



Gregg Davidson

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Genetics, the Nephilim, and the Historicity of Adam

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Considerable controversy exists at present over the apparent inability to reconcile modern population genetics and the fossil record with a genuine first human couple and first act of disobedience against God. Genetic data argue strongly for not only shared ancestry between humanity and animals, but also that the effective human population never dropped below a few thousand. A unique model is proposed, along with a discussion of its strengths and weaknesses, for how a first human pair (Adam and Eve) could have existed without contradicting the findings of current genetics. The argument is not made in defense of any particular interpretation of the early chapters of Genesis, other than the existence of a first human couple and initial act of disobedience. In the proposed model, God chose an individual hominid pair to endow with souls, separating them spiritually, relationally, and cognitively from their otherwise biologically equivalent contemporaries. After being removed from Eden, limited (and forbidden) interbreeding took place between Adam and Eve's progeny and still-extant hominids, including more distantly related hominid species such as Neanderthals, resulting in offspring with unique characteristics referred to as Nephilim. Such unions can potentially account for a present human population that derived from a genuine first human couple, while also carrying genetic evidence of contributions from a much larger hominid population. This model simultaneously offers a plausible explanation for Cain's fear at the time of his banishment, and the enigmatic identity of the "sons of God" in Genesis 6.

Among discussions at the intersection of science and Christian faith, perhaps the most contentious subject in recent years is the historicity of Adam and Eve. On the scientific side, genetic and fossil evidence weigh heavily against humanity starting as a specially created, individual man and woman. Fossil hominid remains make a strong case for human lineage that derives from non-human ancestors, and genetic variability in the human genome appears to require that the earliest *Homo sapiens* population never dropped below several thousand members.

On the theological side, there is no hint of metaphorical language in Romans 5, where the Apostle Paul writes that sin entered the world through one man, Adam.¹ Biblical scholars who have found ways of reconciling other scientific claims with an inspired, inerrant Bible—such as a sun-centered solar system, an ancient earth, or evolution of nonhuman life—have had greater difficulty finding ways in which genetic evidence can be reconciled with biblical characterizations of Adam and Eve. A growing number have simply decided that the creation story is entirely allegorical, and that Paul's description of sin entering through one (Adam) and salvation coming through one (Jesus) was a culturally expedient literary tool. For others, this view represents acquiescence to liberal theology,

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in which science is elevated as a more trustworthy source of truth, and the Bible is viewed simply as a collection of human wisdom from which one must sort out the good and the bad.

In this article, I make a case for the possibility of a genuine first human couple and first act of disobedience that is consistent with current scientific understanding regarding the origin of humanity and population genetics. It is not an argument for any particular interpretation of the first chapters of Genesis, literal or otherwise, nor is it necessarily an expression of my own personal belief. Rather, it is offered as one possible scenario for how Adam and Eve could have existed as real individuals within the context of both human evolution and a particular reading of the biblical narrative. I would add a further note that no claim is made here of an airtight case. From a human perspective, no explanation for the origin of human beings—from the purely literalistic interpretation of the biblical creation story to the purely naturalistic belief in the undesigned flowering of self-aware life—is free from unresolved tensions. I will argue, however, that the proposed model has sufficient plausibility for serious consideration. A particular strength of the argument is that it simultaneously addresses two other long-standing theological conundrums: who Cain was afraid of in Genesis 4, and who the “sons of God” were in Genesis 6. We will start with a brief summary of the scientific data.

Fossil Hominids

There is a common misconception that the number of so-called hominid fossil discoveries is very small, with whole-organism reconstructions typically based on a stray tooth or fragment of a jaw.² In fact, remains from over 5,000 individual hominids have been discovered, ranging from single bones to nearly complete skeletons.³ When dated and placed in chronological order, the exact relationship between species is not always apparent, but there is a clear progression of more ape-like to more human-like features through time.⁴

Genetic Evidence of Common Ancestry

Comparison of the DNA of disparate organisms allows rigorous testing of various origins models. In

a special creation model, in which the first man was created *de novo*, similarities in DNA with other primates are expected because of a “common designer” rather than a common ancestor; God used similar genetic architecture for similar functions. Subsequent genetic drift beyond the creation event should have led to changes in the genetic coding that are unique in humans and in all other primates. One should not expect a series of random mutations, such as point changes (one “rung” on the DNA ladder), or duplication or inversion of gene sequences to be repeated in the same place and pattern in two separate specially created populations.

In an evolutionary creation model, humans should share some of the same mutations as other primates. If diverse organisms share a common ancestor, then comparisons of the DNA of any two species should contain examples of genetic mutations in the same place and pattern, with more shared mutations between organisms with a more recent common ancestor, and fewer between those with a more ancient shared ancestor.

When studying primates, duplicated and inverted gene sequences are found in substantial numbers between humans and other primates, consistent with an evolutionary creation model. The highest frequency of shared mutations occurs between humans and chimps, suggesting a more recent common ancestor than between humans and gorillas, orangutans, or other apes. Of some significance, the genetic distance between chimps and gorillas (the next most genetically similar ape) is greater than the difference between chimps and humans.⁵

Mitochondrial Eve, Y-Chromosome Adam, and Population Size

Using any particular sequence of DNA collected from a large sample of the human population, it is possible to link all humans back to a common ancestor. The estimated age of a common ancestor varies widely with different DNA sequences, which is fully expected as populations diverge and differentiate. As an example, one sequence of DNA might indicate a recent common ancestor shared only by Native Americans, reflecting a time after migration to North America that isolated these people from populations

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still living in Eurasia. Another sequence might indicate an older common ancestor, one that predates the migration, that is shared by both Native American and Asian populations. Still other sequences may indicate more-ancient common ancestors shared between human and nonhuman organisms.

Most of the DNA in our cells shares its origin equally between our mothers and fathers. There are two exceptions. Y-chromosomes, found only in males, come exclusively from our fathers (females have no Y-chromosome to pass on). Mitochondrial DNA, referred to as *mtDNA*, is found outside the nucleus in energy-producing organelles called *mitochondria*. Mitochondria are found only in the egg, not in the sperm, with the result that mtDNA is passed on to both males and females exclusively from our mothers.⁶ Population studies of mtDNA and Y-chromosomes are of interest for many reasons, one being that they do not undergo recombination during sexual reproduction. The only thing that changes their makeup from one generation to the next is mutation.⁷ They are also uniquely suited for tracing ancestry back to a common *female* or to a common *male* ancestor. The most recent common human female ancestor, traced through mtDNA, is commonly referred to as *mitochondrial Eve*. The most recent common male ancestor, based on Y-chromosome studies, is less commonly referred to as *Y-chromosome Adam*.

Geneticists point out that mitochondrial Eve and Y-chromosome Adam are not synonyms for the biblical Adam and Eve for at least three reasons.

1. A common female ancestor is not fundamentally different from a common ancestor of unknown sex. Based on studies of nuclear DNA, additional older common ancestors can be identified (pushing the origins of humans back earlier than mitochondrial Eve).
2. The variability of DNA in the cell nucleus strongly argues that mitochondrial Eve was part of an effective population of at least several thousand individuals.⁸ For nongeneticists, tracing our origins back to a single mother *and* to a larger contemporaneous population at the same time may seem contradictory, but it is actually quite plausible. The explanation is that mitochondrial Eve's offspring mated with members of the larger population present at the time, but within subsequent generations only mito-

chondrial Eve produced an unbroken line of *daughters*. Lineages from other females living at the time of mitochondrial Eve eventually passed through a generation of all male offspring (or did not reproduce). Males without lineage back to mitochondrial Eve continued to mate and contribute to the genetic pool, but once a generation was reached in which all the females traced their mtDNA to mitochondrial Eve, all future humans, male and female, would share the same common source of their mtDNA. The genetic makeup of modern humans thus reflects both a common single mother and ancestry from a larger population present at the same time. The same reasoning applies to a common Y-chromosome father. A common father does not mean that there were no other humans present and mating at the time. Rather, it simply means that in subsequent generations, only one male's lineage produced an unbroken line of sons leading up to the present.

3. The degree of genetic variability within the human population is not the same in mtDNA and Y-chromosomes, leading to different estimates of the time required to accumulate the observed variations. In other words, the most recent common mother and common father did not necessarily live at the same time. If mutations occur at roughly the same rate as observed today, mitochondrial Eve dates back roughly 200,000 years.⁹ The common Y-chromosome father was thought to be more recent, dating back to about 140,000 years,¹⁰ but several recent studies have argued for dates closer to or even predating mitochondrial Eve.¹¹

Those attempting to reconcile the time offset with a genuine first human couple note that the published dates refer only to the *most recent* common mother or father, and do not preclude earlier common mothers or fathers. It is possible that a common *monogamous* mother and father existed at the same time, with a more recent common mother or father later in human history. On this subject, writers such as Fazale Rana and Hugh Ross have argued that a more recent common father is conceptually consistent with Noah's flood: Noah's three sons shared a common father, but their wives presumably each had different mothers.¹² Such an event requires that a severe bottleneck occurred in the human population since the time of mitochondrial Eve that does not appear to be

reflected in the diversity of human DNA.¹³ It is worth noting here that the lack of evidence for a bottleneck only bears upon the question of the flood's extent. It does not address the question of whether Noah was a real person or if a flood of great size actually occurred. The only tension is that, at present, human genetic diversity does not appear reconcilable with a complete destruction of all humans from lands far distant from Noah.

Interbreeding

The most recent hominids thought to be distinct from *Homo sapiens* are the Neanderthals (and the more poorly known Denisovians).¹⁴ Neanderthals had distinctive skulls and skeletal features that make these fossils easily identifiable. Their first appearance predates modern humans by over 100,000 years, but overlapped with *Homo sapiens* for thousands of years before their disappearance. Preservation of organic material from some Neanderthal remains has allowed genetic analyses, with the conclusion that they were indeed distinct from modern humans. However, comparisons of DNA from Neanderthal fossils, ancient *Homo sapiens* remains, and modern humans suggest that limited interbreeding took place between Neanderthals and some *Homo sapiens* populations, resulting in recognizable Neanderthal DNA in non-African human populations today.¹⁵

Summary of Scientific Claims

- Man shares a common ancestry with other life forms.
- Modern humans trace their ancestry both to a common mother and to a larger contemporaneous population (humanity was never limited to two individuals), roughly 200,000 years ago.
- Different varieties of hominids existed at the same time.
- Interbreeding occurred between *Homo sapiens* and hominids such as Neanderthals.

At first glance, the list above may seem utterly at odds with a historical Adam and Eve, but there is at least one possible scenario, summarized below, in which modern genetics and a genuine first human pair are not inherently in conflict.

- Adam and Eve were naturally born hominids selected by God.

- Selection included endowing with souls, making them spiritually, relationally, and cognitively distinct from their hominid relatives and neighbors.
- After being cast out of Eden, forbidden interbreeding occurred between their offspring and contemporaneous hominids.

Several criteria must be satisfied to reconcile this proposed history with scripture and modern genetics.

1. *Evolution and selection of a single hominid pair must be consistent with God's nature.*

This first criteria is a bold statement, because it implies that we can know and understand God's nature sufficiently to make such an assessment. On the one hand, we are presumptuous when we think we can define the parameters that must constrain the actions of God. Romans 11:33 proclaims that God's judgments are unsearchable and his ways unfathomable.¹⁶ On the other hand, scripture also tells us that we can have the mind of Christ (1 Cor. 2:16), and gain understanding of God's nature and character through the study of both his revealed and natural world (Rom. 1:19).

The concept of nonliving earth materials giving rise to complex life is entirely consistent with what we are told of God's interaction with his creation. In the creation account, God spoke to the earth and commanded it to bring forth living creatures, and it obeyed (Gen. 1:24). This obedience is equally satisfied by the earth producing life in a single step, or through multiple generations (evolution) starting with nonliving earth materials. It is significant here that no distinction is made in the source material for Adam. Genesis 2:7 tells us that Adam was made from the same raw materials as the animals—from the dust of the earth. Whether created in one step or many, Adam was derived from the earth and owes his existence to God.

Selection of one individual from among many for a particular purpose is also consistent with God's nature. God chose Abraham over the rest of humankind, Isaac rather than Ishmael, Jacob over Esau, and Israel rather than other nations, typically without any explanation. Selection of one hominid pair over all others would be consistent with this pattern.

Lastly, creation over time through a series of stages is perhaps *more* consistent with God's nature than

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instantaneous creation. Being made in the image of God arguably includes the desire to be creative. The sculptor pursuing this desire takes no delight in punching a button for a protrusion machine to spit out a statue, but rather spends countless hours working and shaping the material into the envisioned design. This reflection of God fits well with a mode of divine creativity that started with formless clay (earth materials) that was molded and fashioned over time through a series of generations toward a variety of end designs. But, being infinitely more creative than human beings, each step of God's handiwork—each successive generation—has been a marvelous end product on its own.

2. *To be evolved and to be the first true humans, Adam and Eve had to have nonhuman parents, yet they needed to be substantively distinct from their biological parents and relatives.*

In the proposed scenario, God worked his hominid creations through a long series of generations, culminating in a biological structure ready and suitable for housing a soul. If God selected two individual hominids to endow with souls, then this first pair would have been physically similar to their parents and neighbors, but spiritually, emotionally, and relationally on an entirely different plane.¹⁷ Unpacking this idea requires some discussion of what it means to be in possession of a soul, and the difference between soul-bearing and "soul-ish" creatures.

The precise nature of the soul—and how an individual comes into possession of one—is a mystery. While there is no uniform consensus among Christian theologians, there is a general recognition that a human is both a physical and a spiritual organism.¹⁸ Our physical form begins at conception with the recombination of our parents' genetic material and ends at death. (While scripture speaks of a bodily resurrection, it is a glorified version that does not require the reformulation of the same molecules dispersed at death.¹⁹) In order to exist beyond the grave, to have a continued relationship with God, and to experience eternal reward or punishment, there has to be a fundamental characteristic of each individual that is not bound by the laws of nature and continues when physical life ceases. If we define this characteristic as the *soul*, then its existence and its origin is not something that can be teased apart by the scientific method.²⁰

This duality creates an inevitable tension. Awareness of a relationship with God that extends beyond physical death requires a sufficiently developed brain and physiology to carry out the appropriate neural transmissions to process that awareness. At the same time, the physiological structure that facilitates awareness cannot generate that awareness without the actual possession of a nonmaterially constrained soul. I would argue that the gift of a soul to a previously soulless, yet biologically equipped hominid, had the potential to impart a quantum, *bigger-than-biology* shift in the emotional and relational awareness of Adam and his bride that set them apart from their contemporaries.

A logical counter-argument might be made that hominids, such as Neanderthals that we do not think of as truly human (at least not in the modern sense), exhibited behaviors reminiscent of an understanding of life after death, such as ornamenting and burying their dead. Addressing this requires an understanding of what is meant by *soul-ish* behavior. The higher animals are often spoken of today as *soul-ish* creatures, meaning that they possess some degree of decision-making capacity and conscience experience that goes beyond simple instinct. Soul-ish characteristics may include loyalty, affection, pleasure, excitement, curiosity, sadness, or a measure of self-awareness. The reason we have such a word in our theological vocabulary is that we assume the behavior of the higher animals *resembles* that of a soul-bearing human, though lacking the spiritual identity that makes them subject to eternal reward or punishment after death.²¹

A soul-bearing creature—what we think of today as a *human*—has mental and relational capacities that go well beyond soul-ishness, such as a cognitive understanding of justice and mercy,²² the ability to create and appreciate art, the desire to understand why things are the way they are, the ability to ponder and communicate abstract ideas, the desire to know truth, and the sense that there is a realm or existence that is beyond the physical. When the Bible speaks of creation in the image of God, it is not a physical appearance, but possession of such characteristics that allow human beings to be God's relational representatives on this earth.²³ As creatures lacking a soul, hominids living at the time of Adam and Eve may well have had behaviors that were much more

soulish than those of the most advanced primates of today, but still only soul-ish.

Selection and endowment of a soul at one point in time also avoids a logical conundrum inherent in arguments advocating an evolutionary development of the soul or spirit. In the evolution of *physical* forms, transitions from one function to another, such as bone structures transitioning to a more upright posture, can proceed in a stepwise fashion. There is no conundrum in a creature walking “partially upright.” But if humans are uniquely in possession of a spiritual entity—a soul—that can abide with God in heaven or be cast into hell, stepwise transitions are much more problematic. How can a creature possess a transitional form of a soul that upon death gives it a *partial* eternal union with God in heaven, or a *partial* separation in hell?

Several additional questions logically arise from this discussion such as how the progeny of Adam and Eve came to have souls, whether the offspring of a soul-bearing human and a nonsoul-bearing hominid would have a soul, and how a sinful nature came to be inherent to the human condition. The proposed model is not dependent on a particular answer to any of these questions, other than the reminder that a soul that continues beyond the grave is not a biological entity that is constrained by genetic principles. We possess a soul and a relationship with our Maker, not by virtue of the DNA passed on by our ancestors, but by the divine agency of God. Given that much of humanity today is, in essence, “mixed” (at least considering Neanderthals), one may assume that God endowed all of Adam’s progeny with souls. Rebellion from God is likewise a spiritual phenomenon, ungoverned by our biology—though certainly lived out in a bodily fashion. As such, the model is consistent with, but not dependent on any of the historical theological views of original or ancestral sin.²⁴

3. *Adam and Eve had to live for a time in the midst of their hominid relatives.*

The presence of contemporaneous hominids offers a plausible explanation of who Cain was afraid of after becoming an outcast.²⁵ Genesis 4:14 relates Cain’s concern that “whoever finds me will kill me.” Every generation has pondered the question of who Cain feared if all of humanity at the time was Adam, Eve, and Cain (with Abel deceased). The standard response is that Adam and Eve had other children

who quickly gave rise to a sizable population. But there are timing and location problems. Regarding timing, we are told explicitly in Gen. 4:25 that Adam and Eve’s next son, Seth, was born *after* Cain killed Abel, and the absence of a genealogy for Abel indicates that he died childless. This requires that Cain was either afraid of people not yet born, or that his eviction occurred decades after his offense. Neither seems a reasonable option.

Regarding location, recall that Cain’s punishment was *banishment*—sent to a land away from Adam and Eve. If there were other children of Adam and Eve in this land, it means they also committed terrible sins that resulted in their earlier banishment, yet without a hint of such events occurring in the biblical narrative. All these problems disappear if the land of Cain’s banishment was inhabited by hominids. If so, it would have been quite natural to refer to these soulish, human-looking creatures using anthropomorphic pronouns such as *whoever*, and to fear them.²⁶

4. *Hominids must have persisted and mated with Adam and Eve’s offspring to produce the genetic variation we see today.*

Here we finally arrive at the *Nephilim* (found in the title of this article) as a means of addressing the genetic evidence that the effective human population never dropped below a few thousand.²⁷ Genesis 6 is the enigmatic story leading up to Noah’s flood, in which the “sons of God” found the “daughters of men” to be beautiful and took them as wives. These unions were an anathema to God, and the offspring are identified with their own name, the *Nephilim*, of which some became known as “mighty men” or “men of renown.” There are three common explanations offered: angels marrying human women, noblemen or tyrant rulers marrying commoners, or the righteous line of Seth intermarrying with the unrighteous line of Cain.²⁸ Substantive objections can be raised for each of these arguments. Angels intermarrying with humans fails because Christ explicitly stated that angels neither marry nor are given in marriage (Mark 12).²⁹ Noblemen intermarrying with commoners is a stretch because this would not have been objectionable to God, and would not have produced offspring with any unusual physical attributes. And the most commonly cited explanation, the righteous line of Seth intermarrying with the unrighteous line of Cain, falls short because *all* humanity, with

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the sole exception of Noah, had become thoroughly unrighteous. If they were righteous, they would not have been engaging in forbidden unions and falling under God’s judgment. Such unions likewise would have failed to produce offspring with any unusual physical attributes.³⁰ To further complicate matters, none explain why the Nephilim were still around *after* Noah, when the flood had supposedly wiped out all but Noah’s family (Gen. 6:4; Num. 13:33).

It is conceivable that the “sons of God” were hominids, either those of the same biological stock as Adam and Eve, or more distantly related, coexisting hominids.³¹ Hominids would have been “sons of God” in the sense that they were God’s creations, and they would have been physically similar to soul-bearing humans, biologically capable of interbreeding, even if forbidden by God. The pervasiveness of this behavior indicated by Genesis 6 is consistent with the introduction of considerable genetic variability. Such intermixing could also potentially account for the persistence of the Nephilim after Noah’s flood, even if one were to

insist that the flood was universal in its coverage. It would require only one of the wives of Noah’s sons to carry Nephilim DNA to ensure that it would manifest itself in some offspring after the flood (though it is again acknowledged that the genetic data does not currently support such an extreme bottleneck).

Interbreeding between the offspring of Adam and Eve with hominids from their ancestral population would not be expected to produce the unusual physical prowess associated with the Nephilim. However, if the timing of Genesis 6 coincides with the period of overlap between humans and Neanderthals, the heavier musculature of the Neanderthals could certainly have resulted in offspring with enhanced strength or unique physical characteristics that made it natural to refer to them by a special name.³² (If farther back in time, then a similar argument can be made for an earlier variety of hominid.)

Figure 1 provides an example of how human-hominid interbreeding could produce the genetic makeup of modern humans.³³ In this simplified illustration,

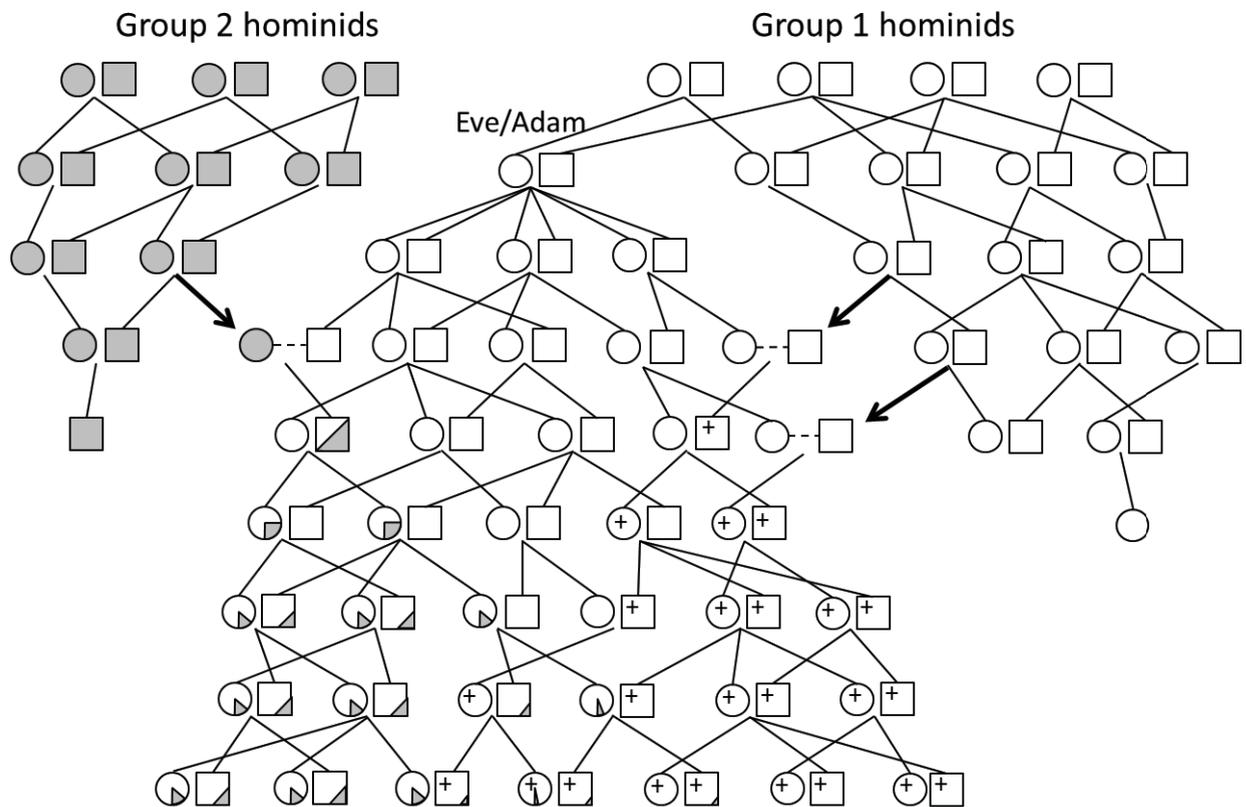


Figure 1. Lineage illustration for how similar and dissimilar hominid groups could have contributed to the genetic makeup of Adam and Eve’s progeny. Squares represent males and circles represent females. Contribution to the human lineage (starting with Adam and Eve) from Group 1 hominids is indicated with a “+”; contribution from Group 2 hominids is indicated with proportional shading.³³

an initial pair of hominids is selected from Group 1 and set apart as the first true humans—endowed with souls. In subsequent generations, forbidden interbreeding with contemporaneous hominids introduces greater genetic variation into the human gene pool. Group 1 represents the original stock from which Adam and Eve were selected. These individuals are not genetically distinct from soul-bearing humans, but do contribute to the genetic diversity of later humans. A plus sign in each symbol represents genetic variability introduced by interbreeding with Group 1 hominids. Group 2 represents a more distantly related hominid population, such as Neanderthals. In this case, the percentage of DNA introduced and passed along in later generations is tracked with proportional shading to show a final population of humans with varying retention of genetic material from these hominids (consistent with varying degrees of Neanderthal DNA in modern humans). Group 1 and Group 2 hominids eventually die out, with the exception of offspring produced via interbreeding with Adam and Eve’s offspring. Figure 2 illustrates how this could be possible and still have all living humans trace their mtDNA lineage back to a common female, or their Y-chromosome lineage back to a common male.

Though this model equates the “sons of God” with hominids and the “daughters of men” with humans, it works equally well if these are reversed. Such a scenario perhaps fits better with the tendency for males to bring females back to their tribe. To preserve the ancestry of all living humans back to mitochondrial Eve, this simply requires that the progeny of all female-hominid/male-human unions eventually failed to produce daughters. Figure 1 is constructed intentionally to show insertion of hominid males from Group 1, and hominid females from Group 2, with modern mtDNA ancestry shown leading back to a common mother in Figure 2.³⁴

5. *It must be possible for a first monogamous couple to produce a genetic lineage with different dates for the most recent common father and common mother.*

One mechanism for producing different dates for the most recent common mother and common father is by having multiple mates. If mitochondrial Eve produced offspring by more than one mate, the most recent *common father* of humanity would be traced to a different point in time. Different dates are also possible, however, beginning with a monogamous pair. Figure 1 is constructed to illustrate how a more recent common father is possible that still traces human ancestry back to a monogamous mate of mitochondrial Eve (traced out in fig. 2).

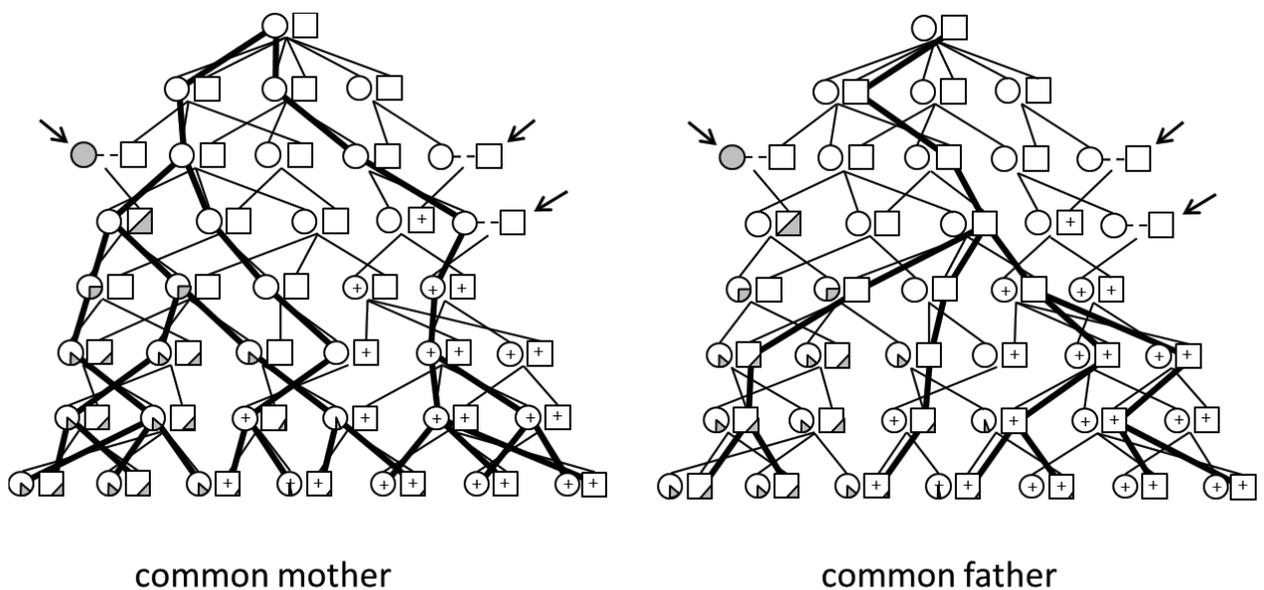


Figure 2. Maternal (mtDNA) and paternal (Y-chromosome) lineage traced for figure 1.

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6. *The timing of mitochondrial Eve should correspond with the first appearance of agrarian society (tending livestock and gardens).*

Adam and Eve's first two sons were raising flocks and tending gardens (Gen. 4:2). Placing mitochondrial Eve at 200,000 years ago does not align well with the oldest evidence of animal husbandry and intentional gardening, which is an order of magnitude more recent.³⁵ Archaeologists recognize that the oldest evidence of any particular practice does not represent the date the practice was first applied—only the oldest date we have thus far discovered. Accumulation and preservation of materials related to a particular practice are not likely to be uncovered unless the practice had been in extended use and geographically dispersed. This means the very earliest application of agriculture, and the age of Adam and Eve, could be well over 20,000 years. Pushing this back to 200,000 years (by a very small, regionally isolated population) is a considerable stretch, though not categorically impossible.

A second possibility is that the biblical description is an anachronistic description of hunting (animal food sources) and gathering (vegetable food sources) practices, or some rudimentary form of tending flocks and gardens. This understanding, without the constraint that the timing must be within the last 20 to 30 millennia, does not depart from the fundamental mechanics of the story (Abel offered a blood sacrifice, Cain did not).

A final observation is worth noting concerning the accuracy and significance of genetically determined dates. Though nothing in the proposed model requires any date to be incorrect, there is some caution warranted against modifying one's theological understanding *solely* on the basis of genetically estimated dates. The dating methods employed are based on the assumption that mutation rates within specific segments of DNA are constant, such that variations within that segment in a population of organisms can be used to estimate how much time has passed since they shared a common ancestor. It is known, however, that mutation rates vary, in some cases by orders of magnitude, for DNA from different types of organisms,³⁶ for different segments of DNA within an organism,³⁷ for the same sequence of DNA over multiple generations,³⁸ and even for the same segment of DNA produced later in the life of an individual.³⁹ This means that mutation

rates are dependent to some degree on the particular sequence of base pairs and the biochemical environment in which they are found. As mutations accumulate within a DNA segment, the subsequent rate of mutation for that sequence could conceivably change as well.⁴⁰ Additionally, there are studies noting mechanisms, such as duplication or replacement of a sequence of base pairs that can add unexpected heterogeneity and a potential overestimate of age.⁴¹ Uncertainty can be reduced by comparing calculated ages based on a large number of different segments of DNA, and in some cases, by comparing those estimates with the radiometric ages of fossil transitional forms, though here also the dates do not always align as well as hoped.⁴² None of this is suggested as an argument against employing genetic dating methods. It is only a word of caution against placing undue weight on the importance of these ages in attempts to reconcile science and scripture.

Conclusions

The existence of a genuine first human couple and a first act of disobedience against God have been challenged. In defense of both population genetics and a historical Adam and Eve, the described model illustrates how both the biblical and genetic records can be accounted for by interbreeding between hominids and the offspring of a genuine first human couple. The model preserves an understanding of a first sin (whether *original* or *ancestral*) as described both in Genesis and in the writings of Paul, and also potentially resolves the biblical conundrums of who Cain was afraid of in Genesis 3, and the enigmatic identity of the "sons of God" and the Nephilim in Genesis 6. ◆

Notes

¹In this article, a "first sin" refers only to a first act of willful disobedience against God. No attempt is made to defend or describe the various theological views of how this first act affected subsequent generations.

²Technically speaking, *hominids* is a broad term that includes humans and African great apes. The subset of hominids giving rise to humans are identified as *hominins*. See B. Wood and P. Constantino, "Human Origins: Life at the Top of the Tree," in *Assembling the Tree of Life*, ed. J. Cracraft and M. J. Donoghue (Oxford: Oxford University Press, 2004), 517–35.

³Richard Potts, personal communication. Potts, director of the Human Origins Program at the Smithsonian Institution, has compiled a personal database of hominid fossil discoveries. At present, the database includes entries for over 5,000 separate individuals ranging from 20,000 to 6 million years in age. Note this is not 5,000 fossil frag-

ments, but fossil remains originating from over 5,000 different individual hominids.

- ⁴Ian Tattersall, *The Fossil Trail: How We Know What We Think We Know About Human Evolution*, 2nd ed. (New York: Oxford University Press, 2008). Contrary to the claims of young-earth advocates, fossils are not dated based on the assumption of evolution. The ages of layers in which fossil hominids are found are based on a variety of different methods: some that date the fossil material directly, and others that date the sediment or other artifacts found in the same layer.
- ⁵Excellent summaries of the evidence for common descent can be found in D. L. Theobald, "29+ Evidences for Macroevolution: The Scientific Case for Common Descent," *Talk Origins Archive*, ver. 2.89, March 12, 2012, <http://www.talkorigins.org/faqs/comdesc>; and D. R. Venema, "Genesis and the Genome: Genomics Evidence for Human-Ape Common Ancestry and Ancestral Hominid Population Sizes," *Perspectives on Science and Christian Faith* 62, no. 3 (2010): 166–78.
- ⁶R. E. Giles, H. Blanc, H. M. Cann, and D. C. Wallace, "Maternal Inheritance of Human Mitochondrial DNA," *Proceedings of the National Academy of Sciences* 77, no. 11 (1980): 6715–19.
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- ¹²Fazale Rana with Hugh Ross, *Who Was Adam?* (Colorado Springs, CO: NavPress, 2005), 55–75.
- ¹³H. Li and R. Durbin, "Inference of Human Population History from Individual Whole-Genome Sequences," *Nature* 475 (2011): 493–97.
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- ¹⁵R. E. Green et al., "A Draft Sequence of the Neandertal Genome," *Science* 328 (2010): 710–22; K. Prüfer et al., "The Complete Genome Sequence of a Neanderthal from the Altai Mountains," *Nature* 505, no. 7481 (2014): 43–49.
- ¹⁶This is perhaps the least believed verse in all of scripture, for our tendency is to put God into neatly defined theological boxes, and to proclaim that "my God" would never do this or that.
- ¹⁷Such a possibility has been suggested by a number of other writers: for example, Rendle Short, *Modern Discovery and the Bible* (London: The Inter-Varsity Fellowship of Evangelical Unions, 1942), 81; Derek Kidner, *Genesis, Tyndale Old Testament Commentaries*, ed. D. J. Wiseman (Downers Grove, IL: InterVarsity Press, 1967), 26–31; Gavin Basil McGrath, "Soteriology: Adam and the Fall," *Perspectives on Science and Christian Faith* 49, no. 4 (1997): 252–63.
- ¹⁸C. Hodge, "Nature of Man" and "Origin of the Soul," in *Systematic Theology*, vol. 2 (New York: Charles Scribner, 1872), chapters 2 and 3; W. Grudem, "The Essential Nature of Man," in *Systematic Theology* (Grand Rapids, MI: Zondervan, 1994), chap. 23.
- ¹⁹Bodily resurrection cannot be a simple reformulation of our molecules at the time of death, for many have shared the same molecules over time as decomposition reintroduces atoms back into the ecosystem to be incorporated into a new organism.
- ²⁰This is not an argument for any particular version of dualism. It simply recognizes that being made in the image of God includes a nature that does not cease to exist at biological death. See J. B. Green and S. L. Palmer, ed., *In Search of the Soul: Four Views of the Mind-Body Problem* (Downers Grove, IL: InterVarsity Press, 2005).
- ²¹This says nothing about whether there will be animals in heaven, only that their eternal destiny is not predicated on the spiritual condition of their souls or any conscious action on their part.
- ²²Apes have been observed to demonstrate a sense of justice, such as whether they have been given their fair share of a treat, which is a good example of a "soulful" behavior that is a pale reflection of the human ability to contemplate the moral implications of choices made.
- ²³Some insist that the "image of God" refers to one of three choices: resemblance to God, representation of God's authority on Earth, or being relational in nature. C. John Collins does an excellent job of arguing that scripture does not provide sufficient justification for limiting the "image of God" to one choice, and all three are likely true (Collins, *Did Adam and Eve Really Exist?* [Wheaton, IL: Crossway, 2011], 93–95).
- ²⁴H. O. Wiley, "Original Sin or Inherited Depravity" in *Christian Theology* (Kansas City, MO: Beacon Hill Press, 1941), chap. 19.
- ²⁵The possibility that Cain feared hominids (or "more primitive type of man") was suggested at least as early as 1942 by Short, *Modern Discovery and the Bible*, 81.
- ²⁶Genesis 4:17 notes that Cain built a city, named after his son, in the land of his banishment. The proposed model fits with a city either built by Cain and his direct offspring, or built with participation to some degree by hominids.
- ²⁷G. R. Davidson, *When Faith and Science Collide* (Oxford, MS: Malius Press, 2009), 73–79.
- ²⁸John H. Sailhamer, *Genesis—Numbers*, ed. F. E. Gaebelin, vol. 2 of *The Expositor's Bible Commentary* (Grand Rapids, MI: Zondervan, 1990), 75–79; R. C. Sproul, ed., *The Reformation Study Bible* (Nashville, TN: Thomas Nelson Publishers, 1995), 18; and John H. Walton, *The NIV Application Commentary: Genesis*, ed. T. Muck, (Grand Rapids, MI: Zondervan, 2001), 290–96.
- ²⁹The angelic interpretation gains strength from the use of "sons of God" to describe heavenly beings in three places

Article

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in Job (1:6; 2:1; 38:7), and it was likely the prevailing view of early theologians. The literary genre of Job is quite different from Genesis 6, however, and terms in scripture often carry more than one meaning. A declaration by Jesus that angels do not marry is part of the reason other explanations began gaining favor in the second century and thereafter (Walton, *The NIV Application Commentary*, 291, 295).

³⁰An alternate minority view holds that this narrative is not an introduction to the flood, but simply a summary statement of the preceding chapter with man acting in a normal fashion of “marrying and giving in marriage” up until the flood (e.g., Sailhamer, *Genesis–Numbers*, 75–6). The discussion of the Nephilim, however, would suggest that something more out of the ordinary is being related, with direct bearing on God’s decision to bring on the flood.

³¹Rendle Short came very close to suggesting this scenario in 1942 (Short, *Modern Discovery and the Bible*, 81).

³²The only other reference to the Nephilim is in Numbers 13:33, many generations after Noah, where they are described as being much larger than the Hebrews. Neanderthals were not taller than contemporaneous humans. There are at least three possible explanations for large size: (1) genetic recombination between humans and Neanderthals produced offspring larger than their parents; (2) genetic drift in size-controlling gene expression in later generations carrying significant Neanderthal DNA resulted in larger stature; or (3) the interbreeding of Genesis 6 was with other, possibly earlier hominids. The degree of genetic diversity among African populations lacking contributions of Neanderthal DNA (or at least evidence of direct interbreeding) would appear to require that forbidden unions had been occurring between humans and genetically similar hominids for many generations before interbreeding began at a later time between Neanderthals and a subset of the human population.

³³It was necessary to depart from normal convention in the creation of the pedigree chart in figure 1 in order to show the ancestry of *all* individuals in the lineage. Pedigree charts normally show lineages with mates brought in from unidentified parents. Kenneth Kemp proposed a similar model for mating with hominids of the same biological stock in K.W. Kemp, “Science, Theology, and Monogenesis,” *American Catholic Philosophical Quarterly* 85 (2011): 217–36.

³⁴It may eventually be possible to tell if Neanderthal contributions to human lineage were introduced predominantly from unions with male or female Neanderthals by studying Y and X chromosomes: see interview of David Reich by C. Zimmer, “Interbreeding with Neanderthals,” *Discover Magazine* (March 4, 2013), <http://discovermagazine.com/2013/march/14-interbreeding-neanderthals>.

³⁵M. A. Zeder, “Domestication and Early Agriculture in the Mediterranean Basin: Origins, Diffusion, and Impact,” *Proceedings of the National Academy of Sciences* 105, no. 33 (2008): 11597–604.

³⁶For example, J. F. Gillooly, A. P. Allen, G. B. West, and J. H. Brown, “The Rate of DNA Evolution: Effects of Body Size and Temperature on the Molecular Clock,” *Proceedings of the National Academy of Sciences* 102 (2005): 140–45. The opening line reads, “Observations that rates of molecular evolution vary widely within and among lineages have cast doubts on the existence of a single ‘molecular clock.’” They specifically note differences in mutation rates based on body size and metabolism.

³⁷For example, M. Hasegawa and S. Horai, “Time of the Deepest Root for Polymorphism in Human Mitochondrial DNA,” *Journal of Molecular Evolution* 32 (1991): 37–42. The evolutionary rate of the most rapidly evolving sites in mtDNA was estimated to be more than 100 times greater than that of a nuclear pseudogene.

³⁸For example, N. Howell, J. L. Elson, D. M. Turnbull, and C. Herrnstadt, “African Haplogroup L mtDNA Sequences Show Violations of Clock-Like Evolution,” *Molecular Biology and Evolution* 21, no. 10 (2004): 1843–54. This study identified several regions of mtDNA that have not mutated in a “clockwise” fashion, and advised caution against indiscriminate selection of mtDNA sequences for dating.

³⁹For example, O. Venn, I. Turner, I. Mathieson, N. de Groot, R. Bontrop, and G. McVean, “Strong Male Bias Drives Germline Mutation in Chimpanzees,” *Science* 344, no. 6189 (2014): 1272–75. Male humans and male chimps pass on genes with an increasing number of mutations as they get older.

⁴⁰A similar caution was recently expressed by evolutionary biologist J. David Archibald of San Diego State University, reported in E. Wayman, “Ancestors of Today’s Placental Mammals May Never Have Shared the Earth with Dinosaurs,” *Science News* (March 9, 2013): 5–6.

⁴¹For example, C. M. Koehler, G. L. Lindberg, D. R. Brown, D. C. Beitz, A. E. Freeman, J. E. Mayfield, and A. M. Myers, “Replacement of Bovine Mitochondrial DNA by a Sequence Variant within One Generation,” *Genetics* 129, no. 1 (1991): 247–55; and X. Gu, Z. Zhang, and W. Huang, “Rapid Evolution of Expression and Regulatory Divergences after Yeast Gene Duplication,” *Proceedings of the National Academy of Sciences* 102, no. 3 (2005): 707–12.

⁴²For example, fossil evidence suggests that chimpanzees and humans diverged from a common ancestor 6 to 8 million years ago, while recent estimates based on genetic mutation rates place the divergence closer to 13 million years. See summary article, T. H. Saey, “Human-Ape Split Gets an Earlier Date,” *Science News* (July 12, 2014): 12.

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