

BIBLICAL APPROACHES TO BIOLOGY.

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In contrast to those who restrict the authority of the Bible to moral and religious topics exclusively, Seventh-day Adventists accept the Bible as the revealed word of God on all matters. As such, we attempt to harmonize our understanding of science with relevant biblical information.

This exercise rests squarely on our unshakable conviction that the Bible contains supernatural revelation. Without this, how could we assign such a dominant role to material written 3500 years ago by men, who were utterly innocent of any knowledge of modern science?

The integration of Bible and science is an uphill work that requires careful reading of both the Bible and of scientific data. It is best done in collaboration between theologians and believing scientists.

No other science requires this corrective procedure more than biology. This is not due to biology becoming the dominant science of our age, although this development gives added urgency to such work. Rather, it is because no other natural science has traveled so great a distance down a path of anti-biblical road. Currently, in order to accept the teachings of modern biology at face

value, one has to discard, ignore or at the minimum, drastically reinterpret what the Bible teaches on these matters.

Contemporary Biology and Religion.

By way of illustration let's look at two examples on the relationship between modern biology and religion. The first is an article published in the American Biology Teacher in 1973 by T. Dobzhansky entitled "Nothing in biology makes sense, except in the light of evolution" (1).

In his article Dr. Dobzhansky states that he is a religious person, even a "creationist", who believes that God created and continues to create through evolution. He makes the following observations: 1) The Bible is not a primer of natural science. It treats "matters even more important, the meaning of man and his relations to God." The Bible "is written in poetic symbols that were, understandable to people of the age when they were written, as well as to peoples of all other ages". 2) "Contrary to Bishop Usher's calculations, the world did not appear approximately in its present state in 4004 B.C. The estimates of the age of the universe given by modern cosmologists (are)...about 10 billion years old....The origin of life on earth is dated tentatively between 3 and 5 billion years ago; manlike beings appeared...between 2 and 4 million years ago." 3) "Antievolutionists fail to understand how natural selection operates. They fancy that all existing species were generated by supernatural fiat a few thousand years ago, pretty much as we find them today". 4) Despite its great diversity, there is a basic unity of life, suggesting that it arose from inanimate matter only once. If the millions of species found today

were all created by separate fiat, then the Creator “deliberately arranged things exactly as if his method of creation was evolution, intentionally to mislead sincere seekers of truth”. 5) Besides the biochemical universals, comparative anatomy and embryology also proclaims evolutionary origins. Examples are the homologies in the skeletons and other organs of all vertebrates, the striking similarities among embryos of diverse animals, the presence of non-functioning gill slits in human and other terrestrial vertebrate embryos. 6). Without the light of evolution, biology is a pile of sundry facts, some of it interesting or curious, but not meaningful as a whole.

The second example is from the introductory chapter of a recent textbook of college biology with the heading “Science and Religion” (2). Here is a portion of this material: ” ...creation science is not science. Science begins with observations and the formulation of testable hypotheses.

Creation science begins with the unsubstantiated assertion that Earth is only 4,000 years old and that all species of organisms were created in approximately their present forms. This assertion is not presented as a hypothesis from which testable predictions are derived. Advocates of creation science do not believe that tests are needed, because they assume the assertion to be true.

In this book we present evidence supporting the hypothesis that the Earth is several billion years old, that today’s living organisms have evolved from single-celled ancestors... All of this extensive scientific evidence is rejected by proponents of creation science in favor of a religious belief held by a very small minority of the world’s population. Evidence gathered by scientific procedures does not diminish the value of the biblical account of creation. Religious beliefs are not based on falsifiable hypotheses, as science is, they serve different purposes, giving meaning

and guidance to human lives. The legitimacy of both religion and science is undermined when religious belief is called science”.

The Bible and Science.

These comments, which suggest that the Bible and religion in general have no useful input to science and if religion is applied to science, it will destroy the effectiveness of science, approximate the official stance of all scientific organizations on this matter. Thus the Seventh-day Adventist Church, with its determination to conduct a brand of science in all of its schools, which harmonizes with the Scriptures, is on a clear collision course with main-line thinking.

Without arguing the specifics at this point, (we will re-visit some of these later on), one is struck by the caricature-like, stilted characterization of the creationist’s position, by the deliberate blurring of the differences between facts and interpretations of facts. Evolution is presented as a single monolithic concept, and science is defined in such a way as to preclude any revelatory input.

In reality, science is about explaining the way everything about us operates. Conducting science may begin with observation, but even that is done with some theoretical framework in mind.

However, when students learn science, they are given information, gathered by previous generations of scientists. The importance is the **validity** of information, not its source.

Creationists maintain that just because scientific information was obtained supernaturally by

revelation, rather than by experimentation, it does not diminish its value. On the contrary, having a faith in the Source of the information renders it superior to any experimentally derived scientific datum and its interpretation.

Scientific data and their interpretations are not equivalent in value to biblical revelation about nature. Given that harmony must exist between the two, in case of conflict, biblical revelation must have supremacy.

“He who has knowledge of God and His word has a settled faith in the divinity of the Holy Scriptures. He does not test the Bible by man’s ideas of science. He brings these ideas to the test of the unerring standard. He knows that God’s word is truth, and truth can never contradict itself; whatever in the teaching of so-called science contradicts the truth of God’s revelation is mere human guesswork.

To the really wise, scientific research opens vast fields of thoughts and information. The ways of God as revealed in the natural world and in His dealings with man constitute a treasury from which every student in the school of Christ may draw” (3).

While the Bible is not a primer on science, it contains information of great relevance to science. This information is not falsifiable by testing, it can be accepted and utilized as foundational material or it can be rejected. The same may be said of evolutionary theories, in that if one version is shown to be incorrect, another variation of it is constructed. Contrary to Dr.

Dobzhansky's assertions, no version of evolutionary theory is compatible with the Bible. The clash is not between science and the Bible, but between evolutionary science and the Bible.

Creation: the foundation of biology and all sciences.

The coherence and meaning of the Holy Scriptures rest squarely on the creatorship of God. It is also foundational for building a biblically friendly biology curriculum. Biology, the study of life, rests on the pillars of physics and chemistry. Modern biology strongly overlaps chemistry, therefore it seems appropriate to enter into a discussion of biology between these two pillars.

When the Lord began to create the Earth, he did not use preexisting matter (4). From Einstein's equation $E=mc^2$ we surmise that the Creator converted some of His energy into matter. The mass of Earth is an estimated 6×10^{21} tons, which means that 5.4×10^{48} joules were needed just to bring the matter of our Earth into existence, an amount of energy to that could meet Earth's energy needs for 10^{27} years (5).

The relationship between the Creator and the physical matter of the universe needs to be better understood. There can be no question about the ownership of matter. But is there more here? Is it too far fetched to suggest that since matter is a stable form of some of His energy, the Creator has the capacity for absolute control over the inanimate world to the extent that He is able to track every atom?

The saying of Jesus that “the very hairs of your head are all numbered” (6), perhaps can be reformulated to “every atom of your being is numbered”. It is not that the Lord manipulates us through our atoms. Rather, the Creator is aware of every atom He created and has the ability to use them any way He wishes. This insight helps us appreciate how the Creator could multiply loaves and fishes, calm the sea of Galilee, or command Lazarus to walk out of his grave.

With the creation of matter, the Lord brought into existence a universe that is at least 30 orders of magnitude larger than the smallest object within it (7). New dimensions were created which could be populated with living beings. From the existence of radioactive elements we know that the matter of our world is of finite age. Had matter been in existence forever, there would be no radioactive elements. Assuming that at the birth of matter there were only parent isotopes present, (an assumption currently used by mainline science), it would seem that the matter of our Earth came into existence some 4-5 billion years ago.

A literal reading of the biblical account of creation and of the subsequent history of mankind does not readily allow for such enormous span of elapsed time. To be sure, many Adventists squeeze billions of years between verses 1 and 2 of Genesis chapter 1. But this contortion of the biblical text has a price. Now the word “creation” can refer only to the re-organization of a preexisting, “formless” planet and the creation of living organisms. The words of the Lord, etched in stone: “in six days the Lord made the heaven and the earth, the sea and all that in them is, and he rested on the seventh day” (8), lose their potency, if indeed creation of the heavens and the earth began 4.6 billion years ago.

From the narratives found in Genesis chapters 1 and 2, it is clear that many of the created entities, the trees in the garden of Eden, the animals, Adam and Eve were all brought into existence with an apparent age. It is therefore logical to assume that each of the 100 or so different elements, out of which everything was made, at creation contained their complements of isotopes, including some daughter elements of radioactive isotopes. Contrary to Dr. Dobzhansky's charge, this would not be trickery or game-playing on the part of the Creator, since the first man was personally briefed by the Creator as to his origins.

From biblical context, such as Job 38:7 ("the sons of God shouted with joy" at creation), Adventists understand that Genesis 1:1 refers to the formation of our planet and its immediate surroundings, including perhaps the solar system. Therefore we object to being characterized as ones who teach a 6000 year old Universe.

Scientific insights into the creation accounts of Genesis.

Living organisms first appeared on the third day of creation week in the form of robots. These machines, also known as plants, are the connecting link between Earth and its power source, the Sun. Without plants, the energy of the Sun could only warm the planet, but could not nourish it. It is the green solar panels of the plants, which capture a portion of the electromagnetic radiation of the Sun, utilize it to split water into hydrogen and oxygen. The oxygen is released for the benefit of all other organisms that respire air, and hydrogen is used to reduce carbon dioxide to

carbohydrates.

The carbohydrates are compact, portable pockets of energy, which when swallowed, absorbed and metabolized, release the solar energy to power the operation of the organism. The Genesis accounts are clear, that the Creator designed plants, nuts and fruits as the nutrients for all other organisms. There was no predation in the garden of Eden. But there must have been death: that of the plants which were eaten even before sin.

Non-plant organisms were created next, all possessing nervous systems, all able to move and interact with their environment. The Creator's command, given to birds and to marine organisms to multiply and fill their ecological niches indicates that they were equipped to adapt to their respective environments. That is, they could exist in relative isolation, as well as in larger communities.

Creationists do not claim that the Lord created essentially all species found today. Species are reproductively isolated groups of organisms, existing undoubtedly within the Genesis "kinds". Studies of hundreds of fruitfly species of Hawaii, for example, revealed that the difference between them is the order of genes on their chromosomes. The changes in gene order came about by stepwise mutations, and apparently all species were derived from one or two original species. This is an example of "microevolution", and creationists have no quarrel with it.

What creationists deny is that an organism from one "kind" is related to another "kind" of

organism through a common ancestor. There is no clear agreement as to what rank of taxonomy would the Genesis “kind” weigh in on the scale of phylum (highest)->class->order->family->genus->species (lowest). One possible level is above genus and below family (9).

Variation within each “kind” is implied in the Genesis account. One such “kind” is the human kind. By explaining that all humans are descendants of one pair, the implication of variability is clear. This variability among offsprings gives a true individuality to every being. We now know that all physical characteristics of individuals are determined by the nucleotide sequences of their genetic material. Variations among humans of the same race is caused not by mutations, but by differences in the levels of gene activities.

The genetic material of the parents is transmitted with extraordinary fidelity to the offsprings.

The error rate of copying DNA is one such event per 10 billion nucleotides copied (10).

Therefore the laws of genetics prevent large scale (from one family to another) variations.

Recent advances in genetics permitted the cloning of the sheep Dolly. She is genetically identical to another sheep, whose genetic material was used in the experiment. The first cloning procedure, however, was recorded in Genesis 2, where the Lord took the genetic material from Adam’s bone cells, modified it appropriately to create Eve. This was done in order to have a kinship between the first human couple.

Creation of living matter.

One of the biggest conundrum of modern evolution is the origin of life. Because of the complexity of living matter, and because there are fundamental similarities among all forms of life, it is assumed by evolutionists, that all life forms originated from a single, one celled primitive organism. In contrast, the biblical accounts in Genesis 1 and 2 describe separate creations of plants, aquatic organisms, birds and terrestrial animals and of humans.

Birds, animals and Adam were all created from the ground, indicating a qualitative similarity between them. And indeed, biochemists find a lot of similarities in the gross biochemical composition of all living matter, from bacteria to man.

More detail is given for Adam's creation: the Lord breathed into his nostrils the breath of life, and man became a living soul. A commonly held perception is that this "breath of life" is what distinguishes man from beast.

However, we read in Ecclesiastes 3: 19, that the same breath is in man and beast, nullifying that notion. Just because the Genesis account did not report animals receiving the breath of God, does not necessarily mean that they in fact, did not get it. After all, nothing is said about Eve receiving it either.

What is life?

It is appropriate at this point to discuss what life is. Even though entire disciplines revolve around manifestations of life; biology, microbiology, biochemistry, biophysics, it is difficult to

find extended considerations of this subject. Perhaps it is assumed that everyone knows what life is, but more likely, because it is a difficult subject. The scope of this presentation does not allow an extended consideration of this topic either, it is available elsewhere (11).

All life forms with which we are familiar in science are associated with matter. Life in the operational sense, is not a free standing entity, something that can be isolated and studied. Rather, life is a description of the behavior of very unique forms of matter. One definition of life is: "...the property or quality that distinguishes living organisms from dead organisms and inanimate matter, manifested in functions such as metabolism, growth, response to stimuli and reproduction " (12). The term "life" has multiple meaning, depending on what the type of matter it is applied to.

Illustrating this, imagine an unfortunate victim of a car accident. This person is alive in one minute and dead the next. However, his organs such as kidney, heart, liver or bones may be salvaged within a short period of time and transplanted into another body. The rescued organ will continue to live in its new environment. Cells from this organs may be put into an appropriate culture dish and can be maintained for extended periods of time. The life of the person (organism) has a different meaning than the life of an organ, which again is different from the life of a cell.

When a cell is taken apart, one finds water (70 % by weight), complex substances of proteins, nucleic acids, polysaccharides and fat-like material (26% by weight), a mixture of simple

metabolites (3% by weight) and inorganic salts (1% by weight). The shocking thing is that all of these substances are inert, lifeless. What happened to life when we took apart the living cell?

We may mix the constituent of the cell together, but we continue to get a lifeless, inert mixture of chemicals. Having available the most sophisticated laboratory equipments and biochemical techniques is of no help. We just cannot restore dead cells to life.

The living cell can be viewed as a chemical machine (Figure 1).

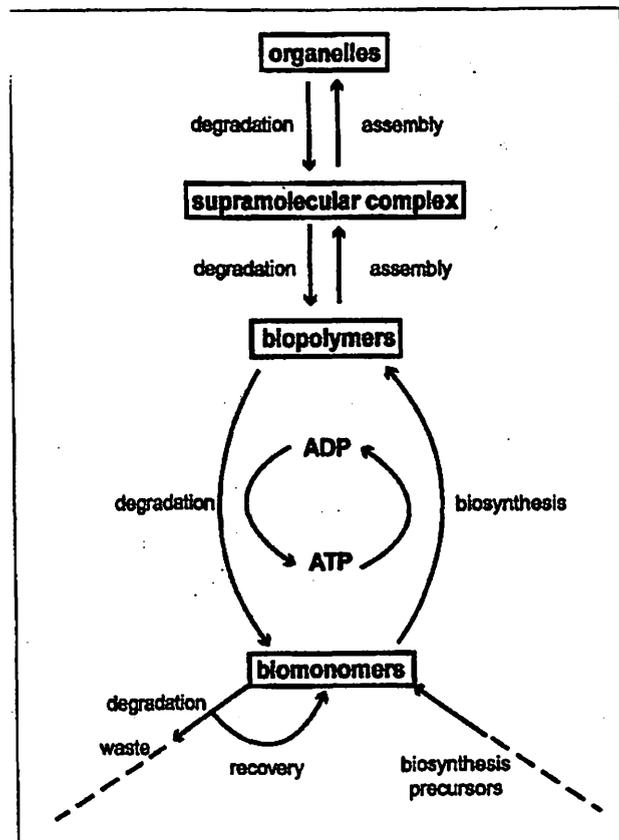
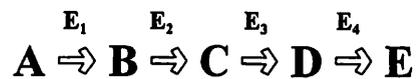


FIGURE 1.

It absorbs simple substances that contain carbon, nitrogen, sulfur and phosphorus and converts these into the biomonomers, amino acids, nucleotides, monosaccharides, fatty acids and glycerol. The biomonomers are polymerized into proteins, nucleic acids, polysaccharides and lipids. These, in turn, are built into cellular complexes such as ribosomes and membranes. The complexes are combined to form subcellular organelles such as the mitochondrion, endoplasmic reticulum, nucleus etc. Then the process reverses, and degradation occurs, so that the cell always uses freshly made, brand new components.

These simultaneous processes happen because of the coordinated work of chemical assembly lines, called biochemical pathways. Schematically a pathway may be represented as:



where $\mathbf{A} \Rightarrow \mathbf{E}$ are metabolites, and $\mathbf{E}_1 \Rightarrow \mathbf{E}_4$ are enzymes, biochemical catalysts. The role of catalysts is to speed up chemical conversions. Isolated chemical reactions reach their end points at a state called “equilibrium”. At equilibrium, no further chemical changes are possible. It would be disastrous for the biochemical assembly line if, for example, equilibrium state would set in at step number 3. The intermediate \mathbf{C} would accumulate first, then \mathbf{B} and finally \mathbf{A} . It would be equivalent to a metabolic block at step number 3.

In the living cell, the end products of each metabolic pathway are utilized, permitting the

continuous, steady flux of molecules through the pathways. If there is an accumulation of the substance **E**, it will interact with the first enzyme of the pathway (**E1**), preventing it from catalyzing the first step. This shuts down the assembly line. Such strategies permit each chemical reaction of the pathway to remain in a non-equilibrium state. Cellular life depends on the simultaneous non-equilibrium operation of hundreds to thousands of chemical reactions.

Live bacterial cells, such *Escherichia coli* may be treated with a few drops of the solvent toluene. It creates holes in the cytoplasmic membrane of the cell, causing a leak of the small metabolites out of the cell. This will lead to the loss of the energy generating mechanism of the cell, which in turn will result in the stoppage of various key chemical conversions. The end result is, all of the reactions will reach their equilibria, and the cell dies.

Now we have a dead cell at hand. All of its proteins, nucleic acids, organelles are in place, positioned correctly, yet nothing happens, because the reactions are at equilibria. In order to revive the cell it would be necessary to patch up the hole in the cytoplasmic membrane, and restore simultaneously the non-equilibrium status of all pathways. If we had the ability to manipulate individual molecules, carrying them across membranes we would be in business. Only the Creator can do this. By having absolute control over matter, He can direct molecules to their appropriate places, restoring the non-equilibrium states of reactions.

So we can imagine, that at creation the Lord first built the necessary structures which were chemically at equilibrium. Then, when he “breathed” into his creations, the non-equilibrium

states of biochemical pathways were established and life started. Biologists tell us that “life comes only from life “. Thus creation resulted in the ignition of biochemical chain reactions, which continue to our day.

All hypothetical “primordial earth” scenarios, which purport to suggest how life may have sprung into existence are bankrupt. Besides failing to show how information containing, biologically relevant biopolymers could arise, (a topic not covered here), they are also unable to show how the non-equilibrium states of biochemical pathways could come about spontaneously.

Biblical comments relevant to biology.

“God blessed them and said to them...Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground” (13). This mandate given to mankind implies the call to study nature and to do some good biology. In order to get man started the Lord prompted Adam for some serious taxonomy: “Now the Lord God had formed out of the ground all the beasts of the field and all the birds of the air. He brought them to the man to see what he would name them; and whatever the man called each living creature, that was its name” (14). The Creator had the right to name the creations of His hands, but He deferred to Adam. Thus the first man was drawn into the creation process .

“God saw that all that he had made and it was very good...Thus the heavens and the earth were completed in all their vast array” (15). It does not take a great deal of sophistication to realize

that nature has changed for the worse, since creation. The second part of this quotation closes the door on the idea, suggested by Dr. Dobzhansky, that the Lord is still in the business of creation, via evolution. Creationists are correct in insisting that creation was finished at the end of creation week. As we have seen before, the created kinds were endowed with the ability to vary and adapt within their genetic boundaries.

The discrepancy between the current biological world and the one described in Genesis chapters one and two is an evidence that Genesis chapter 3 is also factual. The presence of destructive biological agents, viruses, prions can only be accounted for as the works of an evil genius, out to sabotage the created world. Jesus identifies this malevolent person as the “enemy” (16).

Fossils.

The extensive coal and oil deposits world wide testify to the historical reality of the great Flood (17). Fossil remains of organisms give abundant opportunity for the study of pre-flood biology. Mainline science assigns great ages to the fossil remains and uses them as evidence for the reality of evolution. In a recent publication, Dr. Ariel Roth presents a balanced discussion of these issues (18).

Interdependency among organisms and cycles.

Other than photo-autotrophic microorganisms, all organisms in the biosphere are dependent on

other organisms for their survival. Plants need nitrogen fixing microorganisms to utilize the great abundance of nitrogen of the air. Plants are food for a large proportion of the animal world, and indirectly even for carnivores. Thus most living organisms, directly or indirectly run on solar energy.

Oxygen of the air combines with carbon and hydrogen of carbohydrates during metabolism and respiration in all organisms, to form carbon dioxide and water. These molecules in turn, are reformulated by plants to oxygen and carbohydrates by plants through photosynthesis (Figure 2).

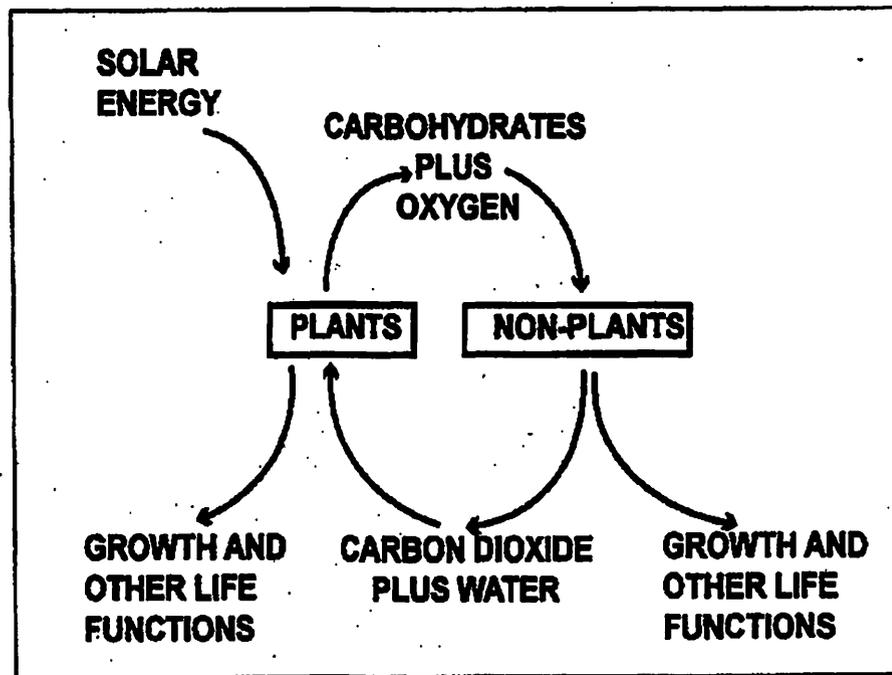


FIGURE 2.

Microorganisms of the soil degrade dead organic substances, enabling the recycling of the

elements carbon, nitrogen, sulfur and phosphorus. The dogma of “metabolic infallibility” states that every naturally occurring organic substance is biodegradable. By these means every organism is linked into a giant solar energy utilizing network. Therefore we have a seamless integration of Earth’s rotation around the Sun with life on our planet. Is it far fetched to suggest that the Creator of the Sun and the Earth is also the Engineer who designed the solar powered living organisms?

These considerations help us appreciate the need for biochemical similarities among organisms. If we all use similar substances for our energy, carbon, nitrogen etc. needs, our metabolic machines will also resemble each other. Thus we see molecular homologies among organisms. Creationists maintain that these reflect the signature of a common designer, rather than being an evidence of common ancestry.

Evidences of design in nature.

In recent years arguments for design in nature have resurfaced with renewed power. William Dembski introduced an algorithm using the laws of probability. Analysis of an event passes through three “filters”: high probability, intermediate probability and small probability. Events of small probability are examined whether they were specified in advance. If they were, the event is judged deliberate, hence intelligently designed (20). Michael Behe showed that when biochemical systems are analyzed, one comes to a point called “irreducible complexity”, which is the minimal essential for the function of the system. Removal of any part of such a complex

renders it useless. The presence of such irreducible complex systems in living matter is an evidence for design (20)

Another way to show design in nature is based on the observation, that when pre-designed components of manufactured goods are assembled, a new function emerges. Thus one ends up with a car, when gears, pistons, sheet metal, wheels and thousands of other components are appropriately assembled. It is possible to arrange the levels of our reality in a hierarchical scale from energy to the universe, where each level acquires a new function (11). This is shown in Figure 3.

LEVELS OF REALITY	NEW FUNCTION
Energy	_____
↓	
Subatomic particles	Stabilization of energy
↓	
Atoms	Shape, substance, chemical properties
↓	
Molecules	Novel chemical properties
↓	
Cells	Life
↓	
Organs	Specialized tasks needed by multicellular organisms
↓	
Organisms	Complex life forms
↓	
Ecosystems	Localized interaction among life forms
↓	
Biosphere of Earth	Global interaction among life forms
↓	
Solar System	(relationships are not clear)
↓	
Universe	(relationships are not clear)

FIGURE 3.

A logical way to account for the new function at each level of increased complexity is to suppose the universe has been designed. Living organisms fit remarkably well into this hierarchical order of reality. It almost appears that this reality was designed for the sake of living organisms.

Summary.

This brief essay intended to show that the great principle of creation as given in the Bible, is still up to date. In fact, we can be confident that the new discoveries will only strengthen the case for creation. "Since the book of nature and the book of revelation bear the impress of the same master mind, they cannot but speak in harmony" (21). The time will come when scientists at large will be forced to acknowledge that "nothing in biology makes sense except in the light of creation".

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4. White, E. G. The Faith I Live By. p25.
5. The mass of the Earth is 6×10^{27} g, $c = 3 \times 10^{10}$ c m/sec, $E = 5.4 \times 10^{48}$ g cm^2/sec^2 . (1 joule = cm x dyne, 1 dyne = g x cm/sec^2)
6. Mathew 10:30
7. The universe is estimated to have a diameter of 13×10^9 light years, (1 light year is 9.4×10^{17} cm), or 1.22×10^{18} cm. The nucleus of an atom has a diameter of 1×10^{-12} cm. Thus we have a 10^{30} range between the atomic nucleus and the diameter of the universe.
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