



Creative Evolution

A Quantum Resolution between Darwinism and Intelligent Design

By Amit Goswami, Ph.D.

Excerpted from CHAPTER 1
God and a New Biology

So Where's the Problem?

Many people dismiss the idea of intelligent design offhand because “everybody knows” that Darwin and his followers have shown evolution rules out intelligent design and a designer. It is true that Darwin’s much-touted theory tries to explain evolution without invoking the concept of intelligent design. However, it is also true that, according to Darwin’s theory, evolution is continuous and should produce a continuous fossil record of all evolution. Unfortunately, the fossil records show glaring gaps at many important junctures. In other words, evolution is not only continuous but also discontinuous (Eldredge and Gould 1972). Evolution has been compared to punctuated prose: The punctuation marks are discontinuities in otherwise continuous text. Darwinism cannot provide a fully credible explanation of such discontinuity. In this book, I take the discontinuity in biological evolution seriously and show that, like the well-known discontinuous jumps of our own creative experiences (Harman and Reingold 1984), the fossil gaps are signatures of biological creativity. And creativity is a definitive sign of intelligence. In this way, I show that evolution proves intelligent design.

However, creativity and intelligent design also imply a creative and intelligent designer, or, as I term it, a nonphysical and nonmaterial organizing principle. Such organizing principles have been proposed in biology from time to time, but until now it has not been clear how this kind of organizing principle could operate within a scientific framework. In this book I will show that some recent developments in quantum physics and elsewhere are telling us how much-needed nonphysical and nonmaterial organizing principles can be incorporated in biology.

Every biologist must be painfully aware that biology is an incomplete science. It needs new organizing principles, ones that are nonphysical and nonmaterial, to explain three perennial

mysteries: the difference between life and nonlife (Davies 1988), the development of an embryo into an adult biological form (Sheldrake 1981), and, as emphasized here and by Eldredge and Gould (1971), the discontinuous epochs of evolution. Unfortunately, it is not politically correct for a biologist to admit these shortcomings in public. In this book, I will show that the introduction of new, nonphysical and nonmaterial organizing principles (yes, principles, plural; we need more than one) can complete biology as a science. In this way I will set a framework from which biologists can work to rid their field of the paradoxes, controversies, and anomalies that have plagued it from its very inception to the present, including the highly politicized controversy pitting evolutionism against creationism and theories of intelligent design.

What Is Intelligent Design?

In the public arena, the challengers who have gotten the most visible support are those who challenge the idea of evolution itself. Suppose there is no evolution; it is a fact that the fossil data indicate much stasis; many organisms seem not to change for long periods of geological time. The challengers posit the following: Suppose that, instead of being the result of evolution, all life is the result of *intelligent design* by a designer who acts all at once. Certain biological forms are too complex to have originated through chance and necessity, these challengers maintain.

Some intelligent design theorists resort to an old philosophy called *creationism*, following the Genesis chapter of the Old Testament of the Bible (Gish 1978). This theory flatly declares that God created the world and all the biological species six thousand years ago in six days: There is no evolution.

The idea of creation by God is an aspect of God's *downward causation*. The term reflects the tendency to picture God as an emperor sitting on a throne "up there" in the heavens, brandishing the causal wand of downward creation in His hand. Such anthropomorphic pictures of God irritate scientists (and probably many nonscientists as well).

The resurgence of creationism as an alternative to evolutionism has increased the stakes, because the context of the controversy has reverted to the old struggle for "worldview control" between science and the Christian church, and so a lot of negative emotion has been generated. Scientists feel invaded by theology: How can it be called science when an idea of faith (the Biblical God) is brought to bear on science? On the face of it, creationism does sound

unscientific, even to an unprejudiced reader, because of its Biblical origin; it is true that the validity of the Bible is based on faith, not experimental data.

Can religion be taken out of this debate? More recently, some serious scientists, among them some professional biologists, have begun positing the idea that species are created by an intelligent designer—maybe God, but it is kept implicit—without subscribing to the Biblical baggage. In scientific language, this “causal creation by the intelligent designer” is just another organizing principle, albeit a nonphysical and nonmaterial one.

Any perceptive person can see design in life. Can that intelligent design come from linear, step-by-incremental-step chance and necessity? In spite of all the time available for chance and necessity to do their thing, detailed reasoning and probability calculations by the intelligent design theorists and their sympathizers (Shapiro 1986; Behe 1996) raise legitimate doubts about the validity of Darwinism as a mechanism for producing the complicated, often nonlinear designs that life exhibits. These doubts certainly justify scientific consideration of alternatives to Darwinism. If such an alternative involves the introduction of additional organizing principles in biology, so be it.

What Do the Data Say?

In science, experimental results are the final arbiter; if data falsify the predictions of a theory, we must give up the theory, or at least suitably modify its scope. So let us look at data.

Biologists claim that creationism does not stack up well against that ultimate scientific test. This claim is correct. In creationist theory, God created the world six thousand years ago in just six days. This statement has been falsified beyond doubt; much geological and even physical data (radioactive dating) exist to show convincingly that the Earth is about five billion years old.

But the creationists make an equally valid claim that Darwin’s theory of evolution is falsified because of the fossil gaps. One of Darwin’s major theoretical predictions was that gaps would eventually fill up as we perfect our empirical investigations; many later biologists have expressed similar optimism. Well, we have perfected the techniques of empirical investigation, and just as the age of the Earth can today be stated accurately, so can one state accurately that the fossil gaps are mostly real: They’re here to stay.

To be sure, a few intermediates have caused a stir. For example, in reports of intermediates by the biologist J. G. M. Thewissen and his collaborators (1994), much is made

of an intermediate fossil found for an animal that could move both in land and in water, a land-walking whale, so to speak. But how many such cases exist today? A thorough search of the Internet yields only about fifty cases of intermediates in the entire fish-amphibian-reptilian lineage of about forty-two thousand species.

The discovery of intermediates is important because it discredits creationism in favor of evolutionism; unfortunately, evolutionism is not the same thing as Darwinism. I repeat: According to theoretical predictions of Darwinism and its later versions, there should have been thousands upon thousands of reported cases of intermediates filling up most of the fossil gaps. That hasn't happened, and therefore the question of the fossil gaps cannot be refuted simply because a few cases of transitional fossils have been found.

Because both creationism and Darwinism are based on faulty philosophy and both are falsified in part by the data, should we give them up entirely? No, there is a middle ground.

In spite of the fossil gaps, evolutionism does have a solid empirical fact on its side: Some species have so much in common that the idea of a common origin, a tree of life, so to speak, seems unavoidably obvious. Darwin's original idea about such similarities (called homology) has now been corroborated with very convincing data (Carroll 2005). Such a tree has gaps in it, to be sure (fig. 1), reflecting the fossil gaps. But the idea that species evolve from ancestors is too consistent with the data to give up in favor of the alternative, as presented by creationism and intelligent design theory, that God created all species all at once, independently of one another.

Further support for the idea of evolutionary ancestry comes from embryology. In some species, embryos at early stages of development so clearly resemble other species that we are forced to conclude that the former must have evolved from the latter (Wolpert 1993). So creationists and intelligent design theorists miss the boat when they deny entirely the idea of evolution. "Evolution, no; God, yes" is not an empirically valid approach.

Intelligent design theorists implicitly fall prey to the Christian notion that God's design, like God, must be always perfect, from the get-go. Empirically, it is easy to see that God's design has many imperfections (for example, the intermediates mentioned above). Instead of making additional dualistic assumptions about reality to deal with these imperfections (such as assuming a split between good and evil), why not assume that the design is not perfect initially, but rather evolves toward perfection? This choice makes evolution and God quite inclusive of each other.

The revised motto is “Darwinism, no; evolution, yes; God, yes.” Even Darwinism must be given its due. It stands up as an acceptable theory for the continuous epochs of evolution; it’s just not a *complete* theory of evolution.

Intelligent Design without a Designer?

Darwinists, and, inexplicably, most biologists with them, resort to sleight of hand here. They do not deny the intelligence that exists in living organisms: That is too obvious to deny. Instead, they claim that the intelligence of life forms has no causal efficacy (Dawkins 1976). The intelligence of an organism is simply one way the organism’s genes ensure their survival. This idea is an offshoot of genetic determinism. How then does the intelligence of an organism, its ability to process meaning, feeling, consciousness, and all that, develop? According to the Darwinist, it develops not because an intelligent designer made life with those causally efficacious qualities, but because the organism obtains a selective advantage by having them. They are adaptive emergent qualities.

This argument does not make good biology, and for a very good reason. Animal and human behavior clearly shows that a play of real intelligence with causal efficacy exists in living organisms. Furthermore, the ability of organisms, especially humans, to process meaning with creativity and purpose—as supported by much of our own experience and by objective data—indicates causal efficacy. Witness all the creative work by the many scientists of the twentieth century alone that has causally “disturbed the universe.” Think of the discoveries in relativity and nuclear physics that made possible the atomic bomb—and the consequent destruction. That work cannot be dismissed as an example of genetic determinism. If the design shows both intelligence and causal efficacy, the concept of an intelligent and purposive designer cannot be dismissed offhand.

Furthermore, depending on the idea of adaptive advantage for the emergence of all things unexplainable by biology—among them feeling, meaning and purpose, and indeed consciousness itself—is no less foolhardy than the old religionists’ attempt to account for everything inexplicable as acts of God. Matter just isn’t up to the task of handling those things: Scientists and philosophers have been able to argue quite compellingly that matter cannot process meaning (Penrose 1989; Searle 1994) or produce consciousness (Chalmers 1995). In the most rudimentary form, their arguments are quite easy to follow:

- To see why matter cannot process meaning, consider trying to program a computer to process meaning. Computers are symbol-processing machines, so you start by reserving some symbols for processing meaning. But a little thought tells you that now you need more symbols to keep track of the meaning of the meaning symbols. This dance goes on ad infinitum. In other words, there isn't a computer large enough to process meaning.
- Matter consists of objects. Properties of complex objects can be reduced to the movement of other simpler objects. Conglomerates of simple objects can be used to explain the workings of a bigger complex object. So if consciousness were an object, certainly an entirely objective explanation could be found. But how do you experience consciousness? Does it not have a subjective component as well as an objective one? In other words, don't you experience your consciousness as a subject looking at object(s)? But an objective explanation can never be given for the subjective aspect of consciousness. In other words, materialism can never fully explain consciousness.

If matter cannot even process meaning or organize consciousness, how then can matter produce meaning and consciousness as adaptive epiphenomena from which nature may select?

Seeking a Middle Ground

That the fossil data have gaps clearly suggests to some biologists that there are two tempos of evolution, one slow and one fast (Simpson 1944; Eldredge and Gould 1972, 1977; Grant 1977). The idea is that during the fast epochs of evolution, there just isn't enough time for fossils to form, hence the fossil gaps. In Niles Eldredge and Stephen Jay Gould's very evocative description, evolution is like continuous prose modulated by punctuation marks—commas and periods. Darwinism is a theory of slow-tempo evolution; it can only explain the continuous prose. So what is the mechanism behind the fast tempo of evolution, the punctuation marks? A mystery is created. Instead of dealing with the mystery, establishment biologists busily look for theories to explain away the fossil gaps without introducing the inconvenience of a fast tempo. No fast tempo, no new mechanism. Slow and reliable Darwinist chance and necessity will do!

Among such theories, the most successful in terms of popularity, and the one cited in textbooks, is the geographical isolation theory of the theoretical biologist Ernst Mayr (1942).

Suppose that a small population of a certain species gets geographically isolated (by a mountain range, for example) for a period of time. During that period, because the environmental challenges are different, natural selection would lead to the evolution of different traits for the two populations so separated. This isolation can easily lead to a situation in which the two populations, when they come together again, can no longer mate with one another. In other words, the two populations have become reproductively isolated, which is the current definition of speciation, the change of one species into another. Additionally, in a small population, the gene mutation rate increases, so that a population may become reproductively isolated rather quickly.

The theory fails in several ways. Invented as a response to a specific problem, the theory is unverifiable (and thus not truly a scientific theory), simply because it is impossible to create such a scenario for empirical study. A more important question, however, is this: Can geographical isolation explain the data on fossil gaps in *all* cases of speciation? No, it cannot. It certainly is a viable explanation of speciation for what we call microevolution, the evolution of simple organisms involving only a few genetic changes. However, it cannot explain macroevolution, or evolution of new species involving a large number of genetic changes. The reason is subtle, as I will show next.

Probability calculations alone preclude Darwinism's ability to explain all evolution, whether micro or macro. I have cited biologist Robert Shapiro's (1986) work earlier in this chapter. Shapiro showed that the maximum number of chance events available over a billion years of evolution is 2.5×10^{51} . The astrophysicist Arne Wyller (2003), on the basis of very conservative assumptions, deduced that to create the billion multicellular species that have ever existed on Earth until now (according to the Harvard biologist Richard Lewontin) requires more than $10^{1000000000000}$ chance events. This figure is obviously far, far, far greater than the maximum number of chance events available as calculated by Shapiro.

Either way, we are forced to the conclusion that there must be alternative routes that complement Darwinian evolution. Mere chance and necessity cannot do it all. Biologists have to face up to this compromise.

But religionists must also recognize the need to compromise. Suppose you are willing to see the intelligent designer not as a God or emperor sitting on a throne "up there," but as a new, objective organizing principle capable of causation. As mentioned earlier, this mode of action can be called downward causation, but only to contrast it with the upward causation of materialist vintage. Suppose further that you realize the six days of Biblical Genesis could be a

metaphor for all the fast-evolution epochs that the punctuation theorists Niles Eldredge and Stephen Jay Gould have proposed to explain the fossil gaps. Finally, you acknowledge that creativity is empirically known to be sudden, instantaneous. You might now find yourself at a startling conclusion: Downward causation by God is the organizing principle for species creation during the epochs of fast tempo. During those epochs God intervenes, so to speak, and creates new species not from scratch, but out of the existing manifestations. In this view—what I call creative evolution—creationist and intelligent design theories and Darwinism are both vindicated, in the main. They can live together, and more. Together they can explain both tempos of evolution, fast and slow, and the main ideas of both theories are integrated.

How do the odds work out for creative evolution? This is where God's purposiveness enters in a major way. Just as a creative artist can create new work against all odds because he has a template in mind, God is able to evolve the new because She too has a purposive blueprint in mind (for more on this, see chapter 4).

By entertaining the idea of an intelligent designer capable of downward causation (call this designer God or not), we still face a genuine scientific problem. It can be posed this way: How does a supposedly nonmaterial designer (it has to be nonmaterial, not bound by material laws, which allow only upward causation) interact with the world of matter to design anything? This is the previously stated problem of dualism.

If the idea of downward causation were an isolated idea invented to solve the special problems of fast-tempo evolution and purposiveness of life, if it were needed nowhere else in science, then it could not be called a scientific idea, end of story. But the intriguing situation is this: The idea of a "God" as an agent of downward causation has emerged in quantum physics (Goswami 1989, 1991, 1993, 2000, 2002; Stapp 1993; Blood 1993, 2001) as the only legitimate explanation of the famous observer effect. (Readers skeptical about this statement should see these original references, especially Goswami 2002.)

In quantum physics, objects are depicted as possibilities (a possibility wave); yet when an observer observes, the possibilities collapse to an actuality (the wave collapses to a particle, for example). This is the observer effect. Most importantly, quantum collapse of possibility into actuality is discontinuous, so the discontinuity of the punctuation marks of evolution is instantly accommodated if we see them as instances of quantum creativity—discontinuous collapse of quantum possibility into actuality (Goswami 1997a). This premise forms the core of the theory of creative evolution.

Most importantly, downward causation introduced via quantum collapse is consistent with a philosophy, monistic idealism, that avoids dualism and transcends materialism (Goswami 1989, 1993). Under the aegis of this philosophy, consciousness is looked upon as the ground of being in which matter exists as waves of possibility. Downward causation of the event of collapse consists of consciousness choosing the actuality from possibility. This concept is further explained in chapter 2, which discusses how consciousness creates the material world via quantum physics and the event of collapse.

Undoubtedly, the upholders of genetic determinism will point out a drawback here: Genes need not be treated as possibility waves; for them, deterministic Newtonian physics is sufficient. But this view is not justified. As the physicist W. M. Elsasser (1981, 1982) pointed out decades ago, gene mutations are quantum processes and must be treated as such, as changes in quantum waves of possibility. In macroevolution, consciousness creates new species by creatively choosing from genetic variations that exist as quantum possibilities (see chapter 11 for further details).

We will see that this theory not only explains the fossil gaps (seeing them as examples of biological creativity) but also makes room for the few observed cases of intermediates. I should also emphasize that in contrast to geographical isolation theory, the theory of creative evolution has consequences that provide independent verification of the theory (see chapters 11 and 12; also see later in this chapter).

The Nobel laureate physicist Paul Dirac once said that the solution of great problems requires the giving up of great prejudices. Darwin had to give up his prejudice for Christianity and its doctrine of Biblical creationism so that he could explain the data he and his contemporaries collected. In the twentieth century, physicists had to give up the great prejudices of causal determinism and continuity in favor of quantum indeterminacy and discontinuity. Today, the twenty-first century demands an equally revolutionary change in the mindset of biologists. They must give up the prejudices of genetic determinism and the Darwinian continuity of all biological evolution. The remainder of this chapter looks at some specific areas where prejudices need to fall away.