

AAAS Dialogue on Science, Ethics, and Religion (DoSER) Public Lecture May 4, 2006

Human Evolution: Why Do Experts Disagree?

Lecturer: Bernard Wood, Ph.D., George Washington University

Respondent: Kevin FitzGerald, Ph.D. & S.J., Georgetown University

SUMMARY

Bernard Wood began his lecture by noting that one of the sticks with which creationists beat paleoanthropologists is the observation that researchers on human evolution disagree about the interpretation of the fossil evidence. Wood, the Henry R. Luce Professor of Human Origins at George Washington University, then asked, “Is there a suitable metaphor to help us understand why the evidence for human evolution can be interpreted in radically different ways?” The lecture on April 6, 2006, was part of the series sponsored by the AAAS Dialogue on Science, Ethics, and Religion.

He suggested that a traffic accident might serve as a useful metaphor. A traffic accident is contingent; it could occur (or not) in a number of different ways. Evolution – even human evolution – is also contingent. Yet, in many urban settings a traffic accident will be caught on closed circuit television (CCTV), so there will be no doubt about the sequence of events. But for evolution there is no “CCTV.”

In a traffic accident, evidence will be taken from eyewitnesses and there will be professional accident investigators who will also collect physical evidence at the scene like the length of skid marks and vehicle damage. However, witnesses can disagree and investigators can arrive at different conclusions based on the same evidence. In human evolution there are no “eyewitnesses” and seldom is much of the “vehicle” (the human remains) available, other than the “controls” (the head) and the “drive-shafts” (the parts of the limbs closest to the body).

Archeological evidence is comparable to the “skid marks” and can indicate what extinct human ancestors could do and where. The paleontologists are the “accident investigators” of human evolution and, like their metaphorical counterparts, they can disagree on the meaning of the evidence.

Wood then mixed metaphors when he said that one of the sources of potential disagreement was the level of detail at which the paleontological “accident investigator” must work in order to understand the branching process of human evolution. The paleoanthropologist is not simply trying to understand the trunk of the tree of life or even a branch or a limb but rather the details of the pattern of twigs. Where and when does the human twig begin? How many nodes are there on the twig? What is the pattern of any branching? What is the extent of our ignorance?

Prior to the use of molecular biology in the study of human evolution, one proposal was that there was a branching in which one twig led to humans and the other to orangutans, gorillas, and chimpanzees. Today, on the basis of additional evidence from molecular biology, it is thought that humans and chimpanzees are more closely related than either is to gorillas or orangutans. The evidence suggests that the branching that separated humans and chimpanzees occurred between 5 and 10 million years ago.

Would this mean that primate remains dating before that time would represent a common ancestor of chimps and humans? Not necessarily, because some branches do not produce fruit but become extinct. Wood pointed out that the conclusion a researcher may reach on this question will be effected by the initial assumption (s)he makes, not only about the likelihood of branching as such, but also as to whether the fossil record is an adequate sample of all the species present at some point in the distant past. If it is a good sample then that would suggest there were relatively few species, and thus little branching. If, on the other hand, the fossil record under-represents the number of species present at the time, then that would suggest that there were more species and thus more branching. In this latter case, it is less likely that the remains would represent a common ancestor.

Wood called paleoanthropologists who make the first assumption “lumpers;” they lump ancient human remains together in larger groups. Those who make the alternate assumption he called “splitters” and they expect a larger number of extinct lines of human evolution.

A primary problem in this research is that it is necessary “to live with an incomplete data set,” Wood stated. That means that it is also important “to avoid the temptation of attempting to

assemble a comprehensive evolutionary scenario when crucial pieces of evidence may be missing.”

Wood pointed to another phenomenon that makes it difficult to discern patterns of branching in human evolution. “Homoplasy” is the phenomenon where similar body forms shared by two organisms are not due to inheritance from a recent common ancestor but instead are due to parallel or convergent evolution. Again, using a tree analogy Wood noted that in the summer when a tree has all of its foliage, it may be possible to identify its trunk, major branches and even some of its limbs. But the leaves obscure virtually the entire pattern of twigs which are the outermost and most recent growth of the tree. So homoplasy also obscures the branching patterns of the human evolutionary twigs. This makes determining lineages or phylogeny very challenging because species that are not recent relatives may nevertheless exhibit similar evolutionary adaptations given similar environmental circumstances.

In an aside, Wood suggested that evolution is “intelligent design;” that the “Intelligent Designer in the sky” does not make a creature that cannot change but rather one that adapts because the world changes. “If evolution is God’s handiwork, wow! That is really very, very clever. If anything deserves to be called ‘intelligent design’ it is evolution.”

Returning to the main thrust of his lecture, Wood proposed that the question to be answered is which parts of morphology are clues to phylogeny and which “tell little fibs” about family lineages? Seeking ways to discern this difference is an important part of current research. Wood stated that approximately one-third of morphological similarities (i.e., similarities of form) are due to homoplasy and that is quite a lot. So, there is going to be debate about the branches; how many there are and who is related to whom.

Most researchers would accept that there are at least two recent branches: *Homo* and *Paranthropus*. But there is not agreement about when that branching starts. Some would start the *Homo* branch with *H. habilis* and *H. rudolfensis* between 2 and 2.5 mya (million years ago); others would start with *H. ergaster* about 2 mya; still others with *H. erectus* 2 million to 200,000 years ago; and others *H. heidelbergensis* 700,000 to 200,000 years ago. There are even those

who argue that the genus *Homo* should be restricted to *H. sapiens* because language represents such a big evolutionary advance, “almost like another limb.”

“Disagreements’ i.e. different interpretations of the same evidence, then, are almost inevitable in a historical science like paleoanthropology.” Such “disagreements” need to be seen as a sign of a healthy historical science and “should not be used as a stick for beating evolutionary science.” Those who tend to do the beating like certainty, Wood suggested, that if you like certainty you should not be interested in science. “Science is trying to find out how the world is made. But the one thing you can be absolutely sure of as a scientist is that you will be wrong.” Most scientists come up with hypotheses that are responsible and very reasonable at the time, but with new evidence a more reasonable hypothesis emerges and becomes “the best thing on the block.” But even that will eventually be superseded.

Wood closed with the observation that there are some scientists who say that because the disagreements among paleoanthropologists may give succor to creationists or “intelligent design” advocates scientists should not disagree. Wood argued that such proposals are crazy. People who will misinterpret or distort scientific disagreements should not affect the practice of science. “Scientists must continue to be scientists and disagree in a responsible way.”

The discussant for the evening was Fr. Kevin FitzGerald, S.J., Ph.D., the Dr. David Lauler Chair in Catholic Health Care Ethics and Research Associate Professor in the Department of Oncology at Georgetown University. His comments focused on the idea of “disagreement” particularly in the context of the relationship of science and religion. He began by asking rhetorically, “From where comes disagreement?” There are at least two sources: different agendas and different epistemologies. He started by exploring the latter source.

Science, he noted, has a distinctive methodology and perspective. It is quantitative, interested in measurements and observations, and operates within a spatial/temporal framework. Religion, to a significant degree, operates within a spatial/temporal framework because it is human religion and human beings are spatial/temporal beings. “But,” he stated, “religion also investigates the absolute, the eternal, the infinite, and most particularly that which is beyond comprehension, the

ineffable.” This difference between science and religion could be a source of disagreement because it involves very different perspectives.

There have been at least four proposed ways of relating science and religion. Some see religion as being against science. Some see religion co-existing with or tolerating science where both inhabit separate realms. This is a position expressed by the late paleontologist, Stephen Jay Gould, in his understanding of “non-overlapping magisteria.” Still others see areas of overlap and so interaction. Finally, there are some like the Jesuit paleontologist, Pierre Teilhard de Chardin, who look for convergence of all forms of knowing.

But issues of disagreement are not limited to the relationship of science and religion. Biblical studies, FitzGerald indicated, have shown that there is disagreement even within the Bible itself. Genesis manifests at least three traditions: the Priestly, the Elohist, and the Yahwist. In Genesis, the Yahwist tradition identifies humanity’s relationship with the rest of creation as one of “stewardship” in more than twenty passages. The Priestly tradition, still within Genesis, uses the language of domination and subjugation to describe humanity’s relationship with the rest of creation. “Which is it?” FitzGerald asked. So, issues of disagreement can be found within religion as well as between religion and science.

Fr. Fitzgerald noted that there are actually similarities between science and religion in terms of the methodologies they draw upon to resolve disagreements. Both communities make rational arguments, accumulate evidence, and use methodologies of analysis accepted by their respective communities. The problem is that given that science and religion are different communities (and so in a significant way use distinctive methods), how can they come together? Or is it possible and appropriate for them to do so? Perhaps they should remain separated as Gould argued?

But such separation does not appear to be realistic. There are obvious areas of overlap epistemologically and more especially in terms of agenda. The evolution controversy is *prima facie* evidence of this. If there were no overlap of agendas, FitzGerald asserted, there would not be a conflict.

Referring back to Dr. Woods lecture, FitzGerald reminded the audience of the view that as much is known, there is so much more that is unknown. All stakeholders in the evolution controversy, he urged, need to keep this in mind. Whether from a religious or a scientific perspective all should agree that there is a lot that is not known. On the other hand, it is necessary to “make do” with what is known because choices and decisions need to be made on the basis of that knowledge.

How should science and religion move forward given the potential for and actual disagreement? FitzGerald asked rhetorically. Separately? In a conflictual way? Or, perhaps taking a broader human view, one in which both communities operate to see if there is any common ground?

Fr. FitzGerald proposed that there was common ground. He recalled Einstein’s statement that science without religion is blind and religion without science is lame. He said that he would like the relationship between science and religion to be more than therapeutic, more than keeping us from stumbling into a pit or stumbling at all. “Can there be a relationship that enhances our understanding and that leads us to that comprehensive story – not that we are ever going to get there – but a better grasp of the ineffable, a better grasp of the creation in which we exist, a grasp that cannot be made by any one type of knowledge or any one form of methodology?” This will only be possible, FitzGerald declared, if we have “epistemic humility” and look to one another for insight, for enhancement, and for creativity for a kind of convergence that might lead to a better understanding of our functioning in the world. “Can we look to a relationship between religion and science that fosters collaboration and concerted effort rather than competition and conflict?” he asked.

To make this issue more concrete he asked, “Which is the more constructive way to interact?” For the scientific community to ask other communities what is the most important research in which to be engaged? And, how much research should be engaged in the light of other concerns? Or, for the scientific community to say something like, “Who are you without a scientific degree to tell me that I cannot do this particular research?” The way one approaches questions of scientific priority can foster an antagonistic relationship or a collaborative one.

But the relationship issue applies in both directions. Science brings something of value to the table that religions need to hear. Science advances human knowledge and this advance represents a challenge to the religions that they must address, even if their way of addressing it is to deny it. Fr. FitzGerald closed his remarks by stating that a positive way forward can allow for disagreement so long as it is constructive and stimulates a collaborative search for insight rather than destructive disagreement that is only intended to serve one agenda.