HUMAN UNIQUENESS, THE OTHER HOMINIDS, AND "ANTHROPOCENTRISM OF THE GAPS" IN THE RELIGION AND SCIENCE DIALOGUE

by Joshua M. Moritz

Abstract. The concept of human uniqueness has long played a central role within key interpretations of the hominid fossil record and within numerous theological understandings of the *imago Dei*. More recently, the status of humans as evolutionarily unique has come under strong criticism owing to the discovery of certain nonhuman hominids who, as language and culture-bearing beings, lived as contemporaries with early anatomically modern humans. Nevertheless, many scholars, including those in the field of religion and science, continue to interpret the remains of these other hominids in light of empirically ungrounded implicit assumptions about human uniqueness, which the author calls "anthropocentrism of the gaps." This paper argues that "anthropocentrism of the gaps" is philosophically unwarranted and thus should not be assumed by scholars in religion and science when evaluating contemporary findings in paleoanthropology.

Keywords: anthropocentrism of the gaps; evolution; hominids; human uniqueness; *imago Dei*; monogenism; multiregionalism; paleoanthropology; polygenism; racism; Upper Paleolithic Revolution

For thousands of years, philosophers, theologians, poets, and scientists have pensively pondered the question "Are we alone in the universe?" Though a multitude of life forms enfold human beings on all sides, and myriads of other animal species even share in the societies of *Homo sapiens*, the disparity between them and us is still too great for us to see our own reflection in them. The company of animals is not sufficient to break the eerie silence of our solitude, and thus civilizations have posed the question of human isolation and human uniqueness. Though humans may not differ *in kind* from animals, the differences *in degree* are sufficient to make us matchless. Consequently, these scholars conclude, *H. sapiens* are still unique among the animals and still desolately alone. But this was not always the case. Once upon a time there were others who reflected our likeness as through a strange-looking glass that bends the original visage. These others were the terrestrial intelligent life forms called the hominids. While it is agreed that

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[*Zygon*, vol. 47, no. 1 (March 2012)]

no *presently living* nonhuman animal possesses the precise combination of characteristics and the advanced development of those traits that would be necessary if they were to seriously challenge human cultural and technological hegemony, the same cannot be said of the prehistoric human past when other hominids equally shared such presumably unique traits with *H. sapiens*. Living contemporaneously with, though not evolutionarily ancestral to, early anatomically modern humans, several nonhuman hominid species possessed every key capacity by which we currently define humans over against animals. The incontestable existence of the nonhuman hominids—as beings from separate species who equally enjoyed language, reason, technology, and religious awareness—comprises the final empirical nail in the coffin of all scientific claims for human uniqueness. There was once a day when the earliest human beings awoke to behold the ancient glory of the sunrise and discovered, perhaps to their astonishment, that they were indeed not alone. In this paper, I will first place the question of humanoid others within its historical context. I will then discuss the presuppositional role of the concept of human uniqueness in the religion and science dialogue's use of paleoanthropology. Rejecting the "anthropocentrism of the gaps" approach to the hominid fossil record, I will endeavor to reconstruct what the earliest humans saw when they observed the features and ways of these other hominid beings of uncanny familiarity. Finally, I will attend to the theological importance of the matter of human uniqueness in the current dialogue between religion and science.

THE QUESTION OF ADAM'S ANCESTORS

The idea that there were (or are) other humanoid beings who once walked the earth is nothing new. The ancient Greeks wrote of strange humanoid races, including centaurs and mermaids, and some, such as the Milesian philosopher Anaximander, even suggested that human beings originally emerged from an aquatic ancestor. As the book of Genesis paints a picture of the earliest days of humanity, it tells us of an antediluvian race with imposing physical strength that appears to be unrelated to human beings: "The Nephilim were on the earth in those days. . . . These were the mighty men who were of old, the men of renown" (Genesis 6:4). Much later, during the first century AD, the Greek historian Pliny the Elder wrote of other nonhuman races and humanoid "monstrosities" who lived in exotic distant lands. Pliny's *Natural History* was handed down to geographers of the Medieval Era, and the Plinian races were held in the forefront of the minds of the early European explorers. In this way, as the first Europeans crossed the Atlantic into the new world, they were "already armed with cultural and physiological taxonomies into which racial 'others' and their traditions had long been inserted." Thus Christopher Columbus, with his annotated copy of Pliny's *Natural History* in hand, and fully expecting to discover nonhuman humanoid beings in the unknown lands he navigated, reported to the surprise of many that he encountered "no human monstrosities" (Livingstone 2008, 16–19).

Instead of finding strange humanoids in the New World, Columbus discovered men and women who seemed to resemble Europeans in nearly every way. As Europeans raised the question concerning indigenous American peoples' status as human beings, Pope Julius II responded by decreeing in 1512 "that the Indians were descended from Adam" and thus fully are human. While the status of the American peoples as true human beings was solidified in the ensuing debates, with the Dominican Bartolome de Las Casas playing a key role in their defense, the issue soon became whether the various races of humankind initially emerged from a single origin, such as from Adam and Eve (*monogenesis*), or from multiple origins where each race arose in a different geographical location (*polygenesis* or *multiregionalism*). Within this impassioned dispute, the polygenists such as Giordano Bruno (1548–1600) were convinced that the "Ethiopians, the American Indians, Pygmies," and various other races "cannot be traced to the same descent, nor are they sprung from the generative force of a single progenitor." Monogenists, on the other hand, "intent on preserving the integrity of scripture," upheld a single origin for all known races of humanity (Livingstone 2008, 20–23). In this context, the Spanish Jesuit Jose de Acosta suggested in 1589 that it was possible for the prehistoric Americans to have crossed over into the New World through extreme Northern Asia into Northern America. Citing the New Testament book of Acts 17:26, Acosta explained that Scripture "clearly teaches that all men are descended from a first man. Hence man must have come to the Indies (New World) from Europe or Asia or Africa." If, reasoned Acosta, "the Western Hemisphere and the Eastern are joined or are not far apart, the aborigines came by land, 'not with full deliberation, but changing their sites and lands little by little, some populating lands newly found, others seeking new lands'" (Jarcho 1959, 430–32).

Though the ardent quarrel would continue for hundreds of years as to whether human beings had a single ancestral beginning or multiple origins, and consequently whether the various races of humanity were really different species or not, the idea that there were radically different humanoid "others" soon faded from focus. With the dawn of the Enlightenment the once ubiquitous ancient awareness of the nonhuman, yet humanoid, other was displaced from the mantle of fact to be forsaken and nearly forgotten. As the Modern Age awoke into history, the primeval accounts of other human-like peoples fast became legend. Legend became myth. And for over two centuries, as no human-like fossils had yet been discovered, the notion that "others" had once walked the earth passed out of the realm of empirical knowledge and into the domains of fantasy and speculation. By the nineteenth century even the staunchest advocates of polygenetic theory, such as biologist Louis Agassiz, "held to the unity of the human race, in the sense that all people had the moral and intellectual powers that made them human, all were in relation to the Deity, and all had the hope of eternal life" (Popkin 1978, 223). For both monogenists and polygenists, the various human races, whether as one family or as distinct species, lay on a single spectrum from savage to civilized. Far from the understanding of either position in the debate was the idea that there once could have been human-like beings, that were completely outside of this spectrum, who lived alongside humans.

But then something unexpected happened. In 1856, German quarry workers excavating clay deposits from the surface of an ancient cave unearthed the fossilized remains of a previously unknown type of human. In 1858 in the German description of the skullcap and bones from the ancient Neander Valley man, Johann Karl Fuhlrott and Hermann Schaaffhausen described "the first human cranium recognizable as lying outside the known limits of human variation" (Eiseley 1957, 325). Less than a year later, Charles Darwin, having no knowledge at the time of the Neanderthal remains, since they were published in a somewhat obscure local scientific journal, would unveil to the world his theory of common ancestry and the evolutionary of species—an account of human origins that initially did much to undermine the polygenist position. Perhaps owing to his monogenist leanings, Darwin himself, once he learned of the findings, was quite reticent on the meaning of the Neanderthal fossils. In the same way, his disciple Thomas Huxley interpreted the remains in a monogenist manner and maintained that "the Neanderthal skull may be described as a slightly exaggerated modification of one of the two types (the lower) of Australian skulls" (Eiseley, 326). In other words, contended Huxley, the Neanderthal individual should be included in the species *H. sapiens* and not be placed in a separate hominid family. Even after a second Neanderthal individual had been found in 1863, demonstrating "conclusively by the mid-1860s that here was not simply a pathological form of *Homo sapiens*," Darwin still exercised caution. Writing over 800 pages on human evolution in *The Descent of Man*, Darwin's sole comment regarding the hominid fossils was "some skulls of very high antiquity, such as the famous one of Neanderthal, are well developed and capacious." Limiting his treatment in *The Descent of Man* to a comparison of humans with living animals, Darwin never directly confronted the notion that "the human species might even in principle have possessed extinct relatives." The evolution of human beings is treated as a unified and linear phenomenon "despite the fact that the entire *Origin of Species* is suffused with the notion that having extinct relatives must be a general property of all living forms" (Tattersall 2009, 30).

A key metaphysical motivation of Darwin's was "a moral passion firing his evolutionary work" that guided both his understanding of human descent and his adamant antagonism to polygenism (Desmond and Moore 2009, xviii). Darwin's abhorrence of racism and his opposition to slavery dramatically informed his thinking and motivated his single-minded effort to develop an understanding of the natural world that could counter the dominant belief in the immutability of species and the superiority of the white race. Enlisting his keen scientific mind to the aid of the monogenist and abolitionist cause, Darwin went against the tide of mid-nineteenth-century scientific thought and offered evolution via natural selection as an empirical foundation to "the unity-of-race thesis." In this way, both scientific and scriptural monogenists enthusiastically embraced Darwin's work, and natural selection permitted scientifically minded theologians, such as Benjamin B. Warfield, to welcome the fact that "both Bible and science taught the organic solidarity of the human species" (Livingstone 1987, 120).

Regardless of Darwin's own intentions, however, others were determined to use his theory in the service of racist and proslavery arguments by pointing to the more "highly evolved" and "superior status" of certain races over others. For them Darwin's scientific work "provided a monogenist base for what was a practical polygenism" and "turned a monogenism of practical equality of races into a monogenism that accepted an irrevocable inequality of races"—a position that was morally and politically little different from the overtly racist polygenism of Samuel Morton and Josiah Nott (Kenny 2007, 368). Even Thomas Huxely, "the most prominent exponent of the new monogenism," saw Darwin's theory of natural selection "as reconciling and combining 'all that is good in the Monogenetic and Polygenetic schools'"—the "good" in polygenism being, for Huxley, "the recognition of the irreversible differences and inequality of races" (Kenny 2007, 380–81). In the same way, Darwin's first cousin, Francis Galton, though a Darwinian monogenist, "shared identical or similar views with the polygenists on the relative worth of races, the importance of maintaining superior stocks, the importance of and difficulties associated with civilization," and "the association with particular characters and types that made up peoples and races." Galton thought it imperative to discover methods to quantify the hereditary qualities of the various races in order to determine the "capacity for civilization" of the various "superior and inferior races." Such practical polygenism under the guise of monogenism would reach its racist fruition in the aggressive eugenics programs of the United States and Germany in the late nineteenth and early to mid-twentieth centuries (Hume 2008, 147–48).

The discipline of paleoanthropology, a new field of research inaugurated by the 1856 discovery of the "Neanderthal man," was likewise impacted by this tendency toward practical polygenism under a monogenist guise. Beginning with Darwin's and Huxley's interpretation of the Neanderthal bones as belonging to a primitive and savage human being, the polygenic reading of Darwinian monogenism enabled succeeding generations of paleoanthropologists to place all observed morphological diversity in human-like specimens on an inclusive spectrum of human variety. This hermeneutic, aided by an intuitive ontology affirming human uniqueness, blinded the majority of paleoanthropologists from recognizing fossilized hominids as belonging to different humanoid species that were phylogenetically distinct from *H. sapiens* (Foley 2001, 5–10).

HUMAN UNIQUENESS IN EVOLUTIONARY PROCESSES: FROM DARWIN TO DOBZHANSKY

Since the publication of Darwin's theory, evolution has been pictured as a branching tree, in which one ancestral species generally gives rise to several descendant species. This "bushy" view of speciation, however, has not been the conceptual framework within which most paleoanthropologists have interpreted the data of fossilized hominids. Why, we might ask, has the human evolutionary record been treated so differently than that of all other animals? Part of the answer to this question, as we have already discussed, lies in Darwin's own concern for the racial unity of humankind and his subsequent refusal to split up the human line of descent—a *moral* intuition that bound the early Darwinians to monogenism, even while they interpreted the data of human evolution in a polygenic fashion. A related reason for this special interpretation of hominid fossils can be traced to the *single-species* model of human evolution—an interpretive framework that entered the discipline of paleoanthropology through the suggestion of Modern Evolutionary Synthesis architects Theodosius Dobzhansky and Ernst Mayr.

In an influential paper, Dobzhansky surveyed the available fossil evidence pertaining to human evolution. Considering the skeletons of *Homo erectus*, he explains that "the differences between Peking and Java men are easily within the magnitude range of the differences between the living human races." It is certain, he says, that "the populations of Europe and Africa were not identical with those of Java and China. The human species was then, as it is now, differentiated into geographic races." Regarding the Neanderthal remains, Dobzhansky admits that "the lack in Europe of an obvious transition between *Homo neandesthalensis* and *H. sapiens*, two forms that were at least for a brief interval contemporaneous, could be used as an argument in favor of considering them distinct species." Based on his analysis of the evidence, though, he does not think this is the case. Rather, he counters, "the Neanderthal and the modern [human] types were not isolated reproductively, and, hence, were races of the same species rather than distinct species" (Dobzhansky 1944, 257–59).

How then should paleoanthropologists and evolutionary biologists understand the human fossil data as they go forward? Dobzhansky recommends that evolutionary biologists and paleoanthropologists alike adopt the view of Franz Weidenreich and his conclusion—which Mayr later agrees with—that "no more than a single hominid species existed at any one time level." Considering "all the available evidence together," explains Mayr, "it seems far more logical and consistent at the present time to unite the hominids into a single genus than to continue the current multiplicity of names" (1950, 111–13). In the succeeding generations, the tacit ontological assumptions of human uniqueness became an established hermeneutical dogma as "the single species model, proposed by Weidenreich, and endorsed by Dobzhansky and Mayr, had hardened into a unilineal and essentialist view on human evolution" (De Cruz and De Smedt 2007, 359).

Likewise handed down was the polygenic interpretation of the unity of the human race that diverged from Darwin's original conception of monogenism. And for many the view inherited from Weidenreich painted a picture of human evolution that clearly "suggested that deep-seated racial characteristics—established when *Homo erectus* settled in the Old World more than a million years ago—divided the peoples of the world." The differing physical features that we see today being the hallmarks of the ancient lineages from which the various human "races" descended (Stringer 2009, 56). The question of race in human evolution was dramatically taken up in a work by Weidenreich's student Carleton Coon, where Weidenreich's arguments were exaggerated in an unapologetic effort to establish clear present racial divisions and a hierarchy of racial superiority. To this end Coon argued that "White and Oriental populations were simply more advanced than those from Africa and Australia," and that Africa was merely the "indifferent kindergarten" of humankind while "Europe and Asia were our principal schools" (57). Responding to these racist interpretations of the human fossil record, Dobzhansky—taking on Darwin's monogenist mantle and personally invoking a visceral hatred for racism—savagely attacked Coon's research, contending that "Professor Coon . . . makes his work susceptible to misuse by racists, white supremacists, and other special pleaders" (58).

The single-species hypothesis of Weidenreich, having been sanctioned by Dobzhansky and Mayr, was developed further and promoted in the 1980s and 1990s by Milford Wolpoff and Alan Thorne as the *multiregional view* of human evolution. In spite of having to be persistently defended against charges of racism owing to its seemingly polygenic perspective on human evolution—a perspective that proponents of multiregionalism have been keen to disavow, preferring instead to be seen as racial monogenists (Caspari and Wolpoff 1996)—the multiregional view eventually came to dominate the paleoanthropological scene and continued to do so through the end of the twentieth century. This view, along with its underlying assumption that human evolution is distinct from that of nonhumans, has continued to wield considerable influence among evolutionary biologists and paleontologists even to the present day. For instance, on the basis of the single-species model's assumptions, Camillo Cela-Conde and Francisco J. Ayala have protested against the four new genera names given to recently discovered hominid fossils from the late Miocene. Such a large number of genera is not acceptable, they argue, and thus we must work to further prune the tree of hominid evolution (Cela-Conde and Ayala 2003).

As discussed in more detail above, the theoretical core of the *multiregional* or *regional continuity* research program is the claim that since the origin of the genus *Homo* about 2 million years ago, the "human lineage has evolved as a single lineage without speciation events." Within the hominid lineage, "there would have been universal directional trends in characters" such as increasing brain size and decreasing brow ridge, but at the same time, regional differences—the morphological basis of today's "races"—would have persisted. Such regional diversity in the morphological traits of archaic hominids in Asia, Africa, and Europe thus continue to be present in modern hominids (humans), with Neanderthals providing the link between Modern Europeans and their archaic hominid ancestry (Foley 1998, 339–40).

The basic premise of the multiregional model is "that there is something unique about humans that prevents the formation of genetic or ecological barriers" (Foley 2001, 7). According to this theory, human evolution is distinct from the evolution of all other animals because it is envisioned as a *global* phenomenon where different geographical niches are not sufficient to lead to the speciation of new hominids. As Ernst Mayr explains, "How often has man speciated? The answer is that he has speciated only once. . . . This single event was the branching off of *Homo* from the anthropoid stock" (1950, 116). With the emergence of the genus *Homo* came the all-important creation of *culture*—the "magic ingredient" that put an end to branching speciation for the hominid lineage and ultimately conquered the selecting environment's chokehold on human evolution. According to the logic of the "principle of competitive exclusion," the emergence of one culture-bearing species in evolutionary history would bar the development of any subsequent culture possessing species. Because culture is "such a novel and powerful behavioral adaptation . . . two cultural species simply could not thrive side by side." Furthermore, since "all hominins are cultural by definition, only one hominin species could exist at any one time" (Lewin and Foley 2004, 15).

Though the multiregional evolutionary framework undoubtedly pictures humans as "*rising beasts* rather than fallen angels," the "intuitive human–nonhuman distinction" at the base of this model, which has "contributed to the idea that human evolution is somehow exceptional," nonetheless assures us that hominids have always been *uniquely* rising beasts (De Cruz and De Smedt 2007, 361). Indeed, through the help of culture, we have been given the means to overcome our original beastly nature. Construing culture as humanity's environmental niche, multiregionalists have thus assumed that the human species is not only unique but has *evolved* by unique processes. As Dobzhansky's student Ayala explains, "Cultural inheritance is distinctively human. . . . The advent of cultural heredity ushered in cultural evolution, which transcends biological evolution" (Ayala 1998, 507). Mayr agrees and affirms, "Man is a unique species, in that a large amount of cultural 'inheritance' has been added to biological inheritance" (1982, 82). Making a clear-cut distinction between nature (which is shared by all animals) and culture (which is said to be uniquely human), Mayr, along with other well-known evolutionary biologists and paleontologists, argues that humans stopped evolving when they acquired culture. Placing the evolution of humans in a special "superorganic," "extrasomatic," or "transcendent" category because they possess culture, Ayala, Mayr, and others have contended that "such evolutionary processes as selection and drift do not operate on humans because our capacity for culture has uncoupled us from evolution" (O'Brien and Lyman 2009, 244).

While the multiregional view of human evolution had achieved "normative status" in standard discussions of human evolution by the end of the twentieth century, doubts regarding the single-species hypothesis had already begun to emerge in the mid-1970s. This was especially the case when in 1976 Richard Leakey and Alan Walker presented decisive evidence showing the existence of two contemporaneous hominid species in the Koobi Fora area in Kenya's Turkana Basin. The discovery of the unequivocal coexistence of the large-brained gracile *Homo ergaster* and the robust small-brained *Paranthropus boisei* "made it no longer tenable to believe under any theoretical construct whatever that only one kind of fossil hominid had ever existed at one time" (Tattersall 2000, 4). Hominid fossils found in caves in Mount Carmel, Israel, in the late 1980s told a similar story as the discoveries in Kenya and revealed both regional and temporal overlap of *H. sapiens* and Neanderthals. In the case of the Israeli cave site discoveries, the multiregionalist prediction of "a simple ancestor/descendant relationship between Neanderthals and moderns is not possible, as the moderns are near contemporaries with the earliest Neanderthals of the region and Neanderthals persist for at least 40,000 years after the first appearance of moderns" (Lewin and Foley 2004, 383). In the years following the Middle Eastern discoveries, similar evidence of the diverse and "bushy" nature of human evolution emerged, making it now clear that the morphological evidence does not substantiate a multiregional view.

Beyond the morphological data, another line of evidence that has recently allowed us to evaluate the multiregional hypothesis has come from molecular biology and genetics. The well-known "mitochondrial Eve hypothesis" has been substantiated and broadly confirmed by numerous subsequent investigations, and similar research has been able to trace the paternal genetic lineage of modern human men through analyzing the history of mutations on the Y-chromosome. Additional studies have likewise demonstrated that the variation of mitochondrial DNA types in the global human population is surprisingly low compared to that of apes and chimpanzees. While the *multiregional hypothesis* predicts that genetic diversity should be roughly equal among human populations in Africa, Europe, and Asia, the Out-of-Africa hypothesis (also called the Noah's Ark or Weak Garden of Eden hypothesis) predicts that Africans should be the most genetically diverse and that all other human groups should essentially be "a genetic subset of Africans." This is indeed precisely the pattern that has been revealed as "numerous studies have shown higher levels of nucleotide and haplotype diversity in Africans compared to non-Africans in both nuclear and mitochondrial genomes" (Campbell and Tishkoff 2008, 407). A recent sequencing and analysis of several Khoisan Bushmen genomes, for example, has shown "that [the Khoisan genome samples] are as different from one another as a European would be from an Asian," even though the Khoisan Bushmen studied "live within walking distance of one another" (Ledford 2010, 857). Many indeed have interpreted such evidence for a recent African origin of all human beings as implying "that racial differences are superficial and that we are indeed all Africans under the skin" (Balter 2001).

Moreover, with regard to genetic continuity between modern humans and archaic hominids, genetic evidence has now conclusively shown that Neanderthals and at least one other archaic hominid were too genetically divergent to allow significant interbreeding or a close evolutionary ancestral relationship.[1] Investigations extracting mtDNA from Neanderthal remains and comparing it to human mtDNA sequences clearly demonstrated that "Neanderthals did not contribute mtDNA to modern humans" (Krings et al. 1997, 27). Subsequently, it is now clear that Neanderthals were not a link in the evolutionary chain connecting *H. sapiens* in Europe to their archaic past but rather a "dead end" species who lived contemporaneously with modern humans.

Together these data entail that multiregionalism is "largely inconsistent with the general interpretation of the genetic evidence" and that "the multiregional evolution model cannot explain modern human origins" (Foley 1998, 339). While proponents of the multiregional model have described these developments a "great leap backward," Stephen J. Gould (2002) has mused that multiregionalism had only ever existed in the first place because it describes *human* evolution and that no biologist would ever "advocate such a scenario for the evolution of any other global species." While Christopher Stringer exclaims that with the ascendancy of the Out-of-Africa hypothesis "the heresy of yesterday has become the radical truth of today," Gould, by contrast, explains, that it is "*multiregionalism* [that] should be labeled as iconoclastic, if not a bit bizarre." Indeed, asks Gould, "how could a new species evolve in lockstep parallelism from three ancestral populations spread over more than half the globe? Three groups, each moving in the same direction, and all still able to interbreed and constitute a single species after more than a million years of change?" (Gould, 911–12). It would, consequently, come as no surprise to Gould that the emerging consensus now strongly supports the "Out-of-Africa" or "Weak Garden of Eden" hypothesis—a recent-single-origin model for human evolution where the *H. sapien* lineage is just one branch among many on a much more diverse hominid evolutionary tree.

THE LEGACY OF MULTIREGIONALISM IN THE RELIGION AND SCIENCE DIALOGUE

While it is now apparent that the empirical evidence supports a single recent African origin for modern humans, within the academic discipline of religion and science, the interpretive legacy of multiregionalism continues to remain influential. Following the lead of theologically minded evolutionary biologists and geneticists such as Arthur Peacocke and Francisco Ayala, many theologians of the natural sciences were introduced to the multiregional model of human evolution as the consensus view of the biological sciences. For example, in several influential publications within religion and science, Peacocke maintains that there was a direct evolutionary and behavioral continuity between the Neanderthals and the first modern human beings (Peacocke 1993, 221ff.). Ayala and Camilo Cela-Conde formerly held to this view as well, and while noting the detractors, wrote that "genetic continuity between Neanderthals and morphologically modern human beings is regarded as a documented certainty" (Cela-Conde 1998, 73). Though the multiregional view has now been abandoned by these thinkers, several of the key assumptions underlying the single-species model have remained and have informed the dialogue between theology and the natural sciences.

A key ontological intuition or presupposition that underlay the multiregional model (and the single-species model of Mayr and Dobzhansky) is the notion that *H. sapiens* are exclusive in their possession of culture and that humans are beings uniquely co-constructed by culture on the one hand and by the genetic legacy given to them by natural selection on the other. Within theology and science, this view has been picked up by Philip Hefner. Hefner explains, "The human being is a two-natured creature . . . a coalition or symbiosis of genes and culture" where "culture has elaborated the freedom that our genes make possible." Our genetic nature is a universal given to us by evolution that "motivates behavior by preprogrammed messages" (Hefner 1993, 20). While we do not possess freedom over this genetic nature, our very genes make it possible for us to transcend our biological human nature through generating the neurological freedom that is creatively expressed in human culture. The cultural side of human nature, according to Hefner, empowers us to "discover what our kin in nature [(nonhuman animals)] know by genetic programming." Thus, we as humans may, through culture, "distance ourselves from nature's laws" and override or transcend the genetic side of our animal nature (Hefner 1998, 177).

Like Hefner, environmental philosopher and theologian Holmes Rolston III also speaks of human nature as uniquely possessing a double aspect or identity—one part being the genetically stable biological foundation and the other portion being culturally malleable behavior that supersedes biology. According to Rolston, nonhuman "animals do not form cultures," and the natures of nonhumans are determined primarily by their genes. Human nature, however, consists of a "dual inheritance system" of genes *and* culture. While the information for our biological nature "travels intergenerationally largely on genes; information in culture travels neurally as persons are educated into transmissible cultures." In this way, says Rolston, quoting Dobzhansky, "human genes have accomplished what no other genes succeeded in doing. They formed the biological basis for a superorganic culture" (Rolston 1999, 108–11). With the emergence of cultural information—a process of transmission that both Dobzhansky and Rolston argue is unique to humans and "not found in biological nature"—the grip of genetic control on human nature is relaxed and the biological way is paved for the exploration of an *under*determined existence of freedom.

Philosophical theologian J. Wentzel van Huyssteen, while not accepting the single-species model in its entirety, nonetheless develops a similar understanding of human evolution as a "co-evolution of nature and culture" and he agrees with Rolston's assessment "that natural selection is greatly relaxed in great areas of cultural activity" (van Huyssteen 2005, 118). Whereas the behavior of nonhuman animals is held tightly on a genetic leash, for human beings, says van Huyssteen, "the leash is broken; biology and culture are two dramatically different phenomena—even though culture is superimposed on biology" (van Huyssteen 2003, 175). Human cultural evolution is radically distinct from and cannot be reduced to the principles of organic evolution. The human capacity for culture, says van Huyssteen, is a "result of the peculiar development of the human brain and can be regarded as the most sophisticated expression of the brain's power." On account of the singular properties of the *H. sapien* brain that mediates between biology and culture, the human species "clearly transcend[s] our biological origins," and our possession of culture "makes our species unique in the animal kingdom" (van Huyssteen 2006, 86–95).

Though he doubts the adequacy of the multiregional or single-species model of human evolution, in his treatment of the paleontological record van Huyssteen—following the lead of a number of contemporary paleoanthropologists—yet argues in a manner akin to the proponents of the single-species model. In this way, he continues the single-species model's basic ontological premise as he consistently maintains and seeks out reasons to uphold the *unique status* of human beings in the face of hominid diversity. Because they are perceived as lacking true culture and other key capacities, for van Huyssteen, the other hominids are in no way equivalent beings that can be likened to modern humans. Lacking spoken language, culture, symbolic behavior, the capacity for abstract thinking, planning depth, and behavioral and technological innovation, he says, our hominid ancestors were radically different from us humans who have crossed the threshold of *behavioral modernity* (190, 63, 203). Interestingly the "us" that van Huyssteen is referring to is not the *anatomically* modern human beings that arose in Africa 150,000–200,000 years ago, who were genetically identical to *us who are presently living*, but rather, van Huyssteen's "us" is the Cro-Magnon ancestors of Modern Europeans dating from 30,000 to 40,000 years ago, whom, he argues are the first clearly behaviorally modern humans. It is these "Upper Paleolithic people," explains van Huyssteen, who, in addition to having "the same bodies and brains that we do," even more importantly, "were the first people for whom archeology clearly implies the presence of both 'culture' and 'cultures'"(63, 169).

While van Huyssteen, following paleontologist Ian Tattersall, doubts the adequacy of the single-species model in light of recent genetic and fossil evidence, in his treatment of the paleoanthropological record, he ultimately seeks to vindicate human uniqueness as he defends the position that modern humans are and always have been "alone in the world." According to his analysis, modern humans, from the time of their initial emergence 50,000 years ago, had no competitors with regard to imagination, creativity, consciousness, self-awareness, language, culture, religion, or any other capacities that define us as unique. Akin to the single-species model's and multiregionalism's guarantee that human beings have always been—since their very origin—without an equivalent or rival, for van Huyssteen, the exclusive nature of mankind is securely safeguarded via his interpretation of the paleoanthropological evidence. Following Tattersall's saltationist understanding of human evolution, van Huyssteen argues for "a significant cultural explosion, a 'big bang' of human culture" and human reflexive consciousness related to a transformation in the human mind around 60,000–30,000 years ago (196). Making a distinction between the *anatomically* modern features of the human body on the one hand and the *behaviorally* modern features of human mental and social complexity on the other, he discerns the emergence of "modern human behavior" solely in the European "Upper Paleolithic Revolution" 45,000 years ago and dismisses not only Neanderthal and other hominid aspirations to possessing symbolic culture, but also the first 100,000–150,000 years of anatomically modern humanity (176 ff.). Citing

Stephen Mithen's understanding of the evolution of cognitive fluidity in the human mind, and Iain Davidson and William Noble's argument linking the archeology of Upper Paleolithic Europe with the fairly late human discovery of language and its symbolic properties, van Huyssteen also accepts their assessment that around 50,000 years ago, "we find a dramatic behavioral break, a 'big bang' of cognitive, technological, and social innovation" with the rise of cognitive fluidity and language (232). With the Cro-Magnon variant of *H. sapiens*, there was "not simply an 'improved version' of its ancestors, but . . . in fact a new thing altogether, qualitatively distinct from them in highly significant if limited respects" (190).

According to van Huyssteen, "the famous 'cultural explosion' of the Upper-Paleolithic," exemplifies "the most distinctive traits of our species much as the creation myths of the Abrahamic religions refer to the arrival of a new species, created in the 'image of God.'" The linguistic, symbolic, cultural, and artistic big bang of 50,000 years ago most dramatically embodies the unique and "quintessentially human" qualities that "set us apart from other animals and even from our closest pre-[modern] human ancestors" (2005, 106, 119). As the behaviorally modern human capacities for self-awareness, moral awareness, consciousness, imagination, productivity and creativity, and religious behavior materialized suddenly as products of symbolic language and cognitive fluidity, the uniquely human faculty of the *imago Dei* emerges "from nature itself" (124). The paleoanthropological understanding of "embodied human uniqueness" as witnessed in the symbolically expressive behaviors of the Upper Paleolithic human—the first and only being to arise "biologically as a center of self-awareness, identity, and moral responsibility"—thus becomes central to van Huyssteen's theological conception of the image of God in humanity. For van Huyssteen, the concept of *human uniqueness*, as seen and defined by the qualities and capacities displayed in the Upper Paleolithic Cro-Magnon humans, is synonymous with the *imago Dei*.

THE UPPER PALEOLITHIC REVOLUTION THAT WAS NOT

Van Huyssteen leaves his reader with the impression that there exists a marked discontinuity between the behaviorally modern European humans of the Upper Paleolithic and all human, hominid, and animal ancestors that have gone before. Citing Davidson and Noble, he points out that "there is a very direct link between language and symbolic activities," and with the exception of the Upper Paleolithic Europeans, "symbolism did not emerge elsewhere in the world populated by *H. sapiens* at that time" (2006, 228). Backing up this understanding with the work of Mithen, he explains that "both language and symbolic behavior are very late developments, appearing no more than 50,000 years ago." Thus, van Huyssteen muses, "it is tempting to infer" that the dramatic discontinuities of the Upper Paleolithic period were "ushered in by a major enhancement of language abilities." The Cro-Magnon modern humans of this period are further distinguished from the Neanderthals who lived in the same region at the same time. Van Huyssteen tends to downplay the capacities and accomplishments of Neanderthals and follows Tattersall in maintaining that these contemporaneous nonhuman hominids "lacked both language and modern sensibility" and "left no evidence of the creative innovative spark that is so conspicuously a characteristic of our own kind" (2006, 189, 231, 227).

To be fair, van Huyssteen, who understands his own position as that of a gradualist and a centrist, does offer something of a cautionary note regarding the dangers of seeing this reading of the paleoanthropological record as Eurocentric, is careful to warn his readers to not make the mistake of imagining too sudden a transition to what he calls behavioral modernity, and he does mention some evidence (such as Blombos cave discoveries in South Africa) indicating that modern human behavior and symbolic expression might have existed a good deal earlier than 50,000 years ago (177–78). Van Huyssteen's treatment of the evidence weighing against an Upper Paleolithic Revolution, however, is ultimately conferred little persuasive force and does not impact his subsequent discussions of human uniqueness or his conclusions about the existence of a behavioral "big bang" marking the emergence of modern humans. Briefly mentioning and then proceeding to move past the implications of discoveries that place human symbolic awareness much earlier than 50,000 years ago, van Huyssteen does not bring the full critical force of counterevidence to bear upon scholars such as Tattersall, Mithen, and Davidson, whom he cites approvingly and much more frequently than behavioral gradualists such as Alison Brooks, Sally McBrearty, or Christopher Henshilwood. Indeed, this tendency to present such anomalies and then overlook the serious problems confronting the notion of an Upper Paleolithic Revolution even begins to look somewhat like *hedgeless hedging*. In instances of hedgeless hedging, "one admits the existence of an anomaly or problem of a theory and then proceeds as though one had not. If one is then accused of neglecting the anomaly, one then produces the admission of its existence as conclusive evidence of one's innocence of the charge" (Robert 2004, 10).

While most certainly not his intention, this appears to be precisely what happens in van Huyssteen's response to accusations of downplaying the symbolic and cultural capabilities of both the African human ancestors of the Cro-Magnons and the nonhuman Neanderthals. For example, biological anthropologist Barbara King comments that "by citing approvingly Ian Tattersall's perspective, van Huyssteen dismisses the meaning of the Neandertal archaeological record far too easily, concluding that with *H. sapiens* we see a totally new type of creature in the world." Similarly, she mentions that van Huyssteen's direction of argument "points *away from* early *H. sapiens* sites in Africa, just as it points away from

Neandertals' symbolism" (King 2008, 462). In a response to King, van Huyssteen writes:

> I am hoping that my strong focus on continuity/discontinuity in principle would never point away from early *Homo sapiens* sites in Africa, much in the same way that I would never want to point away from the possibility of Neanderthal proto-symbolism (King 2008, 460). What I stressed in both of these cases, and could have made clearer, is the piecemeal, inconclusive nature of what we can know today about these very ancient forms of proto-spirituality. (van Huyssteen 2008, 512)

Significantly, King herself does not use the terms "*proto*-symbolic" and "*proto*-spiritual" to describe the cultures and capacities of early African humans and Neanderthals, but rather speaks of discoveries indicating African "human symbolism," "an engagement by Neandertals with symbolism," and, even more, "symbolism of a spiritual nature" (2008, 461). By the unwarranted insertion of the prefix "proto" onto King's categories, van Huyssteen, yet again, implicitly seems to minimize early African *H. sapiens* and Neanderthals and he appears reluctant to consider them as the cultural and spiritual equivalents of the Cro-Magnons without stating precisely why.

While van Huyssteen does not expressly reveal his reasons for downplaying the achievements of the Cro-Magnon's human ancestors and their hominid cousins, it is clear that to fully concede that Neanderthals and anatomically modern humans are the equivalents of the so-called behaviorally modern humans of the Upper Paleolithic would be to make the human-nonhuman boundary line significantly fuzzy and to surrender the advantage of having a precise and clear-cut scientific understanding of human nature and human uniqueness. In the clear face of such counterevidence, it would have to be admitted that humans are in fact *not unique* and this acknowledgment would, in turn, render van Huyssteen's theological project much less straightforward and less effective. Though van Huyssteen states that he thoroughly concurs with "[Marc] Bekoff's nice phrase, 'absence of evidence is not evidence of absence,'" in his choice of interpreters of the paleoanthropological record, he yet chooses to work primarily with minimalists such as Noble and Davidson who read even much of the positive evidence for cognitive sophistication in terms of absence (2008, 524).

Indeed, "the minimalist approach to the archaeological record is typified by Davidson" who "urges archaeologists to adopt an interpretation of past technology that attributes to them the least human-like abilities logically possible for the behaviour seen, in order to avoid imposing on minds now extinct the cognitive patterns of our species today" (Morwood and Cogill-Koez 2007, 49). If one were to judge recently vanished or even some *contemporary* human cultures by the cognitive-archaeological standards of Noble and Davidson, however, we would be forced to exclude from behaviorally modern humanity, and relegate as cognitively challenged, many people groups and cultures from New Guinea, the Pacific Islands, North and South America, Southeast Asia, and Australia. For instance, "the stone tools made in some regions of New Guinea until recently . . . are similar to the earliest known from Africa, despite the fact that the makers' cultivation technology, social organisation, etc. are exceedingly complex" (47–48). The recent Tasmanian record likewise "has all the hallmarks of what in Eurasia would be identified as a record of archaic behavior." And the same can be said of the North American Paleoindian archaeological record, where most of the sites are "just 'patches' or 'scatters' of artifacts and bones, with few if any formal hearths" having "little or nothing in the way of ornaments or grave accompaniments." Though these remains were all deposited within the last few thousand years, in the majority of North American Indian sites "art of any nonperishable sort is virtually nonexistent" and archaeologists "are hard-put in most cases to find anything that even remotely smacks of symbolism" (Speth 2006, 184). In contrast to the notion that certain types of material cultures are absolutely necessary in order to ascribe a certain degree of cognitive sophistication, the reality is that fully modern and culturally complex recent human societies create very diverse archeological signatures.

What, then, warrants treating archaic humans and prehuman hominids so differently? The historical answer to this question is the predominance, beginning in the 1980s, of a basic principle of archeological interpretation formulated by archaeologist Lewis Binford. Defining culture as "the set of universal behaviors found to be common to all humans," Binford's hermeneutic postulates "that the capacity for culture could be assumed to have existed in the past only when dealing with the archaeological remains of anatomically modern people" (Zilhão 2001, 16–17). This heuristic thus recommends that, when dealing with *H. sapiens*, interpreters adopt as a null hypothesis that advanced culture did exist (even in absence of evidence), but when dealing with nonhuman hominids they should adopt a null hypothesis that sophisticated culture did not exist. Originally devised as a principle of interpretation that encouraged caution when considering the capacities of nonhuman hominids, Binford's method was in time further circumscribed so that only humans after the onset of "*behavioral* modernity," as opposed to mere *anatomical* modernity, were given the benefit of the doubt with regard to culture. In this capacity, this principle seems to have taken on the role of guaranteeing a kind of cultural uniqueness to behaviorally modern humans by asserting—even in the face of contrary evidence—a type of *anthropocentrism of the gaps*. In other words, these interpreters of the hominid fossil record presuppose human exceptionality in lieu of empirical evidence and maintain a faith in human uniqueness even where evidence is wanting. For instance, when faced with the recent discovery of items signifying symbolical behavior within dwelling sites of nonhuman hominids contemporaneous with modern humans, some paleoanthropological minimalists—rather than conceding that the objects were created by nonhumans themselves—have instead insisted that the non*sapien* hominids must have traded, borrowed, or scavenged the symbolic items from nearby humans. Or at the very least, say these scholars, the nonhumans must have *mimicked* humans rather than innovating and creating such objects by themselves and through their own cognitive powers. Binford's heuristic thus seems to have set up an archaeological burden of proof that is in practice impossible to bear, creating scenarios where no amount of evidence is sufficient to override blind faith in human uniqueness. To move beyond this position of anthropocentric faith requires that we apply a more consistent reading of the evidence—in particular, one that does not *a priori* rule out the existence of symbolic culture among early humans or nonhumans. This does not mean, however, that we may rashly ascribe culture and higher cognitive faculties to animals or other entities when *no evidence* is present whatsoever. Rather, it recommends an important note of caution with regard to the temptation to interpret archeological remains of early anatomically modern humans and other hominids in an overly minimalist fashion.

Keeping these hermeneutical caveats in mind, let us consider whether it is warranted to claim that a sudden cultural revolution occurred 50,000 years ago that was directly precipitated by an abrupt transition in human cognition and by the human acquisition of language. In our discussion above, we made reference to the European Cro-Magnon people of 30,000–40,000 years ago and how from their hauntingly beautiful cave artwork, intricate sculptures, carefully carved bone flutes, and variety of jewelry and body adornments one finds indisputable evidence for symbolic behavior, abstract thought, and aesthetic awareness. Discussing the archaeological remains of the Cro-Magnon Aurignacian Culture, van Huyssteen argues that the majority of scholars see the "punctuational appearance" of these elements as being immediately preceded by the emergence of "a complex, fully modern spoken language," and he cites the work of paleoanthropologist Richard Klein in support of this contention (2006, 227). For his part Klein argues that human beings' "fully modern capacity for culture . . . stemmed from a genetic change that promoted the fully modern brain in Africa around 50,000 years ago." This genetic change triggered a profound "neurological shift" that in turn marked the development of fully modern language (Klein and Edgar 2002, 8, 146). In 2002, it was discovered that the FOXP2 gene is essential for acquisition of normal spoken language and that this gene had mutated recently in the course of human evolution. Many saw these genetic findings concerning the origin of spoken language as a confirmation of Klein, Davidson, and Noble's theory.

More recent genetic evidence, however, has pointed in another direction. While it is still clear that FOXP2 is a key gene involved in acquiring and producing language, it has turned out that its roots are more ancient than previously thought. It is now believed that the essential "mutations in FOXP2 . . . may actually have occurred some 1.8 million years ago, when *Homo habilis* and *Homo ergaster* were appearing in the fossil record, and as the human brain began gradually to triple in size from the 450 cc of chimpanzee and australopithecine brains to the 1,350 cc of modern human brains" (Diller and Cann 2009, 136). Another study, which has independently confirmed the ancient roots of the FOX2P mutations, has likewise clearly shown that Neanderthals share with modern humans the key language-related changes or genetic mutations in FOX2P—results that indicate that such changes "predate the common ancestor (which existed about 300,000–400,000 years ago) of modern human and Neandertal populations" (Krause et al. 2007, 1908). From a genetic standpoint, then, insofar as FOX2P is an indicator of speech, it is evident that language was never the exclusive possession of human beings, but rather a capacity that was shared among a variety of our fellow hominids.

Besides the empirical data from DNA, strong evidence from physical anthropology and archeology also casts serious doubt on the hypothesis of sudden revolution in linguistic and symbolic culture about 50,000 years ago. A series of discoveries that would "ultimately upset received wisdom about the evolution of human behavior" and work to overturn the idea of an Upper Paleolithic Revolution started in 1988 when archaeologist John Yellen uncovered "a finely crafted" barbed bone harpoon point and other evidence for a well-developed bone tool industry from the Katanda site in Zaire dating to 90,000 years ago or possibly older (1995, 553). The findings, which include many tools, ornaments, and implements carefully crafted for a variety of purposes, are similar in appearance to artifacts from the Holocene (which began only 12,000 years ago). The high level of technical skill involved in crafting the implements and the purposes for which they are created "indicates that the toolmakers were engaging in sophisticated behavior" and had "the capacity to plan ahead and to conceptualize complicated technologies." Furthermore, the presence of ocher pigments and grindstones made of nonlocal materials reveals additional evidence of planning as well as a level of sophistication in several other domains of behavior such as the social, aesthetic, and economical aspects (Gibbons 1995, 496).

Other archaeological discoveries that imply language and symbolic culture, such as engraved geometrical designs, ornamental shell beads, fine bifacial points crafted well beyond mere utilitarian needs, bone tools showing formal production techniques, and evidence of sophisticated subsistence strategies, have been unearthed at the 77,000-year-old Blombos Cave site in South Africa. At the other end of Africa, in Morocco, the situation is analogous, as similar ornamental shell beads from human occupation sites have been shown to date from 82,000 years ago. Such beads, "considered by many authors as tangible signs of symbolic material cultures," clearly show that symbolic culture was widespread among human populations in Africa by at least 80,000 years ago (Bouzouggara et al. 2007, 9964). Many of the other components of the presumed Upper Paleolithic Revolution in Europe have been found to have been present at various locations across Africa tens of thousands of years earlier. Such findings include "blade and microlithic technology, bone tools, increased geographic range, specialized hunting, the use of aquatic resources, long distance trade, systematic processing and use of pigment, and art and decoration" (McBrearty and Brooks 2000, 453). The geographically widespread nature of such innovations that "signify modern human behavior, including art, ornamentation, symbolism, ritual burial, sophisticated architecture, land use planning, resource exploitation, and strategic local alliances," have further undermined the notion that a human cultural big bang occurred 50,000 years ago (Ambrose 2001, 1748). Indeed, these findings clearly demonstrate an unprecedented level of societal and technological sophistication and aesthetic awareness even back to the very dawn of anatomically modern *H. sapiens* (d'Errico and Stringer 2011).

From genetic and fossil evidence, we know that *H. sapiens* emerged as a separate species most likely around 200,000 years ago. From archaeological evidence, we recognize that these humans of 200 millennia ago were the same in all their essential characteristics as human beings today. Being genetically identical to us, belonging to the same biological species and having the potential to interbreed with contemporary humans, they were also essentially the same at the social and cultural levels. Thus, empirically speaking, we are not led to believe that humans of the present century are by any means more physically capable or even more intelligent than our ancient human ancestors. Indeed, since the time of the earliest anatomically modern humans, and especially over the last 50,000 years, human brain volume, physical strength, and stature have been steadily decreasing. Consequently, one would have reason to believe that it is *they* and not *us* who are both athletically and intellectually superior.[2] Nevertheless, the differences between the humans of 200,000 years ago and the twenty-first century are predominantly owing to the cumulative growth of knowledge and the ever-increasing development of new technologies over time. In other words, early humans were "every bit as intelligent as we are today, but they lacked the shoulders of giants on which to perch" (Balter 2002, 1224).

Close Encounters of the Hominid Kind

Our ancient human ancestors of 200 millennia ago were just like us in every respect except in their history of knowledge acquisition, and now there is unambiguous evidence indicating that when our early human ancestors first emerged from their evolutionary slumber, they were not alone. From the current data, it is clear that there were at least four different human-like species who lived at the same time and in the same places as our ancestors: *H. erectus*; *Hominid "x,"* a new hominid species known only from its DNA that may have been related to *H. antecessor*; *H. floresiensis*; and *H. neanderthalensis*. As fellow hominids, these beings were our close evolutionary cousins. They shared with us all the key features that we today identify with humans alone. Beyond having opposable thumbs, a bipedal gait, and large brains, they also had well-developed material, social, and symbolic cultures and in all likelihood possessed the capacity for spoken language. What they did not share with us, however, is our genealogy or recent evolutionary lineage. The various lines of descent of each of these different hominids goes back to a distinct last common ancestor that is the point at which each hominid species, respectively, began to diverge genetically from the rest. As a result, these hominid cousins, though incredibly *human-like*, are all truly different species that, if alive today, would not have the potential to interbreed with one another or with humans to produce viable offspring.[3] In terms of their features and capacities, then, we might think of them as "fully human," but in terms of their genealogy or evolutionary lineage, they are clearly not. In this respect, the other hominids were truly alien, though terrestrial, forms of intelligent life.

Homo erectus. With the evolutionary emergence of *H. erectus*, the world would witness a level of societal sophistication and cultural complexity that had never before been seen. As the first hominids to venture outside of Africa (around 1.8 mya), *H. erectus* persisted in Asia until about 25,000 years ago (Anton et al. 2007). Thus, for many millennia *H. erectus* lived within Asia alongside of *H. sapiens*—the latter having colonized both Eastern and Western Asia by 60,000 years ago. *Homo erectus* were the first hominids to use systematic hunting that involved foresight, planning, and the use of appropriate technology. They were innovators who carefully constructed a variety of different tools such as hand axes, picks, and cleavers that necessitated a great degree of cognitive insight and more manipulative skill; and from microlith studies we know that these tools were used for many functions such as cutting and whittling wood and bone, scraping animal hides, and defleshing and butchering animal carcasses (Keeley 1980). With the emergence of *H. erectus*, we also see the first use of fire, the first appearance of something like "home bases" or centrally located semipermanent settlements, and the first evidence for successful hominid seafaring (Gibbons 1998). In light of the above archaeological evidence, morphological investigations, and genetic data, it is very probable that *H. erectus* also had the capacity for symbolic spoken language. Moreover, the brain size of *H. erectus* individuals who might have come into contact with early humans was well within the modern human range (about 915–1,251 cm^3 for *H. erectus* in the Late Pleistocene) (Morwood and Cogill-Koez 2007, 47).

THE DENISOVA HOMININ OR "HOMININ X"

Another nonhuman hominid who was both geographically and temporally contemporaneous with modern *H. sapiens* may be referred to as the Denisova hominin or "hominin X," since its exact morphological and archeological identity is as of yet unknown. The only physical remains of hominin X are a finger bone recently discovered in layers from a cave in Siberia that date to about 40,000 years ago. Extracting mtDNA from the bone, researchers found that the species represented was a new hominin whose mtDNA differed significantly from both modern humans and Neanderthals—having shared a common African ancestor with both groups about 1 million years ago. The new hominin possessed the mutations of the FOXP2 gene necessary to exhibit spoken language and shared many cultural parallels with early humans—as can be seen in the various symbolic decorative ornaments, such as bracelets, beads, and pendants that were discovered in the same soil layer of the cave and date to the same period as the new hominid's remains (Derevianko et al. 2008). Based on the archaeological finds where the finger bone was unearthed, researchers suspect that the unknown hominids also hunted large game, such as woolly mammoths and woolly rhinos. Furthermore, harsh climate conditions in Siberia imply that these hominids would have used fire and worn heavy, protective clothing. Because the cave where the finger bone of the new hominin was found also contains many millennia of archaeological layers, which have yielded both Neanderthal and modern human stone tools and ornaments, it is safe to infer from the close proximity of the three species that they came into contact with and likely interacted with one another.

HOMO FLORESIENSIS, THE "HOBBITS OF FLORES"

According to the current scientific evidence, the last time that modern humans beheld the face of a member of another species from their own genus was around 12,000 years ago when they encountered *H. floresiensis* on the tropical island of Flores in the heart of the Indonesian Archipelago. *Homo floresiensis*—nicknamed "Hobbits" because of their short stature and disproportionately large feet—engaged in sophisticated cultural behaviors such as skilled hunting, butchery, and cooking with fire. The systematic big-game hunting, such as that evinced among *H. floresiensis* can be seen as "evidence of linguistic abilities that minimally reach the level firstly of symbols, and secondly of displacement, the use of the symbols in the physical absence of their referent" (Morwood and Cogill-Koez 2007, 51). The tool-making ability of *H. floresiensis* likewise displays evidence of complex cognition similar to that of behaviorally modern humans. In addition to this, studies of stone points revealing the presence of adhesive residue indicate that the technology of *H. floresiensis* also included composite tools where stone blades were attached (or *hafted*) onto wooden handles or spear shafts. Such composite tool technology has long been seen as indicative of behavioral modernity. The geography of *H. floresiensis* likewise suggests that either the evolutionary ancestors of *H. floresiensis* or the Hobbits themselves were capable of seafaring. Either way, the Hobbits of Flores who were contemporaneous with humans 12,000 years ago would have been evolutionary heirs to all the cognitive and linguistic skills that a deliberate crossing of many miles of the dangerous open sea would demand.

Lastly, the skeletal evidence from Flores gives us a hint of the Hobbit's complex social dynamics and practice of compassion and care. Consider, for example, an individual who fractured a leg so severely that it left the final healed "radius bent almost at right angles." This person "survived the many weeks or months of severe incapacitation that the complete bone severance and the subsequent difficult angle of the healing would have demanded" and "also went on to survive much longer still, with a spectacular deformation of the arm; one that seems to have restricted its use considerably." For such a disabled person to survive for so long would have required not merely "the limited sharing of the occasional meat bonanza, but prolonged social provisioning of diverse food types, at a very high level" (43–74). The fact that the community of this individual cared for him or her to this extended degree reveals a high level of altruism and "positively human levels of cooperation" present among *H. floresiensis*.

Homo neanderthalensis. The fourth hominid species that coexisted with early modern humans is *H. neanderthalensis*. Primarily a European population, with some presence in the Middle East and Asia, the Neanderthals persisted as a distinct evolutionary lineage from humans until roughly 25,000 years ago when they disappear completely from the fossil record. Having preceded humans in Europe, who appeared there about 40,000 years ago, European Neanderthals were contemporaneous with modern humans for over 15,000 years. From various lines of evidence, it is now clear that Neanderthals would have possessed language abilities similar to modern humans. In terms of the genetic evidence and the anatomical data pertaining to language and cognitive ability, "Neandertals share with modern humans two evolutionary changes in FOXP2, a gene that has been implicated in the development of speech and language," and they possess cranial capacities as large as or larger than modern humans (Harvati 2007, 1733).

In terms of physical appearance Neanderthals bore a face that was "at once familiar and foreign" (Wong 2000, 99). Though significantly more muscular than humans, the posture, stance, and the way that Neanderthals moved and walked were the same as ours. Indeed, though genetically distinct species, in their earliest encounters Neanderthals and humans shared enough in common—in terms of both appearance and DNA—that they occasionally had sexual intercourse and contributed to each other's genomes. In fact, recent genetic studies have shown that both Asians and

Europeans (but not Africans) share from 1% to 4% of their nuclear DNA with Neanderthals, suggesting that "early modern humans interbred with Neanderthals after moderns left Africa, but before they spread into Asia and Europe" (Gibbons 2010, 680). When all things are considered, then, it would seem that the average Neanderthal could blend in quite well in contemporary cosmopolitan human society without being gawked at for their "primitive" or "alien" appearance. As one paleoanthropologist remarked: If a Neanderthal "could be reincarnated and placed in a New York subway—provided that he were bathed, shaved, and dressed in modern clothing—it is doubtful whether he would attract any more attention than some of its other denizens" (Stringer and McKie 1997, 97).

Cognitively and linguistically our equals, Neanderthals were likewise our equals culturally. Neanderthals were skilled hunters, who utilized sophisticated stone-tipped spears to hunt a wide variety of prey (Pearson et al. 2008). Archaeological findings have likewise revealed that some Neanderthals, using mammoth tusks for structural elements, constructed well-designed huts with centralized hearths (D'Errico 1998, S9). Furthermore, researchers have unearthed numerous sophisticated stone blades, intricately carved bone tools, and decorative body ornaments—including pendants of carved bear, wolf, and deer teeth. While archaeological minimalists initially attempted to explain away these findings by suggesting "that Neandertals had acquired the modern-looking items either by stealing them, collecting artifacts discarded by moderns, or perhaps trading for them," others have since then convincingly argued that these behaviorally modern-looking objects were indeed created by Neanderthals (Zilhão 2006). Other sites in France, Spain, and Italy have borne evidence for Neanderthal art in the form of engraved bone fragments, and red and yellow ocher pigments, and decorative body ornaments. Considering that "comparable early modern human-associated material from Africa and the Near East is widely accepted as evidence for body ornamentation, implying behavioral modernity," the discoveries from Spain "show that European Neandertals were no different from coeval Africans in this regard" (Zilhão 2010, 1023). In light of this evidence, it is clear that "the behavioral barrier that seemed to separate moderns from Neandertals and gave us the impression of being a unique and particularly gifted human type—the ability to produce symbolic cultures—has definitively collapsed" (Zilhão and d'Errico 2000, 105).

Beyond the well-developed aesthetic sense of Neanderthals, as evinced by their use of jewelry and body and/or face painting, there are also indications of an ethical or moral sense as well as an awareness of death that is suggestive of a "spiritual sense." We see evidence of an ethic of care and compassion among Neanderthals from the remains of numerous individuals who at one point evidently suffered serious physical trauma or debilitating injuries that were afterward healed or partially healed. Individuals in such a disabled state—hindering overall group mobility and being unable to contribute to hunting or other intensive food-gathering efforts—would have put a considerable strain on the group. Consider, for example, a male individual from the Neanderthal site of Shanidar (Iraq) who survived "an unrepaired fracture of the right arm above the elbow." Due to his injuries, his upper arm subsequently "became atrophied and nonfunctional, and he may have lost his right hand and forearm entirely." Furthermore, this same individual "was likely partially blind and deaf, and had difficulties with locomotion." Nevertheless, as the Shanidar man still lived "until an advanced age," it would seem "his survival was possible only because he received support from other adults in the group" (Hublin 2009). In other similar cases—such as with individuals having "highly worn or otherwise nonfunctional dentition"—the nature of the disability is such that these persons most likely required considerable care and social assistance in order to survive as long as they did. From these, and many other cases, it would appear that Neanderthals engaged in a type of compassionate care for their less fortunate fellows, which shows that the capacity to treat others humanely is not the exclusive endowment of humans (Lebel and Trinkaus 2002, 681).

A final trait that was long thought to be unique to humans is the capacity for death awareness. Consciousness of mortality, however, is not exclusive to human beings, as is revealed in the well-known Neanderthal practice of intentionally burying their dead (Hayden 1993). The majority of researchers have now reached the conclusion that many of the traditionally claimed Neanderthal gravesites are indeed the result of deliberate burials. Because such burials are *intentional*, paleoanthropologists have likewise come to regard such burials as *symbolic acts* (Kimbel et al. 1995). As Paul Mellars expresses in a cautious and somewhat minimalist view, "at the very least we must assume that the act of deliberate burial implies the existence of some kind of strong social or emotional bonds [within Neanderthal societies], which dictated that the remains of relatives or other close kin should be carefully protected and perhaps preserved in some way after death" (Mellars 1996, 381). It is apparent that in these burials, some of which contain grave goods, "a symbolic component is implied, for the bones of dead kin are *at least* iconic of the living person in that they point to their referent by physical resemblance" (Kimbel et al. 1995, 56). We may never know for certain whether or not there were rituals associated with the process of inhumation. At least in one case, though, it has been argued that a Shanidar Neanderthal grave contained an offering of flowers that may have been ritually placed upon the departed. Based on the analysis of the ancient pollen contained in the sediment surrounding one of the Neanderthal skeletons found at Shanidar, it has been suggested "that deliberate arrangements of flowers had been deposited alongside the dead person as part of the burial ritual" (Zilhão 2001, 13). Nevertheless, what is unmistakable from the combination of such evidence as discussed above is that as "the boundary between Neandertals and moderns has gotten fuzzier"—humans are not as unique as we previously thought (Stringer 2009).

WHAT IS THEOLOGICALLY AT STAKE WITH REGARD TO THE QUESTION OF HUMAN UNIQUENESS?

Many popular Christian voices and academic theologians have long made a central connection between the concept of human uniqueness and the doctrine of human beings as created in the "image and likeness of God" (known as the *imago Dei*). Indeed, this understanding of *H. sapiens* as qualitatively unique has led to various theological attempts to identify the particular capacities that form the basis of the supposed "essential nature" of humans, and for many theologians the locus of distinctiveness that separates humans from nonhumans is explicitly connected to, or understood as the content of, the *imago Dei.* Pursuing what is called the *comparative approach* to theological anthropology, popular preachers, along with philosophers and theologians, have asked, in what ways is human nature *different from the nature of nonhumans* and, therefore, *like the nature of God*? (Gunton 1991, 47).

The vast amount of research establishing human continuity with the nonhuman hominids has not gone unnoticed, and many contemporary theologians of nature such as Gregory Peterson, Celia Deane-Drummond, Oliver Putz, and others have rightly criticized the presumption involved in biologically isolating humanity from the rest of the nonhuman creation. These scholars have faulted proponents of the human uniqueness position for ignoring the full implications of investigations revealing the cultural complexity and "modern" behavioral patterns of the nonancestral nonhuman hominids. Peterson, for example, raises the question of nonhuman hominids and asks, "Were they, too, in the image of God, and at what point, assuming that one can be specified, did they cross the threshold to being *human* in the morally and theologically relevant sense of the word?" (Peterson 2008, 473). Deane-Drummond has similarly raised the question of nonhuman hominids and the associated challenge to the idea of human uniqueness. In particular she points to the recent discovery of *H. floresiensis* who lived contemporaneously with humans and asks if these findings "undermine the meaning of humans as made in the image of God, *imago Dei*?" (Deane-Drummond 2006, xvii).

Questioning the verity of human uniqueness, these scholars have rightly judged that a logically consistent application of the comparative approach to theological anthropology entails extending the *imago Dei* to nonhuman hominids. To remedy the theological situation, then, in light of science, they have proposed extending the *imago Dei* to include the other hominids and at least some nonhuman animals (depending on whether or not these animals display certain key characteristics). Because empirical research in animal cognition and paleoanthropology no longer allows us to point to some uniquely human aspect of cognition that animals and nonhuman hominids lack, Peterson and Deane-Drummond, utilizing the comparative approach to theological anthropology, recommend that we significantly rethink our understanding of the *imago Dei*.

While this extension of the divine image to nonhuman hominids has the virtue of taking paleoanthropology seriously, this procedure nevertheless betrays several significant exegetical and theological problems. In contrast to a broad consensus of biblical exegetes, this view of the *imago Dei* still defines the divine likeness via reference to particular capacities and characteristics. In this way, the very method of the comparative approach to theological anthropology receives virtually no backing from the actual biblical texts. There is no reason, explains Old Testament scholar James Barr, to believe that the author of Genesis chapter one "had in his mind any definite idea about the content or location of the image of God" (Barr, 13). Other scholars point out that the terms "'image' and 'likeness' . . . make no statements about the *nature* of human beings" (Preuss 1999, 115). When we read of "the creation of human beings in God's image (Gen 1:26) . . . the biblical narrative remains silent . . . about any qualities of human nature that might account for their special standing" (Tanner 1994, 573). If we are to properly understand the meaning of the texts, then, we must confidently resist "the tendency to see the image and likeness of God as a something, a quality" (Westermann 1974, 57–58). Consequently, no specific anthropological content or characteristics may be directly equated with the *imago Dei*. If one is to take the findings of biblical exegesis seriously, then the image of God cannot be either defined or extended on the basis of particular traits or characteristics.

Beyond this, both contemporary biblical exegetes and the theological consensus of the Jewish and Christian traditions agree that the divine image and likeness applies to humans and *humans alone*. While there has been little historical consensus with regard to the precise theological meaning of the phrase "image of God," and it is well known that a number of interpretations of the *imago Dei* have been offered over the centuries, in the midst of all this disagreement, there has been at least one point of unequivocal consensus for over 2,000 years of Christian and Jewish understandings of the divine image: "Of all God's creatures, humans *alone* bear the image of God" (Cohen 1989, 1). From early Judaism and Philo to the Early Church Fathers and Reformers, and from Eastern Orthodoxy to the Anabaptists, all have agreed that human beings, and *only* human beings, bear the image and likeness of God. Indeed, one could hardly overstate the unanimity of the entire Christian theological tradition when it comes to this point. This is a fact that is not lost on those who would extend the image of God to nonhumans. As David Cunningham (2009) comments: "It is true, of course, that the biblical text very clearly attributes to human beings at least one description that it does not employ as an attribute of any other element of creation. This is the claim that human beings are created in the image and likeness of God" (105). Extending the *imago Dei* designation beyond human beings thus entails a rejection of the consensus of biblical exegesis and over 2,000 years of unanimous theological teaching that has affirmed that humans alone bear the image and likeness of God. Any doctrine of the *imago Dei* that names nonhumans as the divine image dramatically breaks with the historical Christian understanding. Consequently, staying within the boundaries of both the exegetical consensus and historical Christianity requires that we may not extend the image of God to nonhuman hominids.

In light of this situation where attempting to establish the *imago Dei* within some unique human characteristic (or set of characteristics) has become increasingly—and perhaps even irresolvably—problematic, one may desire to either deny the empirical reality of evolutionary continuity between humans and nonhuman hominids in order to affirm both the theological tradition and the standard reading of the Genesis passages, or one may alternatively seek to break with the consensus of biblical scholars and millennia of Christian and Jewish theological tradition in order to extend the *imago Dei* to nonhumans. Some may indeed conclude that in view of the significant conceptual tension between theological history and the findings of biblical exegesis on the one hand, and the scientific data substantiating evolutionary continuity on the other, that the doctrine of the *imago Dei* has been irretrievably lost and that theologians should cut their losses and give up the search. The popular controversies surrounding discussions over human evolutionary continuity with nonhumans implicitly attest to what is theologically at stake here—namely how is it possible (if at all) to adequately understand the *imago Dei* in light of both scriptural exegesis and the findings of the natural sciences. Regardless of whichever path the theologian decides to take, though, the current findings and understandings emerging from paleoanthropology have made the parameters of the theological anthropological question clear (see Moritz 2011 for further discussion and a possible way forward).

CONCLUSION

The end of human uniqueness has been heralded by the discovery of numerous nonhuman hominids who, though distinct by genetic lineage, share with humans every behavior, trait, and capacity by which we have sought to define ourselves as unique. In this paper, we discussed four such hominid species: *H. erectus*, *Hominid "x,"* *H. floresiensis*, and *H. neanderthalensis.* From a scientific perspective, these culturally and neurologically advanced hominids from outside our direct line of descent must clearly be seen as the *equivalents of human beings*, since there are no *nonmetaphysical* criteria by which they may be excluded. Though many evolutionary biologists and anthropologists have historically resisted the expansion of the hominid family and have countered attempts to interpret its evolutionary trajectory as the bushy production of species diversity—just like that of any other biological family animals—it is now clear that such resistance is in vain. As the tide of empirical findings washes up new discoveries every day that call into question the singular status of human culture and behavior, the scientific gaps currently filled with a faith in anthropocentrism must give way to an acknowledgment of the reality of evolutionary continuity. In our discovery of the fact that at one time we, as human beings, were not alone in the universe, we ironically come closer to a more ancient understanding of the human place in the cosmos. Though Neanderthals may now take the taxonomical place of "the mighty men who were of old," the "unique" human species may once again be regarded as one among many. The fact of finding ourselves once again among the company of other creatures raises a number of challenging theological questions surrounding the meaning of the *imago Dei*. Such questions need not, however, be cause for fear. For new questions—in time—provide occasions for new answers and bring us closer to the truth.

NOTE

1. Recent comparisons between Neanderthal, Denisovan, and human nuclear DNA have substantiated this view concerning the evolutionary divergence of the three hominids. Interbreeding between humans and Neanderthals occurred at an early stage when both were living in close proximity in the Middle East or Arabia before the two species spread to Asia, and there was no significant mixing during their joint inhabitation of Europe. After Neandertal and Denisovan populations split about 200,000 years ago, a subset of the *Homo sapiens* who carried some Neandertal DNA interbred with the Denisovans in Asia. As a result, the ancestors of this group of humans, the Melanesians, inherited DNA from both Neandertals and Denisovans, with as much as 8% of their DNA coming from non-human hominids. "Low levels of interbreeding suggest that either archaic people mated with moderns only rarely—or their hybrid offspring had low fitness and so produced few viable offspring." Because the amount of interbreeding between the three groups was negligible, the majority of paleontologists still consider these other hominids to be genuinely separate species (Gibbons 2011, 394). The recent evidence for inter-hominid interbreeding nevertheless underscores the point that the other hominids were quite human-like in many respects because it shows that early culture-bearing humans themselves considered these other hominids as potential mates.
2. Living humans are smaller by about 9 to 13 percent than ancestors who lived anytime in the Pleistocene (1.95 million to 100,000 years ago), and there has been a steady decline over the last 50,000 years. The brain sizes of early modern humans, who lived between 90,000 and 30,000 years ago, were about 10 percent larger than that of living humans. Like body size, brain size has continued to decrease until today.
3. Interbreeding between *Homo sapiens*, Neanderthals, and the Denisovans appears to have happened before they were too genetically divergent from each other and thus the genetic legacy of the other hominids within humans is relatively small. Later in their evolutionary history, if these species remained in contact, they were too genetically distinct for significant interbreeding—otherwise the percentages of admixture would be much greater. The evolutionary "fuzziness" of species is dramatically reflected in such recent empirical discoveries of hominid interbreeding. If a species, by definition, breeds only with others of that species (as Ernst Mayr and others have argued) then humans, Neanderthals and Denisovans should not be distinguished. Yet, the vast majority of paleoanthropologists and paleogeneticists—in view of morphological and genetic evidence—do consider the various hominid participants in these prehistoric mating encounters to be members of separate species. Mirroring the philosophical 'species problem' in theoretical biology, in scientific practice there is "no agreed-upon yardstick for how much morphologic or genetic difference separates species" (Gibbons 2011, 394). In light of this recent evidence for interbreeding between early culture-bearing humans and other non-human hominids, paleoanthropological arguments for human uniqueness become even more problematic.

REFERENCES

Ambrose, Stanley. 2001. "Paleolithic Technology and Human Evolution." *Science* 291:1748–53.

Anton, Susan, et al. 2007. "Defining *Homo erectus*: Size Considered." In *Handbook of Paleoanthropology Vol. 3: Phylogeny of Hominids*, eds. Winfried Henke, Ian Tattersall, and Thorolf Hardt, 1655–94. New York: Springer.

Ayala, Francisco J. 1998. "Biology Precedes, Culture Transcends: An Evolutionist's View of Human Nature." *Zygon* 33:507–23.

Balter, Michael. 2001 "Anthropologists Duel Over Modern Human Origins." *Science* 291:1728–29.

———. 2002. "Becoming Human: What Made Humans Modern?" *Science* 295:1219–25.

Barr, James. 1968. "The Image of God in the Book of Genesis: A Study of Terminology." *Bulletin of the John Rylands Library* 51:1968–69.

Bouzouggara, Abdeljalil, et al. 2007. "82,000-Year-Old Shell Beads from North Africa and Implications for the Origins of Modern Human Behavior." *Proceedings of the National Academy of Sciences, USA* 104:24.

Campbell, Michael C., and Sarah A. Tishkoff. 2008."African Genetic Diversity: Implications for Human Demographic History, Modern Human Origins, and Complex Disease Mapping." *Annual Review of Genomics and Human Genetics* 9:403–33.

Caspari, Rachel, and Milford Wolpoff. 1996. "Weidenreich, Coon, and Multiregional Evolution." *Human Evolution* 11:261–68.

Cela-Conde, Camilo. 1998. "The Hominid Evolutionary Journey: A Summary." In *Evolutionary and Molecular Biology: Scientific Perspectives on Divine Action*, eds., Robert J. Russell, William R. Stoeger, and Francisco J. Ayala, 59–78. Vatican City State, Berkeley, CA: Vatican Observatory Publications; Center for Theology and the Natural Sciences.

Cela-Conde, Camilo, and Francisco J. Ayala. 2003. "Genera of the Human Lineage." *Proceedings of the National Academy of Sciences, USA* 100:7684–89.

Cohen, Jeremy. 1989. *"Be Fertile and Increase: Fill the Earth and Master It": Ancient and Medieval Career of a Biblical Text*. Ithaca, NY: Cornell Univ. Press.

Cunningham, David S. 2009. "The Way of All Flesh: Rethinking the *Imago Dei*." In *Creaturely Theology: On God, Humans and Other Animals*, eds., Celia Deane-Drummond and David Clough, 100–20. London: SCM.

Deane-Drummond, Celia. 2006. *Genetics and Christian Ethics*. Cambridge: Cambridge Univ. Press.

De Cruz, Helen, and Johan De Smedt. 2007. "The Role of Intuitive Ontologies in Scientific Understanding—the Case of Human Evolution." *Biology and Philosophy* 22:351–68.

Diller, Karl C., and Rebecca L. Cann. 2009. "Evidence Against a Genetic-Based Revolution in Language 50,000 Years Ago." In *The Cradle of Language*, eds., Rudolf Botha and Chris Knight, 135–49. New York: Oxford Univ. Press.

Derevianko, Anatoli P., et al. 2008. "A Paleolithic Bracelet from Denisova Cave." *Archaeology Ethnology & Anthropology of Eurasia* 34:13–25.

Desmond, Adrian, and James Moore. 2009. *Darwin's Sacred Cause: How a Hatred of Slavery Shaped Darwin's Views on Human Evolution*. New York: Houghton Mifflin Harcourt.

Dobzhansky, Theodosius. 1944. "On Species and Races of Living and Fossil Man." *American Journal of Physical Anthropology*, 2:251–65.

d'Errico, Francesco, et al. 1998. "Neanderthal Acculturation in Western Europe?: A Critical Review of the Evidence and Its Interpretation." Current Anthropology, *Special Issue, The Neanderthal Problem and the Evolution of Human Behavior* 39:S1–S44.

d'Errico, Francesco, and Chris Stringer. 2011. "Evolution, Revolution or Saltation Scenario for the Emergence of Modern Cultures?" *Philosophical Transactions of the Royal Society B* 366:1060–69.

Eiseley, Loren. 1957. "Neanderthal Man and the Dawn of Human Paleontology." *Quarterly Review of Biology* 32:323–29.

Foley, Robert. 1998. "The Context of Human Genetic Evolution." *Genome Research* 8:339–47.

———. 2001. "In the Shadow of the Modern Synthesis? Alternative Perspectives on the Last Fifty Years of Paleoanthropology." *Evolutionary Anthropology* 10:5–14.

Gibbons, Ann. 1995. "Old Dates for Modern Behavior." *Science* 268:495–96.

———. 1998. "Ancient Island Tools Suggest *Homo erectus* Was a Seafarer." *Science* 279:635–37.

———. 2010. "Close Encounters of the Prehistoric Kind." *Science* 328:680–84.

———. 2011. "A New View of the Birth of *Homo sapiens*." *Science* 331:392–94.

Gunton, Colin E. 1991. "Trinity, Ontology, and Anthropology: Towards a Renewal of the Doctrine of the *Imago Dei*." In *Persons, Divine and Human: King's College Essays in Theological Anthropology*, eds., Christoph Schwöbel and Colin Gunton, 47–61. Edinburgh: T & T Clark.

Gould, Stephen J. 2002. *The Structure of Evolutionary Theory*. Cambridge, MA: Harvard Univ. Press.

Harvati, Katerina. 2007. "Neanderthals and Their Contemporaries." In *Handbook of Paleoanthropology*, eds., Winfried Henke, Ian Tattersall, and Thorolf Hardt, 1717–48. Berlin: Springer.

Hayden, Brian. 1993. "The Cultural Capacities of Neandertals: A Review and Re-Evaluation." *Journal of Human Evolution* 24:113–46.

Hefner, Philip. 1993. *The Human Factor: Evolution, Culture, and Religion*. Minneapolis, MN: Fortress Press.

———. 1998. "Biocultural Evolution and the Created Co-Creator." In *Science and Theology: The New Consonance*, ed., Ted Peters, 174–88. Boulder, CO: Westview.

Hublin, Jean-Jacques. 2009. "The Prehistory of Compassion." *Proceedings of the National Academy of Sciences, USA* 106:6429–30.

Hume, Brad D. 2008. "Quantifying Characters: Polygenist Anthropologists and the Hardening of Heredity." *Journal of the History of Biology* 41:119–58.

Jarcho, Saul. 1959. "Origin of the American Indian as Suggested by Fray Joseph de Acosta (1589)." *Isis* 50:430–38.

Keeley, Lawrence H. 1980. *Experimental Determination of Stone Tool-Use: A Microwear Analysis*. Chicago: Univ. of Chicago Press.

Kenny, Robert. 2007. "From the Curse of Ham to the Curse of Nature: The Influence of Natural Selection on the Debate on Human Unity Before the Publication of the Descent of Man." *The British Journal for the History of Science* 40:367–88.

Kimbel, William H., et al. 1995. "Hominid Remains from Amud Cave in the Context of the Levantine Middle Paleolithic." *Paleorient* 21:47–61.

King, Barbara. J. 2008. "Primates and Religion: A Biological Anthropologist's Response to J. Wentzel van Huyssteen's *Alone in the World?*" *Zygon* 43:451–66.

Klein, Richard, and Blake Edgar. 2002. *The Dawn of Human Culture*. New York: Wiley.

Krause, Johannes, et al. 2007. "The Derived *FOXP2* Variant of Modern Humans was Shared with Neanderthals." *Current Biology* 17:1908–12.

Krings, Matthias, et al. 1997. "Neanderthal DNA Sequences and the Origin of Modern Humans." *Cell* 90:19–30.

Lebel, Serge, and Erik Trinkaus. 2002."Middle Pleistocene Human Remains from the Bau de l'Aubesier." *Journal of Human Evolution* 43:659–85.

Ledford, Heidi. 2010. "Africa Yields Two Full Human Genomes." *Nature* 463:943–47.

Lewin, Roger, and Robert Foley. 2004. *Principles of Human Evolution*. 2nd ed. Malden, MA: Blackwell.

Livingstone, David N. 1987. *Darwin's Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought*. Edinburgh: Scottish Academic Press.

———. 2008. *Adam's Ancestors: Race, Religion, and the Politics of Human Origins*. Baltimore, MD: The Johns Hopkins Univ. Press.

Mayr, Ernst. 1950. "Taxonomic Categories in Fossil Hominids." *Cold Spring Harbor Symposium on Quantitative Biology* 15:109–18.

———. 1982. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Cambridge, MA: Harvard Univ. Press.

McBrearty, Sally, and Allison S. Brooks. 2000. "The Revolution That Wasn't: A New Interpretation of the Origin of Modern Human Behavior." *Journal of Human Evolution* 39:133–51.

Mellars, Paul. 1996. *The Neanderthal Legacy: An Archaeological Perspective of Western Europe* Princeton, NJ: Princeton Univ. Press.

Moritz, Joshua. 2011. "Evolution, the End of Human Uniqueness, and the Election of the *Imago Dei*." *Theology and Science* 9:3307–40.

Morwood, Michael J., and Dorothea Cogill-Koez. 2007. "*Homo* on Flores: Some Early Implications for the Evolution of Language and Cognition." In *Mental States: Evolution,* *Function, Nature, Volume 1 of Mental States*, eds., A. Schalley and D. Khlentzos, 43–74. Philadelphia, PA: John Benjamins.

O'Brien, Michael J., and Richard Lee Lyman. 2009. "Darwinism and Historical Archaeology." In *International Handbook of Historical Archaeology*, eds., T. Majewski and D. Gaimster, 43–74. New York: Springer.

Peacocke, Arthur. 1993. *Theology for a Scientific Age: Being and Becoming-Natural, Divine and Human*. Minneapolis, MN: Fortress Press.

Pearson, Osbjorn, et al. 2008. "How Different were Neanderthals' Habitual Activities? A Comparative Analysis with Diverse Groups of Recent Humans." In *Neanderthals Revisited: New Approaches and Perspectives*, eds. Katerina Harvati and Terry Harrison, 135–56. New York: Springer.

Peterson, Gregory R. 2008. "Uniqueness, the Image of God and the Problem of Method: Engaging Van Huyssteen." *Zygon*, 43:467–74.

Popkin, Richard H. 1978 ."*Pre-Adamism in 19th Century American Thought:* 'Speculative Biology' and Racism." *Philosophia* 8:2–3.

Preuss, Horst Dietrich. 1996. *Old Testament Theology*, Vol 2, Trans. Leo G. Perdue Edinburgh: T & T Clark.

Robert, Jason S. 2004. *Embryology, Epigenesis, and Evolution:* Taking Development Seriously New York: Cambridge Univ. Press.

Rolston, Holmes III. 1999. *Genes, Genesis and God: Values and their Origins in Natural and Human History*. Cambridge: Cambridge Univ. Press.

Speth, John D. 2006. "*Housekeeping, Neandertal-Style:* Hearth Placement and Midden Formation in Kebara Cave (Israel)." In *Transitions Before the Transition: Evolution and Stability in the Middle Paleolithic and Middle Stone Age*, eds., Erella Hovers and Steven L. Kuhn., 171–88. New York: Springer.

Stringer, Chris B., and Robin McKie. 1997. *African Exodus: The Origins of Modern Humanity* New York: Henry Holt.

Stringer, Christopher. 2009. "Quoted in Kate Wong, "Twilight of the Neandertals."" *Scientific American* 35:32–37.

Tanner, Kathryn. 1994. "The Difference Theological Anthropology Makes." *Theology Today* 50:567–79.

Tattersall, Ian. 2000. "Paleoanthropology: The Last Half-Century." *Evolutionary Anthropology* 9:2–16.

———. 2009. "Charles Darwin and Human Evolution." *Evolution: Education and Outreach* 2:28–34.

van Huyssteen, J. Wentzel. 2003. "Fallen Angels or Rising Beasts?: Theological Perspectives on Human Uniqueness." *Theology and Science* 1:161–78.

———. 2005. "Human Origins and Religious Awareness." *Studia Theologica—Nordic Journal of Theology*, 59:104–28.

———. 2006. *Alone in the World?*: *Human Uniqueness in Science and Theology*. Grand Rapids, MI: Eerdmans.

———. 2008. "Primates, Hominids, and Humans—From Species Specificity to Human Uniqueness?" *Zygon* 43:505–25.

Westermann, Claus. 1974. *Creation.* Trans. John H. Scullion, SJ, Philadelphia, PA: Fortress Press.

Wong, Kate. 2000. "Who Were the Neanderthals?" *Scientific American* 282:98–107.

Yellen, John, et al. 1995 ."A Middle Stone Age Worked Bone Industry from Katanda, Upper Semliki Valley, Zaire." *Science* 268:553–56.

Zilhão, João. 2001. *Anatomically Archaic Behaviorally Modern: The Last Neanderthals and Their Destiny*. Amsterdam: Stichting Nederlands Museum.

Zilhão, João, et al. 2006 ."Analysis of Aurignacian Interstratification at the Chatelperronian-Type Site and Implications for the Behavioral Modernity of Neandertals." *Proceedings of the National Academy of Sciences, USA* 103:12643–48.

———. 2010. "Symbolic use of marine shells and mineral pigments by Iberian Neandertals." *Proceedings of the National Academy of Sciences, USA* 107:1038–28.

Zilhão, João, and Francesco d'Errico. 2000. "A Case for Neandertal Culture." *Scientific American* 282:104–5.