

## Review

# Evolution: Is there a problem here for the believing person?

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**Creationists are completely opposed to the scientific concept of biological evolution, and have made concerted efforts to ban the teaching of evolution in public schools. We examine the basis for their opposition, showing that it is not due to the text of Genesis. Rather, the creationist opposition to evolution is based on theological grounds. In their view, there is a close connection between the spiritual and the physical aspects of God's world. In particular, creationists believe that spiritual importance requires physical importance. Thus, if mankind shares similar physical origins with the cockroach and the crocodile, it would seem to imply that, we are equally devoid of any spirituality. This explains why many creationists oppose not only evolution, but also an ancient universe, and why there was such opposition in the past to the heliocentric solar system. However, if one recognizes that spiritual importance is unrelated to physical importance, then all these problems disappear.**

**Key words:** Creationist, spiritual, evolution, Genesis, creation, mankind.

## INTRODUCTION

One of the important news stories of 1999 in the area of science and religion was the decision of the Kansas Board of Education to remove the subject of evolution from its high school education standards. Accordingly, high school students in Kansas would no longer be tested on the subject of evolution, which of course guaranteed that they would no longer learn the subject. (As is well known, both students and teachers tend to view the principal task of teaching as preparing students for examinations). An election in Kansas had produced a Board of Education with a majority of creationists. The new board opposed teaching evolution as a scientifically established fact, and held that evolution should be viewed as "merely a theory," that is, an unproved speculation. The creationist view of the origin of the animal kingdom - the separate divine creation of each and every species - was to be treated as an equally acceptable explanation of present - day fauna.

We shall discuss why the creationists are so opposed to the idea of evolution. There are many other phenomena for which the standard scientific explanation does not correspond to the literal text of the Bible, but these subjects do not provoke the creationists into demanding changes in the school curriculum. For example, consider the rainbow. Newton explained that the rainbow is

caused by sunlight being separated into the familiar spectrum of colors by drops of rain which act as a prism. By contrast, Genesis 9:13 gives a completely different explanation, namely, that the rainbow is of divine origin, a miraculous creation of God whose function is to give assurance to mankind that all life will never again be destroyed by a flood. Yet, one never hears of creationists insisting that the Newtonian theory of the rainbow be taught in schools as "merely a theory," and that equal time be devoted in the classroom to the biblical explanation of the rainbow. What is so offensive in their eyes about evolution that generates such spirited opposition?

## HELIOCENTRIC SOLAR SYSTEM

There is another scientific issue that, in its time, generated even more controversy. This is the question of whether the sun revolves about the earth, or vice versa. As is well known, the seventeenth - century Italian astronomer Galileo was put on trial by the Catholic Church for championing the heliocentric theory. Under threat of death, Galileo was forced to recant. However, even after stating publicly that the heliocentric theory was

completely false and that only the Church had the authority to decide on matters of astronomy, Galileo was nevertheless sentenced by the Inquisition to life imprisonment to do penance and his books were placed on the Index, restricted reading for all good Catholics. It was only his long - time friendship with the pope and his infirm old age that saved Galileo from life imprisonment, when Pope Urban VIII commuted his sentence to house arrest (Redondi, 1987). Opposition to the heliocentric solar system was not limited to the Catholic Church. According to Encyclopedia Judaica (1972), "The Jewish writings on astronomy of the eighteenth century and the rabbinical literature of the nineteenth century are basically derived from the geocentric theory. In his book, *Ma'aseh Tuvia* (Venice, 1708), Tuvia Cohn presents the geocentric theory in its classic form. The heliocentric view is also analyzed, but is rejected on religious grounds."

The religious controversy regarding which heavenly bodies are stationary and which move, is very strange. The Genesis account of creation does not contain a single word favoring the geocentric system. Just where in the Bible is it written that the sun revolves around a stationary earth? This matter is touched upon in a passage in the Book of Joshua. During the battle in the Valley of Ayalon, Joshua asked God to command the sun and moon "to stand still" so that the victory could be completed in daylight (Joshua 10:12-13). Since Joshua had asked God to command the sun and moon to stand still, it follows - so goes the argument - that under ordinary circumstances, the heavenly bodies are not stationary, but revolve about the earth. On the basis of this flimsy exegesis, the Church condemned Galileo to life imprisonment and ordered his books to be burned! Surely, there must be something far deeper here.

## AGE OF THE UNIVERSE

The third phenomenon that arouses great passion in the creationist camp is the age of the universe. Many creationists are opposed to the multibillion -year - old universe of the cosmologists, and insist that the Six Days of Creation of Genesis are to be taken literally, as meaning six 24 - hour periods of time. It is easy to show that the creationist insistence on this point is not based on the view that every word in the Bible must be understood literally (Numbers, 2006). Consider, for example, the "light" mentioned on the First Day of Creation. The famous biblical commentator Rashi (lived in France in the eleventh century) brings the explanation from Kabbalah that the Genesis "light" was not physical light at all, but rather spiritual light (Lancaster, 1993). No creationist seems troubled by the fact that the literal meaning of the biblical text has thereby been set aside in favor of a figurative interpretation. In fact, creationists do not hesitate to interpret many biblical verses as meaning something very different from the literal text.

What do the creationists find so unacceptable about an ancient age for the universe? Why do they refuse to understand the Six Days of Creation figuratively, as spiritual days, just as Rashi explained the Genesis light figuratively as spiritual light? What impels them to insist that the Days of Creation *must be understood* literally, as 24-h periods of time, thus leading to a head-on collision with modern science?

## MAN'S SPIRITUALITY

It is a principle of the Bible that man is the ultimate purpose of God's creation - that human beings are the most important creatures in the world. This is an article of faith for the religious person. What are the implications for human beings? If mankind is of central importance spiritually, must he also be of central importance physically? If the answer is in the affirmative - that is, if the spiritual importance of human beings must be reflected in their physical importance - then it would be sacrilegious to believe the principles of evolution, according to which, man developed from a simple bacterium. If mankind shares similar physical origins with the cockroach and the crocodile, it would seem to imply that we are equally devoid of any spirituality.

If spiritual importance requires physical importance, it also follows that the planet we inhabit must lie at the very center of the universe, with the other heavenly bodies whirling around us. Placing the earth among the other planets - just another astronomical body that revolves around the central sun - would be an affront to the dignity of man. As a uniquely divine species, it is inconceivable that mankind should occupy so undistinguished a dwelling place. It is quite clear that it was not for scientific reasons that the geocentric theory of the solar system went unquestioned for 1400 years. The appeal of this theory was based on other considerations. According to one book on the history of science (Clarke, 1954):

"The universal popularity of the geocentric theory of the universe was due largely to the important place it gave man in the general scheme of things. This theory was not developed in order to account for the observed astronomical facts. The geocentric theory added immensely to man's already fairly developed sense of his own importance. As time went on and astronomical observations increased in accuracy, more and more complicated assumptions were simply added to the geocentric hypothesis to explain the astronomical data."

Further support for the view that the medieval geocentric theory of astronomy was not based on scientific considerations, is to be found in the trajectories assumed for the heavenly bodies. It was taken for granted that the sun, moon, planets, and stars all revolved about the

central earth in circular orbits. Even Copernicus, who proposed the revolutionary idea of a heliocentric solar system, still assumed circular orbits for the planets. What was so attractive about the assumption of circular orbits? The correct shape of the planetary orbits, an ellipse, was a well-known geometric figure, one of the conic sections that had been studied in detail by the ancient Greeks. Why did no one consider the possibility that the heavenly bodies move in elliptical orbits?

The explanation is to be found in the prevailing view of the universe. Since it was assumed that God Himself controlled the motion of the heavenly bodies, their orbits must be "perfect." The ideal geometric figure is the circle. It followed, therefore, that the divinely controlled orbits of the heavenly bodies must be circles. Even when it became obvious that circular planetary motion was inconsistent with astronomical observations, the circle was never abandoned. It was still taken for granted that the planets moved in circles, but it was now assumed that the center of the circle (called an "epicycle") moved on a different circle. And when even this more complicated theory proved inadequate to explain the ever more accurate data, it was assumed that the circular epicycle must revolve around yet another circular epicycle which itself moved in a circle. Planetary trajectories could never be anything but various combinations of circles, however complicated, because theological considerations restricted medieval astronomers to ideal geometric figures.

"By the year 1500, over 80 epicycles were required to account for the motions of the five known planets, the sun, and the moon. That astronomers of that day were able to devise so intricate a picture to account for the observed facts is a tribute to their mathematical ability and ingenuity, but not to their scientific judgment" (Clarke, 1954).

This astronomical theory was but one aspect of a comprehensive theological approach to the physical world, which was assumed to be a window to God. The term "natural theology" denotes the study of God through the study of nature. Theologian Francis Bacon (1605) spoke of the two Books of God: the Book of words (Bible) and the Book of works (Nature). Faith in God is enhanced by studying His universe. With the invention of the telescope in the early seventeenth century, the scientific community finally came to realize that the geocentric theory simply could not explain the detailed observations, no matter how many new epicycles were added. The heliocentric theory gradually carried the day, and mankind was relegated to a "minor" planet, far from the center of the universe. Just when the creationists became reconciled to this unhappy state of affairs, another blow fell. In 1859, Charles Darwin published his famous book, *The Origin of Species*, introducing the theory of evolution by natural selection. This theory asserts that the vast panorama of animals and plants, including man, all developed from simpler forms. Scientists had already

shown that human beings did not occupy a special planet in the physical world. And now scientists were claiming that man is not even a special species in the biological world. The creationists eventually did come to terms with the heliocentric solar system; indeed, it would be quite absurd to deny it today. But, with regard to evolution, they continue to assert the biological uniqueness of human beings. As the preceding discussion makes clear, it is not the Genesis text that underlies the creationist opposition to evolution, but a matter of *weltanschauung*.

The creationist perception of human spirituality requires for mankind a different physical origin from that of the "lower" animals. This perception sees human dignity as degraded by the implication that "man's ancestor was a monkey." The creationist concept places each species in its divinely assigned niche, thus maintaining the unique spiritual position of mankind. The creationists are also opposed to the idea of a very ancient universe. Human civilization, the only subject of interest in the Bible, began only a few thousand years ago. If the universe has existed for more than 10 billion years, then the extremely long period before Adam and Eve accounts for 99.9999% of the history of the universe. This presents a serious problem for the creationist. If man is really so important, as Genesis implies, why was his creation delayed for billions of years?

This question shows how the existence of an ancient universe appears to cast doubt on the spirituality of human beings. Once again, it is not the text of Genesis, but the creationist outlook, that prevents acceptance of modern cosmology. This outlook implies that the physical absence of mankind over such a large part of history would indicate that man lacks spiritual worth. Moreover, why would God have permitted the universe to exist for so many billions of years without any purpose whatsoever? Therefore, it follows that the universe cannot be as ancient as cosmologists maintain. The conflict over the heliocentric theory differs in an important respect from the conflict over evolution and an ancient universe. In the twenty-first century, our knowledge of astronomy and our achievements in space flight make it impossible to deny the heliocentric theory. However, the origin of the universe and evolution deal with events that occurred in the far distant past, when no human beings were present. Therefore, so the creationists claim, who can know what really happened? Perhaps evolution took place, and perhaps not. It's all "merely a theory," and the creationists will not alter their basic religious beliefs because of an unproven theory.

## PHYSICAL AND SPIRITUAL

All these theological problems disappear once one recognizes that the physical importance of an object and its spiritual value are unrelated. Indeed, both Judaism and Christianity stress that spirituality can be found in the

most humble surroundings. The recognition that Genesis deals with the spiritual rather than the physical qualities of mankind, suggests that the biblical phrase, "God created man" refers to the spiritual features of man, and not to creation in the physical sense (that is; the creation of something from nothing). Thus, the verb "created" in reference to mankind (Genesis 1:27) refers to the unique intellectual, moral and spiritual capabilities that characterize human beings. The Jewish commentators Rashi, Sa'adiah Gaon, Sforno, Radak, and Nachmanides all emphasize that man's superiority over other species lies in the areas of speech, knowledge, intellect, and creativity. Indeed, physically, human beings are quite ordinary creatures.

### CHIMPANZEES AND HUMAN BEINGS

The importance of distinguishing between physical characteristics and spiritual characteristics is well illustrated by a comparison between chimpanzees and human beings. At one time, the similarities between different species were determined by morphological studies of tissues, skeletons, and physiological systems. Such comparisons between species could only lead to qualitative assessments that were sometimes not much more than educated guesses. In the 1970s, however, advances in molecular biology yielded a quantitative method, known as the "molecular clock for DNA," for measuring the similarities of different species. Studies in this area have produced some surprises. For example, the primate species most closely resembling human beings (*Homo sapiens*) is now known to be the chimpanzee, whereas previously it was generally thought to be the gorilla (Wilson, 1985).

The new quantitative method for determining the relationship between different species is based on analyzing the proteins found in cells. Each protein consists of a long chain of several hundred amino acids, of which there are twenty different types. The production of the protein ("stringing" the amino acids on the protein "chain") is orchestrated by the gene, which consists of a very long chain of elementary units called DNA base-pairs (Solomon et al., 1996). Consider the protein hemoglobin, which is present in the blood and plays a key role in transferring oxygen to the cells. The gene for producing hemoglobin contains 861 DNA base - pairs. By comparing the DNA base - pairs of the hemoglobin gene of two different species, one can determine the similarity between these species without ever examining the animals themselves. For example, horses are quite different from humans, and correspondingly, it is found that 20% of the DNA base - pairs of the equine hemoglobin gene is different from those of the human gene (Wilson, 1985). As expected, the hemoglobin genes of humans, orangutans, and chimpanzees are very similar to each other, but differ significantly from the gene

of cats, which in turn is quite similar to that of lions. In some cases, however, the genes of quite different species are very similar. For example, swine insulin was widely used for diabetics because it differs from human insulin in only one amino acid. Such studies of the DNA base - pairs of many different genes have established that the chimpanzee, and not the gorilla, is the primate most similar to humans. In fact, the complete array of DNA base-pairs of chimpanzees is 98.5% identical to that of humans, which demonstrates a close physical similarity between chimpanzees and human beings (de Waal, 1995). This scientific finding troubles some people, who interpret it as showing that humans are not much different from apes. However, such an interpretation completely misses the point. Anyone can observe the enormous difference between humans and apes. In the important spiritual realms of creativity, intellect, understanding, and morality, the accomplishments of chimpanzees are totally negligible compared to those of humans. No chimpanzee ever wrote a book, painted a picture, developed a scientific theory, expounded a philosophical thought, or has given help of any sort to a different species. Indeed, since the physical characteristics of the apes are so very similar to those of human beings, one cannot help wondering why their spiritual characteristics are so very different.

What can one say about man's physical capabilities? Humans cannot run like the deer, cannot fly like the bird, cannot swim like the dolphin, cannot climb like the squirrel, cannot chisel like the beaver - the list extends forever. Quite obviously, mankind has no special physical talents. Thus, there is a clear distinction between the spiritual and the physical. In the former realm, mankind excels, whereas in the latter realm, we are quite ordinary. The divine creation described in Genesis maintains this dichotomy between the spiritual and the physical. Therefore, there is nothing degrading in the fact that mankind occupies a very ordinary planet that revolves around a very ordinary star, and that humans share a common evolutionary history with all other animal species. Man's uniqueness, created in the image of God, is not expressed in the location of his planet or in the genes that reside within his cells. Man's uniqueness is to be found in his spiritual qualities. It follows that there is no reason for the devout person to oppose the heliocentric theory or to denounce evolution. The scientific discovery of a very ancient universe is also not a problem for the believer. The scientific time scale - billions of years without man, followed by only a few thousand years of human civilization - seems so skewed only because of our human perception of time. We are all busy people who would consider it extremely wasteful to wait billions of years before getting to the point. But divine considerations are very different. It is not at all a defect in human spirituality if mankind did not exist for the vastly greater part of the history of the universe. The importance of human beings is not to be measured temporally by the

length of time until our appearance. The crucial point is that now we are here, and within an amazingly short time mankind has assumed the mastery of the physical world, precisely as stated in Genesis 1:28:

God blessed mankind, and He told them to be fruitful and multiply, and fill the land and conquer it, and rule over the fish of the sea and the birds of the heaven and all the creatures that inhabit the land.

## THE SECOND CHAPTER OF GENESIS

This idea of the separation of the physical from the spiritual also appears in the second chapter of Genesis, which presents an alternate creation story. Rabbi Joseph Soloveitchik (1965) explains that the two versions of creation, which he denotes as Genesis 1 and Genesis 2, do not indicate two different traditions later joined by an anonymous editor, as claimed by adherents of biblical criticism. Rather, the two versions of creation refer to man's dual nature. Genesis 1 deal with the physical - what happened? - Whereas Genesis 2 deals with the spiritual - why did it happen?

Consider the following example, If asked by my physics students why water boils, I will talk about the distribution of molecular velocities, intermolecular forces, the thermodynamic phase transition - the elements of the scientific theory of boiling. However, if asked the same question by my wife, I explain that the water is boiling because I want to drink a cup of coffee. The same person may give differing explanations to serve different purposes. In the same way, Genesis 2, which deals with the why of creation, is the natural complement to Genesis 1.

## CREATION OF MAN

The Genesis account of the "creation of man" is given in verse 2:7:

"God formed man from the soil of the earth, and He blew the soul of life into his nostrils; and man became a living creature."

This verse stresses the dual nature of man, telling us that man was formed by adding spirituality (soul) to a physical creature (formed from the soil). The physical creature, mentioned first, could have been formed by evolutionary processes that extended over millions of years. That is of no interest. The essential qualities of man lie in his spirituality, which was infused into the already existing physical entity ("He [God] blew the soul of life into his nostrils"). It is this combination - physical and spiritual - that is the essence of "man".

Are there any signs that human beings possess spiritual uniqueness? In fact, the uniqueness of the

enormous intellectual and creative abilities of human beings could not be more obvious. This has been illustrated in a very interesting way by the success of primatologist Sue Savage - Rumbaugh (1992), after considerable effort, in teaching a bonobo chimpanzee (the species most similar to man) to recognize as many words as are learned, completely effortlessly, by every two - year - old human child. Such an "intellectual achievement" on the part of the chimpanzee emphasizes the vast chasm that separates the mental capabilities of man from those of every other species.

## EVOLUTION

Two different verbs appear in Genesis to describe the origin and formation of the animal kingdom. Regarding the primeval sea creatures, Genesis 1:21 states that God "created" them (Hebrew: *vayivra*), whereas regarding the subsequently formed land creatures, Genesis 1:25 states that God "made" them (Hebrew: *vaya'as*). The verbs "create" and "make" denote two quite different processes. "Creation" implies the formation of something fundamentally new, either physically (creation *ex nihilo*) or conceptually (a completely new type of entity, such as life). By contrast, the process of "making" implies the fashioning of something complex from something simple (making furniture from pieces of wood).

The foregoing discussion suggests the following interpretation of the Genesis text. The first expression (God created) refers to the creation of life itself, which first appeared as marine species. The second expression (God made) refers to the later formation of terrestrial species. This understanding of the biblical text is consistent with the scientific idea that present - day animals evolved from earlier species.

## CONCLUSION

We have discussed the two subjects regarding which the creationists oppose the accepted scientific position: evolution and an ancient universe. To these may be added the sharp disputes in the middle Ages about the heliocentric solar system. In each case, the creationist opposition is not based on the biblical text, but rather on their worldview, which holds that the spiritual importance of human beings requires a corresponding physical importance. By contrast, Genesis views physical and spiritual characteristics as being unrelated. It follows that the believing person has no cause to oppose the scientific findings about evolution.

## REFERENCES

Bacon F (1605). *The Advancement of Learning*, First Book, I.3. reprinted 1975. Armstrong WA. ed. Athlone Press, London p. 55.

- Clarke J (1954). Man and the Universe. Simon and Schuster, New York pp. 27-28.
- De Waal FBM (1995). Bonobo chimpanzee society. Sci. Am. 3:84-272.
- Encyclopaedia Judaica (1972). Keter Publishing House, Jerusalem, s.v. "Astronomy" 3:805.
- Lancaster B (1993). The Elements of Judaism. Element Books, Shaftesbury, England p. 45.
- Numbers RN (2006). The Creationists. Harvard University Press, Cambridge pp. 19-20.
- Redondi P (1987). Galileo: Heretic. Princeton University Press, Princeton, NJ.
- Savage-Rumbaugh S (1992). Apes, language, and the human mind. Nat. Geographic 187(3): 32-33.
- Solomon EP, Berg LR, Martin DW, Villet C (1996). Biology, 4<sup>th</sup> ed. Harcourt Brace, New York pp. 245-249.
- Soloveitchik JB (1965). The lonely man of faith. Tradition 7(2): 5-67, especially 10.
- Wilson AC (1985). The molecular basis of evolution. Sci. Am. 253(4): 148-157.