Chapter Nine

DIALOGUE ON THE ORIGIN OF LIFE

During the modern age, discovering the secret of life has replaced the medieval alchemists' search for the lodestone that would change base metal to gold. Long before Charles Darwin published his *Origin of the Species,* Mary Shelley published her *Frankenstein* (1818) in which she explored the horror of man-made life which has no connection with the rest of life created by God. Later in the nineteenth century, *Dr. Jekyll and Mr. Hyde* explored the idea of solving the problem of human evil through scientific means. During the latter twentieth century, we have seen science fiction close in on reality with test-tube babies, cloning, and genetic engineering of DNA molecules. Still, these ventures manipulate life; they do not create life.

What Is the Origin of Life?

The question of life is not simply a question about another feature of the physical or even the spiritual universe. It is a question about me. For every person, the question of the origin of life is a question about themselves.

Scientific View

Darwin speculated little on the origin of life. Since then, neo-Darwinism has postulated that life arose completely from natural chemical reactions. In the 1920s the Russian Alexander Oparin and the Englishman J. B. S. Haldane postulated that the early earth's atmosphere contained what chemists call "reducing gases" such as hydrogen, ammonia, and methane. They also assumed that the atmosphere contained practically no free oxygen. They further stated that the presence of energy (lightning, ultraviolet radiation, or volcanic eruptions) would cause these chemicals to combine to

form the chemicals of life: sugars, amino acids, fatty acids, and nucleic acids (RNA or DNA). In 1950 Stanley Miller and Harold Urey at the University of Chicago sought experimentally to reproduce these conditions. In a closed glass container, they placed water (ocean), the gases hydrogen, methane, and ammonia (atmosphere), and an electric arc (lightning). After letting the reaction run for a week, they analyzed the contents of the reaction vessel. Among the many compounds formed, they found the biological molecules amino acids, fatty acids, and urea. At the 1959 Darwinian Centennial celebrations, the Miller-Urey experiment was touted as the triumph of neo-Darwinism.

The Miller-Urey experiment was also the high-water mark of origin-of-life experiments. Very little progress has been made since. Much criticism has developed about the experimental design and results:

- Geochemical studies suggest that the earth's early atmosphere was not reducing but contained gases such as carbon dioxide, nitrogen, and water vapor. Further studies indicated that oxygen was present, probably as a result of volcanic eruptions. If oxygen was present, it would cause the biomolecules to degrade (decompose).
- Human intervention is apparently needed for the Miller-Urey experiment to work. One thing that experimenters do is stop the reaction before the biological molecules react further to form nonbiological products. Another intervention involves using only short-wavelength ultraviolet radiation. Long-wavelength ultraviolet radiation degrades the products.
- The molecules of life can be made in two forms which are mirror images of each other. Chemists call these forms *optical isomers* and label one isomer as left-handed with the other labeled right-handed. In the Miller-Urey experiment, an equal amount of the left-handed and right-handed molecules are produced. Yet, nearly all naturally occurring amino acids are left-handed. No one has devised a natural way for only the left-handed amino acids to be synthesized.
- No one has devised a natural, spontaneous way for the amino acids to combine to form functioning proteins. Proteins are the actual biochemical molecules found in living organisms and are used for structure (collagen in bone), contraction (muscles), catalysts (enzymes), hormones (insulin), antibodies (gamma-globin), and transport (hemoglobin). Proteins have four different structures called primary, secondary, tertiary, and quaternary. The *primary structure* is the sequence of the amino acids which makes a

long chain. A protein is a polymer containing up to twenty different amino acids that must be linked in the right sequence for a protein to function properly. For example, hemoglobin contains 574 amino acids. Sickle-cell hemoglobin differs from normal hemoglobin in only two out of these 574 amino acids.

- The *secondary structure* of a protein results from the chemical interactions between amino acids in the chain which creates a three-dimensional structure. One such structure is the alpha helix, a three-dimensional structure in the form of a right-handed screw. A *tertiary structure* results from further chemical interactions with the secondary structure components. This tertiary structure gives the protein a lock-and-key relationship to other molecules. By having a certain tertiary structure, the protein acts like a lock that only certain molecules can fit into like a key. Without the correct tertiary structure, the protein cannot catalyze specific chemical reactions. A *quaternary structure* results if the protein is composed on two or more chains of amino acids. Each chain has its own primary, secondary, and tertiary structure. In the quaternary structure, the chains are held together by chemical attractions. Both insulin (two chains) and hemoglobin (four chains) have quaternary structures. The change of two amino acids in sickle-cell hemoglobin affects all structural levels. To degrade or denature a protein is to change one or more of these structural levels.

Although chemical origin-of-life proposals are still being made, some scientists have concluded that the origin of life is beyond the reaches of the scientific method.

The Religious View

For the Christian, the question of the origin of life is quite simply answered: God made all living things. The creation of life came about as an intentional act of God. All life, not just human life, was created with a purpose. The Bible links life with value; in Genesis God declares life to be "good" (Gen. 1:12, 21, 25). Life is valuable to God in and of itself without the necessity of accomplishing something to justify its existence. The different orders of life also came into being as an intentional act of God. In broad strokes, Genesis describes the intentionality of God in creating all kinds of life in the three possible realms in which they can live: on land, in water, and in the air.

While the fact of God's creation of life is quite plain in the Bible, the manner of God's creation of life remains veiled. God planned it and caused it to happen, yet he used the earth and water he had

already created to bring forth life. Was there something about the way earth and water and the rest of creation were planned that at the impulse of God, life would spring from them? Was the creation of life already planned in the very way God prepared the heavens and the earth beforehand?

The Bible also says that life did not appear all at once. The creation of life involves a sequence in which plant life preceded animal life and water life preceded land life. The Bible is silent about the relationship of forms of life to one another. The question does not appear to arise except in distinguishing between forms of life that exist, as Paul does in 1 Corinthians when he declares: "All flesh is not the same: Men have one kind of flesh, animals have another, birds another and fish another. There are also heavenly bodies and there are earthly bodies; but the splendor of the heavenly bodies is one kind, and the splendor of the earthly bodies is another" (1 Cor. 15:39–40). In this passage, however, Paul describes the change that takes place in humans at resurrection when they are transformed by God from one form of life (a child of the dust) to another form of life (a child of God). By analogy, Paul's example suggests that any changes which God brings about in creatures on earth would provide evidence for resurrection.

What Is the Origin of Human Life?

Does humanity differ from other forms of life in any qualitative way? We tend to see ourselves as the highest form of life. Yet, we wonder if we are alone in the universe as superior beings. What is our origin and how do we relate to the rest of life?

Scientific View

Neo-Darwinism views humans as any other animal and says that humans evolved from a common ancestor. Evidence for the evolution of humans, such as fossils and tools, is rare and often fragmented. In many cases, only part of a skull and a few other bones are found; nearly complete fossil skeletons are very rare. Thus, scientific theories about the evolution of humans is based on limited evidence. Although museum reconstructions may indicate otherwise, there is at present no detailed picture of early human life.

Physical anthropology, the study of human origins, probably involves a lot more speculation than other areas of science. For example, when a fossilized fragment—say a pelvic bone—is found

that does not fit an idealized version of the pelvic bone of an ape or a human, can we say whether this fragment comes from an ape, human, or ape-human? Does this pelvic fossil indicate an evolutionary intermediate between apes and humans? If one "knew" that the specimen whose fossil had been found did evolve from ape to man, then the feature would represent an intermediate. But there is no way of knowing with the same certainty that a chemist "knows" that sodium plus chlorine changes to table salt. Physical anthropology will never have the certainty of chemistry. Thus, the basic assumptions of the scientist cloud what he or she sees.

Also, fame may cloud the conclusions. It is a lot more prestigious to announce the discovery of another human ancestor than another ape ancestor. As Alan Mann, professor of paleoanthropology at the University of Pennsylvania, said, "Human evolution is a big deal these days. Leakey's world known, Johanson is like a movie star, women moon him and ask for his autograph. Lecture circuit. National Science Foundation: big bucks. Everything is debatable, especially where money is involved. Sometimes people deliberately manipulate data to suit what they're saying."[1]

Keeping the above caveats in mind, the following is a summary of current thinking on human evolution. Because of the similarities in the physical structure, genetic material, and blood of humans and apes, anthropologists assume that human beings and the apes, such as gorillas and chimpanzees, share a common ancestor. It is proposed that between 10 million and 5 million years ago the line leading to humans split from the line leading to the great apes. The classification *hominids* includes both modern humans and fossil species. Most anthropologists believe that the first hominids were the *australopithecines*. The australopithecines are thought to have lived between 5.5 million and 1 million years ago in Africa. Their facial features may have resembled chimpanzees, and anthropologists believe that they walked upright. The australopithecines had canine teeth that were less ape-like in appearance and had brains that were about one-third the size of modern human brains. The australopithecines, classified in the genus *Australopithecus* (southern ape), are divided into five species: (1) *A. anamensis,* (2) *A. afarensis,* (3) *A. africanus,* (4) *A. boisei,* (5) *A. robustus.*

A. anamensis is thought to have evolved into *A. afarensis* about 3,700,000 years ago. The most famous *A. afarensis* fossil find is "Lucy," which was discovered by Don Johanson in Ethiopia. At 40

percent complete, "Lucy" is the most complete australopithecine specimen. "Lucy" was about 3.5 feet (107 centimeters) tall and weighed about 60 pounds (27 kilograms).

It is estimated that about three million years ago *A. afarensis* evolved into *A. africanus,* whose fossils have been found in South Africa. *A. africanus* had rounder and slightly larger skulls than *A. afarensis*. Many scientists believe that *A. africanus* split into two lines: gracile (slender) and robust. The robust line probably led to *A. boisei* and *A. robustus,* which became extinct about one million years ago. The gracile line is thought to have evolved into the genus *Homo* about two million years ago.

Homo habilis (handy human being) is currently considered the oldest human species. Its fossil remains were discovered by Louis Leakey in East Africa. The brain of *H. habilis* was one-half the size of modern human brains, and *H. habilis* has smaller molars and a less protruding face than the australopithecines. Most anthropologists believe that *H. habilis* was the first toolmaker.

It is thought that about 1.75 million years ago *H. habilis* evolved into *H. erectus*. The *H. erectus* species had thick skulls, sloping foreheads, browridges, and chinless jaws. Their brain size eventually reached the size of modern human brains. This species eventually migrated out of Africa into Asia and Europe. *H. erectus* was thought to be the first to master the use of fire.

Between four hundred thousand and three hundred thousand years ago, it is thought that *H. erectus* evolved into *Homo sapiens* (wise human being). The first *H. sapiens* skulls were higher and rounder than the *H. erectus* skulls. Early *H. sapiens* were about as tall as modern human beings. The early *H. sapiens* skulls do not look exactly like modern human beings; they have larger faces that protrude around the mouth and eyes, browridges, low sloping foreheads, and no chin.

The first fossils with modern human features are thought to have appeared about one hundred thousand years ago. These fossils are classified as *Homo sapiens sapiens*. They had a chin, high forehead, a less protruding face, and no browridge.

Scientists have developed two theories to explain the origin of modern human beings: multiple origins theory and single origin theory. The *multiple origins theory* postulates that *H. erectus* in each geological area of Africa, Asia, and Europe, evolved into a form of *H. sapiens* unique to that area. These types of *H. sapiens*

could then have developed into the modern human races. The *single origin theory* postulates that modern humans (*H. sapiens sapiens*) arose once in Africa and then spread throughout Africa, Asia, and Europe, replacing the older populations of *H. sapiens* already living there. Some scientists use genetic research to support the single origin theory. Each cell contains two locations for genetic material (DNA). In addition to the cellular nucleus, there is also DNA in a cellular structure called the mitochondria. The *mitochondria* contains enzymes responsible for converting food to usable energy. The mitochondrial DNA only comes from one's mother.

By comparing the mitochondrial DNA of different women and by assuming a rate for mitochondrial DNA evolution, Rebecca L. Cann, Mark Stoneking, and Allan C. Wilson of the University of California at Berkeley concluded that all women have a common ancestor who lived in Africa about two hundred thousand years ago.[2] Robert L. Dorif, Hiroshi Akashi, and Walter Bilbert of Yale University, University of Chicago, and Harvard University, respectively, did a similar study of the Y chromosome only found in men and concluded that all men have a common ancestor who lived about two hundred and seventy thousand years ago in Africa.[3] The two ancestors have been dubbed "Eve" and "Adam." Many scientists do not accept the assumptions required to obtain the results.

Religious View

The Bible teaches that humans resulted from an intentional act of God whereby God made an animal which conforms to his image. The image of God is the distinguishing feature of humans from other animals. Not only did God begin the human race; God also continues to create every person. Procreation may be the mechanism through which life begins, yet life only begins in procreation when God creates a new life. God established a physical process as strong as gravity to provide for the continuity of life, yet he remains intimately involved with these lives. God is not an absentee landlord.

In spite of the strong declarations in the Bible about the fact of God's creation of people, the Bible does not say exactly how God did this creation. An explicit description appears in Genesis 2, but as we have seen from the discussion in chapter 5, the reversal of the order of creation in Genesis 2 suggests an allegorical understanding of that chapter which veils from our sight what God actually

did. Frankenstein notwithstanding, the secret of life is withheld from us, but the source of life is proclaimed.

The presence or absence of allegory in Genesis adds a sense of gravity to its interpretation in deciding if a passage should be understood literally—which has been the preference of the modern scientific world—or allegorically—which was the preference of the early Christians. Paul referred to the figures of Sarah and Hagar in Genesis as an allegorical representation of the two covenants (Gal. 4:21–31). Likewise, Hebrews stresses the typological significance of Melchizedek (Heb. 6:20–7:28).

The presence of allegory in Genesis would raise a question about the intention of Scripture regarding when the creation of people took place. At the beginning of the modern period, Archbishop Ussher of Armagh in Ireland calculated the date for the beginning of the world as 4004 B.C. Ussher was highly regarded as a biblical scholar by his Puritan contemporaries in early seventeenth-century England. His calculations are based on the ages of men given in the genealogical tables in Genesis 5:1–32 and 11:10–26. The 4004 B.C. date arises from the view that the numbers in the genealogical tables should be taken as literal numbers. The question of allegory arises, however, because of the location of the numbers in a text that would appear to fix the precise date of the creation. The Book of Genesis and the Book of Revelation mirror each other as they frame the entire Bible. God laid down an allegorical veil on the timing of the end in Revelation while revealing what would happen at the end. At the other end of time, God may have done the same thing with regard to the timing of the beginning while revealing the fact of creation.

The most compelling argument for an allegorical interpretation of Adam and his descendants to Abraham comes from the text itself. The literalist skeptic will invariably ask, "Where did Cain get his wife?" Though smugly posed, the question cannot be ignored. The Bible does not answer the question, nor does it suggest an answer. Only an individual exhibiting a naive arrogance, however, would believe that the ancient writer did not notice the problem. A wife for Cain represents one other person not mentioned in the genealogy of Adam, but the wife for Seth represents a second person unaccounted for. The fear of Cain that someone would kill him because he had killed Abel raises an even larger question: Who are these others that Cain fears? He does not appear to be afraid of his

mother or father, but of some other group. The text not only suggests but assumes that other people were living.

The text does not conflict with itself, but it does conflict with both liberal and conservative modern interpretations of the text based on assumptions that do not necessarily hold. One problem arises in assuming that the Adam and Eve of Genesis 3 and the Adam and Eve of Genesis 4 are the same people. Could they be different couples living an indeterminate number of years apart? Another problem arises in assuming that Eve's name means she was the mother of everyone who ever lived instead of the mother of all those living at the time Genesis was written (Gen. 3:20). The text suggests that a number of people were alive by Genesis 4.

Some have suggested that Adam and Eve had many more children than Cain, Abel, and Seth. This suggestion proposes that Cain and Seth married their sisters. It also proposes that the people Cain feared were other brothers, who also would have married more sisters. This solution has the disadvantage of suggesting that God's plan for procreation involved incest. While incest was a feature of Egyptian and Canaanite religion, it was repugnant to Hebrew faith and the revealed will of God in Scripture, even though Abraham married his half sister Sarah.

All of these solutions represent an attempt to make the text of Genesis fit a modern, scientific understanding of time, sequence, and history. The conservative position would be that if a literal reading of the text conflicts with science, then science must be wrong. The liberal position would be that if a literal reading of the text conflicts with science, then the story is just a legend made up a long time ago to teach a lesson. One position denies the validity of scientific knowledge, while the other denies the reality of divine revelation. They both cling to a modern rationalistic understanding of what constitutes truth.

By raising the question of where the other people came from, the Book of Genesis deliberately places a veil over how God populated the earth and the relationship of people to one another. All solutions to the problem from a theological perspective require the kind of speculation which has been suggested here. We always tread on dangerous ground when we add to Scripture by "filling in the gaps" where the Bible is silent. We always fill in the gaps or create our own scripture by appeal to reason. The variety of positions from conservative to liberal that arise from the appeal to reason, however, suggests how frail a standard reason may be.

Does Human Life Have Purpose?

The existential philosophers have said that people suffer from an overpowering "anxiety" over the need for purpose and the threat of death. How do science and religion deal with these issues posed by the philosophers?

Scientific View

As we discussed in chapter 1, questions about purpose are really outside the realm of the scientific method. However, this has not stopped some scientists from making statements about purpose. In the nineteenth century, many scientists did see human beings as the purpose or pinnacle of evolution. They saw evolution as progression from the simple to the complex. Those scientists holding these views were more likely Lamarckian evolutionists rather than Darwinian evolutionists. With the triumph of neo-Darwinism, a new attitude about purpose developed. The results of neo-Darwinian evolution are viewed as arising from "the unpredictability of variations and the opportunistic character of selection."[4] The following are some neo-Darwinian thoughts on purpose:

> Man was not the goal of evolution, which evidently had no goal. He was not planned, in an operation wholly planless.[5]
>
> The denial of purpose is Darwin's distinctive contention. . . . The sum total of the accidents of life acting upon the sum total of the accidents of variation thus provided a completely mechanical and material system by which to account of the changes in living forms. . . . To advance natural selection as the means of evolution meant that purely physical forces, brute struggle among brutes, could account for the present forms and powers of living beings. Matter and Force. . . . explain our whole past history and presumably would shape our future.[6]
>
> Man is the product of causes which had no provision of the end they were achieving. His origin, his growth, his hopes and fears, his loves and beliefs are but the outcome of accidental collocations of atoms.[7]

They believe that if evolution were run again, human beings would not necessarily appear but that some similar type of bipedal species would appear. Maybe a dinosaur or large flightless bird would fill this niche; this theme can be found in many science fiction stories.

According to neo-Darwinism all species eventually evolve into another species or become extinct as they do not successfully adapt

to a changing environment. Thus, *Homo sapiens sapiens* should disappear either through extinction or evolution. However, some scientists believe that *Homo sapiens sapiens* may be the first species to escape from the effect of natural selection. *Homo sapiens sapiens* is the first species that can drastically modify the effect of the environment on itself. Thus, some scientists say that how *Homo sapiens sapiens* evolves is much more difficult to understand and predict. However, humans may not be in as much control of their environment as we think. We may be depleting our environment and thus destroying ourselves.

Religious View

Christians believe that people have a purpose because of the kind of God who exists. The idea of planned, involved creation suggests that God made people with a purpose in mind. The purpose for people is found in relationship with the Creator. Scripture describes God's relationship to people in terms of bringing an eternal purpose to completion over a period of ages. In the course of time and relationships, people have a purpose to fulfill in terms of the grand design God has planned.

Each life has value and each life is significant in terms of the purpose of God. Likewise, except in relation to their Creator, people cannot know their purpose. More often than not, purpose is found in the little, ordinary moments of life rather than in grand but transitory achievements. Abraham, the father of faith for all three of the great monotheistic religions, discovered his purpose and exercised his faith in the simplest of life experiences. He moved, and his wife had a baby. In those two events, he realized his purpose.

In the medieval period, Thomas Aquinas developed a proof for the existence of God based on the idea of purpose. Because we see purpose in the world, it must have some source; therefore, God exists. The "proof" did not prove the existence of God so much as it expressed faith. The people of the Middle Ages saw the purpose. The people of the modern age, as the existential philosophers have suggested, struggle to find if there is any meaning and purpose. In the modern period, we might turn the proof upside down and say that because a Creator God exists, we have a purpose.

People also have a destiny because of the existence of God. Everyone has a destiny, but not everyone has the same destiny. Some will experience eternal life, while others will experience eternal

death. We may think of eternal life as presence with God, while eternal death is separation from God. Eternal death does not mean extinction. Christians believe that God entered time and space through Jesus Christ to make known how we can have relationship with him. Those who want to spend eternity with Christ will do so. Those who do not want to spend eternity with Christ will not. Eternal life is not inevitable, evolutionary, or a natural extension of physical life, even though it begins during physical life. It comes as a by-product of uniting with Christ, who is life itself (1 John 5:11–12).