

A chemistry professor reflects on how he maintained his faith amidst the struggles of graduate studies.

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The words stunned me. Having started graduate school, I was eager to get started on research. I met with all my

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by
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chemistry professors to get to know them, their current research interests, and any potential for my own future. I went back to one professor I liked best. He suggested that I help him develop a classification system for plants and animals based on biochemical evolution.

After listening carefully to his proposal, I said, “I don’t believe that I would be very effective on that project.”

“Why not?” asked my professor.

“Well, I can’t really put my whole heart into the project. I don’t believe in evolution. I am a Seventh-day Adventist who believes in the Bible and its account of Creation.”

Now it was the professor’s turn to be stunned. But he was in charge. “You’ll never make it through graduate school with that kind of attitude,” he said. “The Bible is full of errors. You and I could sit down and write a better and more accurate book than that.”

I was not convinced, but he went on for a long time with his monologue. Finally, he asked if I still wanted to work for him as a graduate assistant.

“Yes,” I said, “but would it be held against me if I do not accept your views on evolution?”

The professor was fair. “I’ll teach it to you,” he said, “and expect you to give

it back to me in an examination. But I can’t make you believe it.”

Thus began a great working relationship. From then on, I was the unbeliever who was called to witness any new discoveries in the biochemical evolution research he carried on with another of his graduate students. My professor was internationally respected for his research in steroid biochemistry. For a short time, I wondered if it was possible that he was right and I was wrong on how life came into being.

A universal biosynthetic pathway

As my professor shared his data and ideas with me, it soon became clear that frequently what he considered data supporting evolutionary concepts were for me powerful evidences of the wisdom and creative handiwork of God.

Consider, for example, what my professor, Dr. William R. Nes, called a “universal biosynthetic pathway,” so called because portions of it are used by every species and by most tissue types. It starts with molecules of food (primarily carbohydrates and fats) being broken into fragments containing two carbon atoms forming a key structure known as acetyl coenzyme A. Some of this is oxidized to CO₂ and H₂O releasing energy, mostly as ATP (adenosine triphosphate). Most of the remainder is used to synthesize another crucial intermediate compound containing five carbon atoms called isopentenylpyrophosphate. This compound serves as a starting material for the synthesis of hundreds of important natural products. Some contain 10 or 15 carbon atoms as in fragrances of many flowers, citrus fruits, some seasonings and medicinal oils. Vitamin A contains 20 carbons while the closely related carotene pigments contain 40. When two C₁₅ branched compounds are linked together, they form a C₃₀ compound that cyclizes to produce steroids like cholesterol, cortisone, and sex hormones. Steroids produced by this pathway are found in all major groups of organisms, from blue-green algae to humans.¹

Interpretation

But this very data—that plants, animals, and humans use some of the same chemical reactions controlled by similar enzymes to provide for various needs—raises an important question. Does

it prove that plants, animals, and humans share a common ancestor or a common Creator? Proving involves providing evidence or argument sufficient to induce belief. Interpretation of data does not necessarily prove anything. Let's look at two alternative interpretations of this evidence, neither of which constitutes proof.

The first one is from biochemists. "Biological evolution can be traced through the fossil record or by directly comparing the sequences of genes and proteins. These observations suggest that all of the millions of species that exist today have descended from a single ancestor that lived several billion years ago. This ancient ancestral cell was undoubtedly capable of glycolysis (breakdown of glucose) and many of the other fundamental biochemical processes that are common to all cells. It could synthesize amino acids and lipids, and almost certainly used ATP as the fundamental unit of energy. It used the same genetic code that we find in its modern descendants. How the ancestral cell evolved from simpler organisms is an unsolved problem. The origin of life itself, an event that occurred more than three billion years ago, is the subject of much speculation."² To this a biologist adds: "If two species have libraries of genes and proteins with sequences of monomers that match closely, the sequences *must* have been copied from a common ancestor."³

The second interpretation comes from a creationist perspective. God created plants and animals with the need for energy sources and respiration. He made the plants capable of carrying on photosynthesis so that energy from the sun could be used to synthesize organic compounds that could serve as energy sources for plants and animals. Both of them would metabolize the same kinds of compounds and need the same or similar enzymes to carry out the metabolism. Since the enzymes are proteins with a particular amino acid sequence and particular shapes, they need specific DNA sequences containing the coded information as to how to synthesize the enzymes. Thus one would expect to find some DNA nucleotide base sequences in plants, animals, and humans that are comparable. The glycolysis pathway should exist in all living systems that obtain their energy through respiration associated with oxidation of glucose.

A dilemma

Both of the above interpretations are based on unstated, unproven assumptions. Which interpretation is correct? How can we decide which position to take? Unfortunately, science does not give us a clear way to determine the validity of one of two competing paradigms. (A paradigm is a cluster of broad conceptual and methodological presuppositions that shape one's view of the world and one's interpretation thereof.) As I. G. Barbour argues, "Competing paradigms offer differing judgments as to what sort of solutions are acceptable. There are no external standards on which to base a choice between paradigms, for standards are themselves products of paradigms. One can assess theories within the framework of a paradigm, but in a debate among paradigms there are no objective criteria. Paradigms cannot be falsified and are highly resistant to change."⁴

Approaches to the dilemma

Faced with this problem, some scientists take the position that they will accept as data only those things that are verifiable and that depend solely on intellect to interpret the data. Unfortunately, this approach has its weaknesses. For there is no such thing as "bare uninterpreted data." All data are theory-laden. In other words, the paradigm used by a scientist influences the kind of data collected and the observations ignored.

A second approach to the dilemma of conflicting paradigms is the one I have chosen. I admit that my knowledge and understanding are limited and that the models I create in my mind of what reality is like are imperfect and incomplete. Therefore, I will not restrict my search for understanding the world to the reproducible data that others and I can collect in the laboratory. In building my paradigm, I am willing to use the data reported by credible witnesses of events that are impossible for me to observe. For instance, I did not observe the life, death, and resurrection of Jesus Christ, but they are a matter of biblical and historical record. Christ promised that He would send another Comforter who would guide us into all truth (John 16:13). This Helper is omnipotent, omniscient, and omnipresent. A portion of His work of guiding us into all truth was to inspire holy men of God to write

the books of the Bible (1 Peter 1:19-21). All Scripture, produced under the direction of the omniscient Holy Spirit, is valuable to me in my personal development and in helping me to put my observations of nature into proper perspective.

The Scripture gives me added data reported by credible witnesses to use in forming my paradigm. I find 11 Old Testament books and 10 New Testament ones that deal with Creation. The Holy Spirit, who inspired the writing of the Bible, was an active eye witness of the process of creation (Genesis 1). Christ, the eyewitness creator (John 1), repeatedly expressed His belief in creation (Mark 10:6; 13:19; Revelation 1:4, 5; 4:11; 22:16). Even angels validate testimony by swearing by the highest authority in the universe—the Creator of heaven and earth, the sea and everything in them (Revelation 10:5, 6). It seems reasonable to choose the paradigm that does not arbitrarily reject this eyewitness data.

The Scripture also informs us that before Christ comes again there will exist two prominent groups who hold conflicting paradigms. The description of one group is found in Revelation 14:6-12. Those who proclaim the good news of salvation and judgment and believe that God deserves reverence and worship because He is the Creator. They persevere in keeping His commandments, including the Sabbath, which is a memorial of Creation. They maintain their faith in their Creator-Saviour. This ongoing relationship with Him strongly influences how they view the world and how they interpret the data that floods in upon them.

The second group with a conflicting paradigm is predicted in 2 Peter 3:3-6. This group has a worldview that disregards the promises of God as dependable and follows their own inclinations. They promote uniformitarian concepts and ignore the fact that God spoke the world into existence. They forget that God formed the earth out of the waters through movement of the waters and through the force of rapidly moving waters. They forget that the same waters, used in a creative way in the creation of the earth, were used in a judgment process during the Flood, which again changed the earth's form.

A deliberate choice

The prophetic description of these two last-day conflicting paradigms makes it clear that the tensions between creationists and evolutionists are not likely to vanish before Christ's second coming. Accepting either paradigm involves a deliberate choice. It is a decision regarding where to put your faith. One group places faith and trust in the Creator-Redeemer and interprets the events and observations of the world in the light of His revealed Word under the guidance of the Holy Spirit. Others place their faith in their own ability to interpret accurately their observations of the world using the methods of science without assistance from any outside source. They consider their conclusions to be more accurate than conclusions based on the revelation of our Creator-God. That attitude was reflected in my professor's comment, "You and I could sit down and write a better, more accurate book than the Bible."

Ontogeny recapitulates phylogeny?

We can gain additional insight by focusing on the concept that was the basis of my professor's research in biochemical evolution. The concept came from Ernst Haeckel, who for a half-century beginning in the 1860s vigorously promoted the idea that ontogeny recapitulates phylogeny. This theory originally meant that the developing embryo passes through phases resembling the adult stages of its simpler evolutionary ancestors. Haeckel's enthusiasm was so great for his version of the Darwinian concepts of evolution that most of a generation of biologists chose to specialize in embryology as a way to investigate the evolutionary process.

When my professor published the results of the research that I had declined to perform, he wrote that he was conducting "a study of biosynthetic sequences in immature tissues which has been designed to approach the problem of evolution from the standpoint of ontogenetic recapitulation of phylogenesis."⁵ In a subsequent article, he expanded on this terse statement by writing, "In our previous paper we suggested that germinating seeds might recapitulate their evolutionary history at a chemical level."⁶ He was using a theory that had been the source of endless, fruitless arguments among biologists for nearly a half century beginning in the 1860s. As the number of

objections and anomalies to the theory mounted, so did the number of adjustments to the theory. In describing the decline and fall of this theory, Gould⁷ claims that the theory was never proved wrong by amassing anomalies to the theory, but suffered benign neglect and was abandoned.

Nes accumulated considerable biochemical data, which he organized under "organismic relationships." He still had hopes of success with this project, but he admitted that he was having problems. "The primary complication (but not the only one) lies in the definition of more or less advanced."⁸ What is a simple reaction that simple organisms could perform and what is a more complex reaction that could be performed by the embryo of a more advanced species late in its development? Molecular evolutionists are still seeking to understand the evolution of large molecules and to reconstruct the phylogeny of organisms from macromolecular information.

A lesson to remember

My experience as a graduate student in this field of study did place my faith under trial and test. But my faith remained steady and constant in student days and in professional life as a scientist. I do practice my faith and I do teach science. But what I have learned is indispensable: When faith is under siege, we need not surrender. Here are some pointers:

1. *Don't panic.* If you find some new anomaly to your present paradigm built on faith in God, don't panic. You may be able to accommodate it by a minor adjustment of your paradigm without diminishing your faith in your Creator or His written Word.
2. *Think constructively.* If a minor adjustment is not an option, then do something constructive by starting a research project to gain more understanding of the anomaly. As your understanding increases, the subject may no longer be an anomaly or only require minor adjustment, or it may prove to be an unimportant or insignificant issue.
3. *Think creatively.* History shows that we may experience less frustration and make greater

progress in understanding if we devote less effort to direct attack on the competing paradigms and more toward finding new creative approaches to investigating the problem.

4. *Place your faith where it counts.* All paradigms have anomalies, and you may have to live for a while with some unresolved questions. Remember that your choice among the conflicting paradigms is a matter of where you place your faith. May you place it where it really counts!

By the way, I did finish graduate school with a doctoral degree in chemistry. Dr. Nes, my major professor, was always courteous and helpful. He respected my Sabbath observance and served as mentor for my dissertation. When we said farewell after graduation, he stated, "It will be a long time before I have another graduate student like you!"

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Notes and references

1. W. R. Nes and M. L. McKean, *Biochemistry of Steroids and Other Isoprenoids* (Baltimore, 1977), pp. 412-414.
2. H. R. Horton and others, *Principles of Biochemistry* (Englewood Cliffs, N. J.: Neil Patterson Publishers, Prentice Hall, 1993), p. 24.
3. N. A. Campbell, *Biology* (Redwood City, Calif.: The Benjamin/Cummings Publishing Co. Inc., 1993), pp. 434, 435.
4. I. G. Barbour, *Myths, Models and Paradigms* (New York: Harper & Row Publishers, 1974), pp. 95-113.
5. D. J. Baisted, E. Capstack and W. R. Nes, "The Biosynthesis of *B*-Amyrin and *B*-Sitossterol in Germinating Seeds of *Pisum sativum*," *Biochemistry* 1 (1962), pp. 537-541.
6. E. Capstack, Jr., D. J. Baisted, W. W. Newschwander, G. Blondin, N. L. Rosin, and W. R. Nes, "The Biosynthesis of Squalene in Germinating Seeds of *Pisum sativum*," *Biochemistry* 1 (1962), pp. 1178-1183.
7. S. J. Gould, *Ontogeny and Phylogeny* (Cambridge: The Belknap Press of Harvard University Press, 1977), Ch. 6.
8. Nes, *op. cit.*