zihlman and Cohn relate:

How might early hominids have dissipated the heat load generated internally, as well as externally from the sun? One way is through the skin. The skin of modern humans contrasts with that of other, nonhuman primates in four features: 1) humans have a great density (over two million) of functioning eccrine sweat glands over the entire body surface; 2) loss of the apocrine sweat glands has been associated with hair loss, and has occurred except in the ano-genital and axillary regions; 3) hair follicles are diffuse and hair shafts are noticeably reduced in size; 4) skin pigment ranges from dark to light.

How might these features be interpreted in a functional and evolutionary way? There is the remarkable thermo-regulatory function of eccrine sweat glands. Sweating can deliver two litres of water to the skin surface in two hours and carry off almost 600 calories of heat. Hair tends to trap moisture, so that sweat evaporation is more effective with reduced hair. Interestingly, the number of hair follicles in humans is similar to that in chimpanzees and gorillas, but the much reduced size of hair shafts in humans gives a hairless appearance.[40]

Why do we have hair on our head? Radiatively, hair on the top of the head absorbs the solar heat and re-radiates most of it. An absorbing layer can reduce by half the amount of energy reaching the top of the skull. Zihlman and Cohn note that head hair protects the scalp from ultraviolet radiation and acts to stabilize the temperature of the brain.[41] Although various human populations possess different amounts of body hair, all have hair on the head but the rest of the body is hairless enough to allow efficient sweating.

Ancient humans would have needed this mechanism very early. For modern humans even moderate exertion on the savanna increases the heat production by 100% over the resting levels. Since *Homo erectus* was as large as we are, similar exertions on the plains would yield similar heating.[42] Even the smallest *Homo erectus* has a brain that is over twice as large as that of the chimpanzee, which can get by without much sweating. *Homo erectus* would need to sweat and he therefore needed to be relatively hairless.

A relatively hairless *Homo erectus* living in Georgia (former USSR) would have been ill-equipped to handle the winter temperatures below zero Fahrenheit which occur from time to time in that area.[43] Because of these considerations, anthropologists like Brian Fagan were forced to conclude that when *Homo erectus* inhabited Europe, he had to have been capable of building shelters, fire, and clothing.[44]

Thus archaeology has provided evidence for the curse of sweating and hairlessness as far back as 1.9 million years ago when *Homo erectus* first appears. Because of this, it indirectly provides evidence of clothing that long ago. By 300–400 thousand years ago, humankind was living in northern Germany and possibly Siberia where they definitely would need clothes.[45]

There is some more direct physical evidence for clothing among humans living between 300 thousand and 1.9 million years ago.[46] It comes again from a study of stone tools. When a stone tool is used, microscopic scratches are left on the stone. These scratches are unique for each use and can be used to identify the material that was cut. A characteristic pattern of wear indicative of scraping animal hides is found on tools of this age. But the most interesting

direct evidence for working with animal skins comes from some bone tools found at Swartkrans and Sterkfontein, South Africa and Olduvai Gorge, Tanzania all of which indicate working in animal skins. Richard Klein writes:

> At all three sites, the bone implements certainly or probably date from between 2 mya and 1.5 mya. Microscopic examination supports the artifactual nature of 41 Olduvai pieces. Of these, 4 were not tools in the narrow sense but apparently served as anvils or platforms on which soft substances such as skin were repeatedly punctured by sharp ended stone artifacts. The remaining 37 are large, flaked pieces of bone, including (a) 26 with polish of the kind that forms on experimental pieces used to cut or smooth soft materials such as hide and (b) 11 with wear that probably formed from contact with a more abrasive substance such as soil.[47]

The evidence for the processing of animal hides goes far back into the archaeological record.

God's curse for the man and woman could have been implemented through an increase in brain size.

Some have suggested that the tools at Swartkrans and Olduvai were manufactured by *Australopithecus* rather than by *Homo*. While one cannot rule out *Australopithecus* as the tool-maker, there is no proof of this today. There are no stone tools long before the appearance of *Homo*. At Swartkrans, advocates of *Australopithecus* tool-making cite the fact that 95% of the fossil material from that site is Australopithecine. But at least six fossils of *Homo* are found there[48] and the fossil SK-847 dating from the earlier Swuartkrans beds is in our terminology, *Homo erectus*.[49] *Homo habilis* is found at Olduvai in beds dating at least 1.8 million years ago.[50]

Now to tie up the final item, pain in childbirth. Among mammals there are two patterns of brain growth. The first pattern is called altriciality. In this pattern, the animal is born helpless and extremely immature. The brains of altricial animals are usually half the size of the adult's, and double in size by adulthood. Because of this, it takes lots of parental effort to raise the young. Animals following this pattern usually have litters and perform this care for multiple offspring at once. Cats, with their blind and helpless kittens, are altricial. The other pattern is precocial. In this pattern, the offspring are usually born single and from birth can get around quite well. Their brains are nearly adult size at birth. They are alert and all their organs are functioning. An example of this pattern is the horse, the wildebeest, etc., where the young runs with the herds within minutes.

According to Walker and Shipman altricial species almost never have bigger brains than precocial species.[51] The reason is that for all mammals except one, the brain grows rapidly during gestation but then grows less rapidly after birth. There is a kink in the graph of brain size vs. time that occurs at birth. Altricial species are in an immature state at birth and the subsequent slowdown in the rate of brain growth means that they forever remain behind the more maturely-born precocial species.

What humans seem to have accomplished is the trick of keeping the brain growing at the embryonic rate for one year after birth. Effectively, if humans are a fundamentally precocial species, our gestation is (or should be) twenty-one months. However, no mother could possibly pass a one-year-old baby's head through the birth canal. Thus, human babies are born "early" to avoid the death of the mother. Walker and Shipman write:

> Humans are simply born too early in their development, at the time when their heads will still fit through their mothers' birth canals. As babies' brains grow, during this extrauterine year of fetal life, so do their bodies. About the time of the infant's first birthday, the period of fetal brain growth terminates, coinciding with the beginnings of speech and the mastery of erect posture and bipedal walking.[52]

This pattern of growth has huge implications. Every other primate doubles their brain weight from birth to adulthood. But due to the early birth of humans, we triple our brain's size. Our last twelve months of fetal brain growth occur outside the sensually deprived womb. This allows vast quantities of sensory input to affect the rate and nature of the neural connections. There are also huge emotional implications to this pattern of growth. Unlike chimp babies who can cling to their mother's fur, human infants cannot hang onto their mother despite having the hand reflex. The mother has no fur because she sweats and she sweats because of a big brain, which is why she gives birth to her child early. This early birth then requires the mother to care for the infant, which increases the bond between mother and child, which partially makes us human.

So, what is the birth pattern in *Homo erectus*? It is human. Shipman and Walker point out that the adult

Homo erectus cranial capacity was 950 cc.[53] If they followed the apelike pattern of doubling their brain size after birth, they would need to be born with a brain size of around 400 cc. Following the discovery of a nearly complete *Homo erectus* skeleton, the size of the *erectus* birth canal is known. A head with a 400-cc brain is 10 cm too big to fit through the birth canal. Estimates place the maximum fetal brain size able to fit through the *erectus* birth canal at just 231 cc.[54] *Homo erectus* had a human pattern of birth and must have endured similar pain in childbirth, and then cared for their young in a human pattern.

To close this section, it would appear that God's curse for the man and woman could have been implemented through an increase in brain size. This increase caused the need for an efficient sweating system and thus the loss of hair which, in turn, caused a need for clothing when humankind eventually inhabited northern climates.

Religion

One absolute characteristic of a fallen human being is his constant engagement in religious and ritual activities. In spite of the many claims that there is no evidence of religion prior to 40,000 years ago, religion has apparently played a part in the life of humans for several hundred thousand years. Because everyone agrees that anatomically modern humans engage in religion, we will not discuss their activities except as an analogy for what earlier hominids did.

One indirect evidence of ritual among Neanderthals concerns the existence of a flute dating from 43,000 years ago. Bruno Netti points out that in primitive societies music is always associated with ritual and is often viewed as a special form of communication with the spirits.[55] If this connection is real, then the discovery of a bear bone flute at Divje Babe, Slovenia by Ivan Turk and colleagues, sheds some light on the religious activities of Neanderthal.[56] Although some Christians have downplayed this discovery as nothing more than a fire starter, this explanation has not been advanced by anyone in the anthropological community.[57] The object is identical to bear bone flutes made by modern humans and universally accepted as flutes.

Many circumpolar peoples today engage in a form of religion known as shamanism. Converts believe that spirits enter the shaman, who then acts as a medium between the spirit world and his people. Most often the spirits take the form of animals and the shaman wears a costume made from the animal's skin as part of the ritual. Evidence of a shaman's cape was found with a 50,000-year-old Neanderthal burial at Hortus, France.[58] A Neanderthal was found with the paw and tail bones of a leopard arranged in a fashion suggesting that these bones had been part of a cape worn by the Neanderthal. Only the bones of the paws and tail were left of the leopard which would seem to rule out a fortuitous arrangement of bones. This find is reminiscent of costumes worn by primitive shamanistic tribes today.

Religion is not restricted to anatomically modern humans and Neanderthals. Three* Homo erectus *sites have yielded evidence for religious activities.

In 1996 at Bruiniquel, France, a possible Neanderthal sanctuary was discovered. Several hundred meters inside a cave, in total darkness, Neanderthals, prior to 47,000 years ago, built a 13 by 16 foot-rectangular structure. Neanderthals must have had a powerful incentive to travel deep into a dangerous cave, which required lamps or other artificial lighting; religion is an obvious possibility. Inside the structure burnt bear bones were found.[59] None were found outside the structure, implying that Neanderthals used the Bruiniquel site to sacrifice a bear. This activity is not unique to Neanderthals. Similar evidence, when associated with anatomically modern humans, is readily accepted as evidence of religion. Such evidence includes sites such as the 32,000-year-old Chauvet Cave in France, where a bear skull was ritually arranged.[60] Indeed, many modern peoples still make a yearly sacrifice of a bear to their gods in rituals remarkably similar to those depicted at the 18,000-year-old Le Trois Frere[61] and at the 12,500-year-old site of Mas d'Azil.[62] This bear cult religion appears to have originated with Neanderthals.

From the Neanderthal site of Nahr Ibrahim, Lebanon come reports of a deer that had been ritually arranged and sprinkled with red ochre.[63] Red ochre was used by anatomically modern humans and Neanderthal as a symbolic substitute for blood. All throughout the world, graves of Neanderthal and modern humans were liberally sprinkled with red ochre. Interestingly, while the Nahr Ibrahim cave itself contained red ochre, the ochre associated with the grave was chemically different and is believed to have been brought into the cave from elsewhere, implying long-range planning for the ritual.

But religion is not restricted to anatomically modern humans and Neanderthals. Three *Homo erectus*

sites have yielded evidence for religious activities. Chronologically, the youngest is the finding of a Venus figurine from Berekhat Ram, Golan Heights.[64] This crude piece of art dates between 250-280,000 years ago. It is a carved figure of a naked woman that is quite reminiscent of the Venus figurines used as fertility symbols by anatomically modern humans between 30,000 years and the present. The most recent study of the object by one of the world's leading authorities on Upper Paleolithic art confirmed that the figurine was made by a human.[65] When such figurines are found with the remains of anatomically modern humans, no one questions their association with religion and spirituality.

The second *Homo erectus* site with evidence for ritual is near Toralba, Spain. Of this 400,000-year-old site, Johanson and Shreeve write:

> Almost the complete left side of one elephant skeleton was found arranged as if for display, each bone turned over and replaced in the position it would have held in life. At the nearby site of Ambrona, Howell found several leg bones lying end to end in two perpendicular lines.
>
> The oddly symmetrical half-carcass was harder to explain—perhaps it was the remnant of some ritual, though no other signs that *Homo erectus* indulged in ceremony had ever been found.[66]

Johanson and Shreeve are wrong. This is not the only example of ritual. Perhaps the most amazing evidence for religion comes from the 400,000-year-old site of Bilzingsleben, Germany. Bilzingsleben has yielded some of the most amazing cultural artefacts from life that long ago, including a report of a drawing of a four-footed animal.[67] This site was preserved so exquisitely by travertine deposition that wood chips from the cutting and shaping of saplings are found. The site preserved the remains of three huts that were next to a 27-foot wide paved "social area." The excavators of Bilzingsleben write:

> The home base of early man from Bilzingsleben was situated on a shore terrace close to the outflow of a karst spring into a small lake. Previous excavations revealed a division of the camp site into different activity areas and outlines of three simple shelters with hearths and workshops set up in front of them. Five to 8 m from the dwelling structures, an artificially paved area with a diameter of 9 m was found. According to the archaeological evidence, special cultural activities may have been carried out there.[68]

The nature of these cultural activities was not published in English until 1997. Rick Gore reports:

> But Mania's most intriguing find lies under a protective shed. As he opens the door sunlight illuminates a cluster of smooth stones and pieces of bone that he believes were arranged by humans to pave a 27-foot-wide circle.
>
> "They intentionally paved this area for cultural activities," says Mania. "We found here a large anvil of quartzite set between the horns of a huge bison, near it were fractured human skulls."[69]

It would appear that this was an altar upon which human sacrifice may have occurred. This was a religion every bit as much as was the Aztec religion that also performed human sacrifice. As we have seen, there are no grounds for restricting religion only to anatomically modern humans.

Murder

The final item in the list is murder. We do not know the means by which Cain slew Abel but humans use tools to kill their comrades; animals use their teeth and claws. Thus I would restrict the term "murder" to those cases where a tool was used. Around 45,000 years ago, somebody tried to kill one of the Shanidar Neanderthals. The ninth rib on Shanidar 3 shows a partially healed slit made by a stone spear head that had been thrust into him. He survived the attack but before he could heal, he was killed in a rock fall.[70] The 300,000-year-old Broken Hill man, an archaic *Homo sapiens*, is believed to have died from a blow to the head by an antler pronged pick axe.[71] At Zhoukoudian, China, the *Homo erectus* people found, who date between 400 and 500,000 years ago, were believed to have been murdered, then eaten.[72]

Conclusion

The data presented here clearly shows that the various species of hominid engaged in activities indicative of a fallen human being. The data are consistent with the view that all members of the genus *Homo* are descendants of Adam. The data are also consistent with the third view that human characteristics arose gradually. However, the data clearly disprove the second view that restricts spirituality to anatomically modern humans.

In 1995, this author published a novel view of Noah's flood.[73] One criticism of that view is the antiquity of the flood. The data presented here are consistent with that model of the flood and amplify the need for an apologetic that extends the time fallen humankind has been on earth. This data also expand the definition of humans and again empha-

size the point that spirituality is not determined by uniformity or differences in appearance. This is true no matter whether the differences arise merely because of skin color or, as with fossil humans, bone structure.

To claim that spiritual humankind was not on the earth prior to 40,000, 60,000, or 100,000 years ago or to claim that spirituality is restricted to anatomically modern* Homo sapiens *ignores the abundant anthropological data.

Biblically, humanity is determined by the ability to speak, the wearing of clothing, sweating, pain in childbirth, religion, and murder. It would appear that all traits that the Bible lists as indicative of a fallen human being were in existence *at least as early as 400,000 years ago*. However, some of these traits, language, pain in childbirth, and sweating, appear to have been on the earth for up to two million years. It would appear that Adam must be dated prior to this time. This data have important implications concerning how the scriptural data are to be interpreted and/or harmonized. To claim that spiritual humankind was not on the earth prior to 40,000, 60,000, or 100,000 years ago or to claim that spirituality is restricted to anatomically modern *Homo sapiens* ignores the abundant anthropological data. It is time for Christianity to come to grips with this important fact. ❄

Notes

[1]Glenn R. Morton, *Foundation, Fall and Flood* (Dallas: DMD Publishing Co., 1995); see also Glenn R. Morton, "The Mediterranean Flood," *Perspectives on Science and Christian Faith* 49:4 (1997): 238–51.

[2]There are some suspected associations of *Australopithecus* with stone tools. However, these associations only occur after the appearance of genus *Homo* around 2.3 million years ago. For this reason, the data are too sparse to draw any firm conclusions. For a discussion, see Donald Johanson and Blake Edgar, *From Lucy to Language* (New York: Simon & Schuster, 1997), 184.

[3]Alan Walker and Pat Shipman, *The Wisdom of the Bones* (New York: Alfred Knopf, 1996), 145; C. C. Swisher III, et al., "Latest *Homo erectus* of Java: Potential Contemporaneity with *Homo sapiens* in Southeast Asia," *Science* 274 (1996): 1870–4.

[4]Chris Stringer and Clive Gamble, *In Search of the Neanderthals* (New York: Thames and Hudson, 1993), 66.

[5]John C. Whitcomb and Henry M. Morris, *The Genesis Flood* (Grand Rapids: Baker Bookhouse, 1961), 457.

[6]Marvin L. Lubenow, *Bones of Contention* (Grand Rapids: Baker Books, 1992), 162.

[7]Henry M. Morris, *The Biblical Basis for Modern Science* (Grand Rapids: Baker Bookhouse, 1984), 398.

[8]Duane T. Gish, *Evolution: The Challenge of the Fossil Record* (El Cajon: Creation-Life Publishers, 1985), 179.

[9]Morton, "The Mediterranean Flood."

[10]David L. Wilcox, "Adam, Where Are You? Changing Paradigms in Paleoanthropology," *Perspectives on Science and Christian Faith* 48:2 (1996): 88–96, p. 94.

[11]Phillip Johnson, *Darwin on Trial*, 2d ed. (Downers Grove: InterVarsity Press, 1993), 85.

[12]Hugh Ross, "Art and Fabric Shed New Light on Human History," *Facts & Faith* 9:3 (1995): 2.

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[14]Ibid., p. 45.

[15]Dick Fischer, *The Origins Solution* (Lima: Fairway Press, 1996), 189, 194.

[16]E. O. Wilson, "Animal Communication," *Scientific American* 227:3 (Sept. 1972): 52–60.

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[18]Steven Pinker, *The Language Instinct* (New York: Harper/Perennial, 1994), 339–40.

[19]Derek Bickerton, *Language & Species* (Chicago: University of Chicago Press, 1990), 107–8.

[20]Pinker, *The Language Instinct*, 339.

[21]Terrence W. Deacon, *The Symbolic Species* (New York: W.W. Norton, 1997), 43.

[22]Ibid., 331.

[23]E. S. Savage-Rumbaugh, "Language Training of Apes," in S. Jones, et al., eds., *The Cambridge Encyclopedia of Human Evolution* (Cambridge: Cambridge University Press, 1992), 139.

[24]Pinker, *The Language Instinct*, 334.

[25]Clive Gamble, *Timewalkers* (Cambridge: Harvard University Press, 1994), 172.

[26]Patrick J. Gannon, et al., "Asymmetry of Chimpanzee Planum Temporale: Humanlike Pattern of Wernicke's Brain Language Area Homolog," *Science* 279 (1998): 220–2.

[27]Ibid., 221; and Terrence Deacon cited by Sandra Blakeslee, "Brain of Chimpanzee Sheds Light on Mystery of Language," *New York Times* (January 13, 1998).

[28]Kathy D. Schick and Nicholas Toth, *Making Silent Stones Speak* (New York: Simon and Schuster, 1993), 140; and Gamble, *Timewalkers*, 172.

[29]Dean Falk, "Comments," *Current Anthropology* 30:2 (April 1989): 141–2.

[30]Dean Falk, *Braindance* (New York: Henry Hold and Company, 1992), 122.

[31]Schick and Toth, *Making Silent Stones Speak*, 142.

[32]Deacon, *The Symbolic Species*, 340.

[33]B. Arensburg, et al., "A Reappraisal of the Anatomical Basis for Speech in Middle Palaeolithic Hominids," *American Journal of Physical Anthropology* 83: 137–46, p. 145

[34]Deacon, *The Symbolic Species*, 372–3.

[35]Donald Johanson and James Shreeve, *Lucy's Child* (New York: William Morrow, 1989), 263.

[36]Falk, *Braindance*, 156.

[37]Ibid., 153.

[38]Ibid., 159.
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[46]Schick Toth, *Making Silent Stones Speak*, 162.
[47]Richard G. Klein, *The Human Career* (Chicago: The University of Chicago Press, 1989), 164.
[48]Ian Tattersall, *The Fossil Trail* (New York: Oxford University Press, 1995), 201–2.
[49]Donald Johanson and Blake Edgar, *From Lucy to Language*, p. 184. Most authorities believe that the tools were made by *Homo*, not by *Australopithecus*.
[50]Ibid., 172.
[51]Walker and Shipman, *The Wisdom of the Bones*, 220–2.
[52]Ibid., 222.
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[72]Ian Tattersall, *The Fossil Trail* (New York: Oxford University Press, 1995), 61–2.
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