



Seasons of Faith

Adult Education in the Diocese of Dodge City

"We are not meant to remain as children.... But we are meant to hold firmly to the truth in love, and to grow up into Christ." *Ephesians 4: 14-15*

Evolution ~ What was God thinking? Science can't tell.

Session Three

Summary of Session Two:

What do you remember from session two?

What was new that you learned, if there was anything new for you?

What was something familiar that was reinforced in your belief?

What were you called to reconsider?

If you are doing this with a group, poll the group for their responses.

Point of Session Two...

"...the theory of evolution seeks to understand and describe biological developments. But in so doing it cannot explain where the 'project' of human persons comes from, nor their inner origin, nor their particular nature. To that extent we are faced here with two complementary -- rather than mutually exclusive -- realities." (Cardinal Ratzinger, *In the Beginning: A Catholic Understanding of the Story of Creation and the Fall* [Eerdmans, 1986, 1995], see especially pages 41-58)

In this last session we rely on the work of James B. Stenson to explore the fascinating realm of scientific knowledge that opens for us the wonders of creation.

Scientific knowledge...

Popular accounts of science--in textbooks, magazines, and television features--are often misleading about the certitude of scientific knowledge. Writers who explain science to the general public must simplify a host of complex matters to make them understandable and interesting. But this task frequently leads to oversimplification. Non-scientists are led to believe that science is essentially a stable body of factual knowledge. In reality, however, it is a dynamic process, constantly engaged in self-correction and even radical revision. Interpretation, guesswork, and imagination play a larger role in scientific study than most people are aware.

Consequently, knowledge derived from this inquiry has several distinct but overlapping levels of certitude. Some scientific matters are known to be factually true; that is, they are beyond doubt. Others are reasonable conjectures, generally accepted as true by specialists in the field. Still others are untested hypotheses awaiting verification through further work.

Let us take one case in point: Australopithecus was an ape-like creature who lived more than a million years ago in Africa. It is fact that his brain size averaged about 500 cc. and that his leg-bone had some humanlike features. It is, however, a conjecture that he walked upright much of the time; this is a reasonable guess but not so certain as the aforementioned facts. But it is only an hypothesis that his body gave rise to that of man. These distinct degrees of probable certitude are often blurred in many popular science articles.

The evolutionary sciences are especially susceptible to difficulty in establishing certitude. Unlike physics or chemistry, which are verifiable through controlled laboratory experimentation, the evolutionary disciplines are essentially historical. All the forms of paleontology (including paleoanthropology, the study of ancient man) seek to determine what happened to living things over the course of time. When researchers advance hypotheses to explain fossil phenomena, they are giving reasonable interpretations that are verifiable only through subsequent research. Later findings may confirm these explanations, or perhaps render them less plausible, or even prove them wrong--that is, very highly unlikely. Thus what is generally accepted by specialists today may be outmoded only a few years from now. The field is highly dynamic.

Evolutionary research over the past century, and especially in recent years, has taken many such twists and turns, often leading in unexpected directions. This unsettled condition stands to reason. The relative scarcity of fossil evidence, the high reliance on imaginative interpretation, the inherent problem of verification--all combine to make this "detective" work subject to ongoing uncertainty. Unfortunately,

textbooks seldom convey the cautious and provisional nature of evolutionary thinking at any given time. Science knows less for certain about evolutionary phenomena than is generally supposed.

The history of science offers many examples of this self-corrective process. It is worth our while to examine a few of these, even briefly, to see the dynamic at work. (And, parenthetically, it is interesting to see how many outmoded scientific beliefs still survive in popular thinking.)

The Cave-man myth...

Fossil evidence does not speak for itself; it must be interpreted, and this task requires imagination. Scientists at the turn of the century took greater liberties in describing ancient man than their counterparts today would. Their image of paleolithic man has entered popular imagination: a hairy, hunched-over, stupid, and ferocious creature, speaking in grunts and living by violence. Countless illustrations have shown him this way, and still do today in some popular media.

Today's specialists would disavow this image because it does not fit the facts. From fossil evidence alone, one cannot say anything about ancient man's hairiness or intelligence or speech or facial expression or supposed ill manners. These details were supplied through imagination. The "survival of the fittest" motif called for ape-like characteristics in early man, and these were dutifully provided. The bones themselves said nothing.

One set of bones was significant, however. In 1911, the famous French anatomist, Marcellin Boule, carefully studied a recently discovered Neanderthal skeleton. This specimen was important for it was the first nearly complete skeleton of an ancient man. Using it, science could understand the details of a typical Neanderthal's body structure.

Boule's reconstruction of Neanderthal showed a hunched-over, misshapen creature with bent legs and face thrust forward, not unlike the stance of a gorilla. This depiction was highly influential for decades thereafter; it was reproduced in textbooks, drawings, and museum displays around the world. But later discoveries of Neanderthal finds cast doubt on Boule's work. Then in 1957, a team of anatomists re-examined Boule's original skeleton and found a serious source of error: the Neanderthal man had suffered from a case of severe arthritis. His stance was indeed hunched-over, but it was not genetic in origin and was not typical. Today, we believe that ancient people walked and stood erect almost exactly as we do.

The image of ferocity was also without factual support. Over the years, in fact, many archaeological sites have shown evidence of cooperation and even compassion among primitive people. Numerous fossils came from carefully

prepared graves, some as old as 100,000 years. In several instances, the deceased had been old and crippled (like Boule's specimen) and had received care for years before being laid to rest. In one grave, a youth had been buried carefully on his side, with one arm tucked under his head, as if he were sleeping; in one hand, he held a beautifully carved quartz knife. In another grave, archaeologists found the body of an elderly Neanderthal who had had his forearm amputated years before in his youth. (Surgery 60,000 years ago!) He had been cared for all his life. And in yet another Neanderthal site, researchers found evidence that the deceased had been buried with flowers.

Care for cripples and burial with flowers give a dimension of humanness to ancient man that earlier scientists would have found astonishing.

With such evidence of care of crippled members and careful burial customs among our early human ancestors, what should we consider as evidence of our human "evolution"?

Species classification...

Several decades ago, scientists habitually classified almost every new hominid (man-like) find into a separate species. These fossil creatures were thus named "Peking ape-man", "Java ape-man", "Neanderthal man," and so forth. Drawings of the day used to show an upward development: some primitive ape leading to the ape-man, who in turn led to Neanderthal, who then led to Cro-Magnon (identical to "modern" man in nearly every respect).

Within the last 25 years, these have all been reclassified. All the "ape-man" types (from 100,000 to 500,000 years ago and more) now belong to one species, *Homo erectus*, the "upright man." Neanderthal, we now believe, was a racial type of modern man, *Homo sapiens*. But this distinction needs some clarification. In what sense were these two forms of man different? Were they really separate and distinct species?

The true test for species difference is genetic isolability--that is, whether mating of two individuals will produce sterile offspring or not. But obviously we have no way to determine this among creatures long dead.

It is important to realize that, when scientists classify ancient fossils into distinct species, they do so exclusively on the basis of anatomical structure. If a given specimen has bone configurations within the known range of a given species, then it is called by that species' name. If, however, some significant features lie outside that range, then it probably belongs to a different species and is thus classified differently. Homo erectus had several anatomical features which differ from those of modern man. He had, for example, a prominent brow ridge over his eyes, a smaller

stature, and a smaller average brain size.

The key point here is that both were forms of man, the genus *Homo*, with all that this implies. The anatomical variation was possibly, even probably, the only significant difference. We know that *erectus*, even from remotest antiquity, made several types of tools and used fire. Both of these activities show intelligent manipulation of nature. In other words, he, like the *sapiens* form, could think.

Brain size...

At one time, scientists believed that relative brain size correlated closely with intelligence. The viewpoint has been modified considerably because of subsequent research data.

Modern man's brain averages 1250 cc., but with wide variation. It typically falls between the extremes of 1000 cc. and 2000 cc. "Homo erectus", being small in stature, varied between 775 cc. and 1200 cc. All of these figures are much larger than those for apes and ape-like creatures: 450 cc. on the average.

But the wide variation in modern man seems unrelated to thinking powers. In at least one instance, a man with 900 cc. brain size exhibited normal intelligence. Consequently, we cannot with certainty predicate a lower level of intelligence to early man merely on the basis of his brain size.

Tool-making...

As far back as man's fossil record indicates (currently about two million years), we find evidence of tool making. Several decades ago, scientists correlated tool-making skill with native intelligence. A primitive tool indicated a primitive mind; a more complex form, showed a relatively stronger intelligence. This value judgment no longer holds sway among specialists.

Today it is generally held that mastery of technique is distinct from native intelligence. Tool fashioning is a skill acquired through learning and practice. Moreover, today's anthropologists have a much higher regard for the considerable skill which ancient man wielded in fashioning his implements.

One remarkable detail is the great variety of these ancient tools. For scores of thousands of years, paleolithic man fashioned dozens of different tools--axes, scrapers, awls, burins, saws, knives, and many other types of implement. These were formed with extraordinary consistency, and even artistry, through hundreds of generations. Many were expertly fashioned in quartz and semi-precious stone.

Such variety in this paleolithic tool-chest implies that early man used tools extensively on other materials (wood, leather, bone) which have, of course, perished without a trace. Tools imply intelligence, not only because they are deliberately fashioned (an intelligent act itself), but because they are intended for some purpose further in the future. Such purposeful planning is a clear sign of rationality. So scientists believe today.

How much could early man have accomplished with these primitive stone tools? To find out, a team of anthropologists recently hired an expert Scandinavian woodsman and supplied him with a set of genuine paleolithic tools. The craftsman hafted stone axe-heads onto wooden shafts and experimented with various cutting techniques. Shortly afterward, he succeeded in felling large trees, splitting logs and making them into planks. Within three months, the expert constructed a complete one-story frame house.

Clearly, skill lies in the minds and hands. Little can be predicted from crudity of the tools.

Cardinal Ratzinger's Theological Commission called for human beings contribute to the reshaping and transformation of the universe. Tool making is a primitive way of seeing humans reshaping and transforming the world. What are some contemporary ways?

Current theoretical developments...

Over the past ten years, several major developments in research have left the theoretical picture highly unsettled. These are too complex to explain in detail here, but they are worth noting in brief.

From the mid-1920's until the early 1970's, scientists generally believed that man evolved gradually from a small ape-like creature called *Australopithecus*. As we mentioned earlier, this animal lived more than a million years ago and its fossils showed some human-like characteristics. It may have walked upright, at least some of the time, and its teeth approximated those of man. Moreover, researchers often found stone tools scattered among its fossils.

The theory during these decades held that some form of *Australopithecus*, enjoying relatively free use of its hands, developed tool-making, and this skill gave rise to an ever-larger brain through the forces of natural selection. Countless drawings in magazines and textbooks showed the furry *Australopithecus* standing next to *Homo erectus*, his distant evolutionary offspring.

But in the early 1970's researchers were astonished to discover forms of *Homo erectus* from almost two million years ago, complete with tools. In other words, man had lived alongside and even before some forms of *Australopithecus*. Most likely, it was he who had fashioned the tools found among the ape-man fossils. This discovery threw into question, to say the least, the evolutionary relation between the two forms of life. As of this writing, the problem is still being debated.

Around this time, several prominent paleontologists went on record to question the prevailing theory of gradualism, the well-known Darwinian position of evolution through natural selection. (High school and college textbooks taught this as virtual dogma up until recently.) These researchers claimed that, contrary to Darwin's predictions, the fossil record does not show gradual transitions between species. On the contrary, they maintained, the evidence shows extreme stability of form. Species seem to appear suddenly on earth, remain virtually unchanged for millions of years, and then disappear just as abruptly.

What could account for this phenomenon?

Current theory holds, among other positions, that major genetic alterations resulted in relatively sudden appearances of new species. This genetic leap is called "macroevolution." Meanwhile, within species at any given time, the forces of natural selection were at work effecting minor alterations of structure --like reshaping of finches' beaks, noted by Darwin. This process is called "micro-evolution." How genetic and environmental forces have interacted to produce new species is, at this point, an open question.

How do you see God at work in the creation of the world...of humans? How do you see God at work in our world today? How do you experience the invitation to sit at the table with the Trinity? Do you think there is room at the table for you...for your loved ones...for those you fear...for those who are our enemies?

Our purpose here...

has been to demonstrate the dynamic nature of scientific inquiry. Even these few brief sketches show how evolutionary thinking has undergone an evolution of its own and still does. Science has many uncertainties and very few dogmas. This uncertain quality accounts, in large measure, for the fascination scientists find in their work.

What has been your purpose in the study of evolution and Catholic thought? Has your purpose been fulfilled? Interested in more? Contact Monsignor Moore (bmoore@dcdiocese.org).

Catholics have nothing to fear ...

from science's honest inquiries, honestly explained. On the contrary, every new discovery is a source of wonder and a reason for giving praise to God. Of the Creator, we can say with St. Paul, "... from the foundations of the world, men have caught sight of His invisible nature, His eternal power and His divinity, as they are known through His creatures" (Rom 1,20).

Please reflect. Do you have any fears regarding evolution? What is the difference between "awe" and "fear". Does the exploration of human evolution cause any "awe" in you?