

# How Can We Tell Science from Religion?

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## Introduction

I propose for consideration two models of the relation between science and religion. In the first, materialist model, science is seen as based upon philosophical materialism. For scientific purposes, every event or phenomenon is conclusively presumed to have a material cause, at least after the ultimate beginning. Within this first model, to postulate a non-material cause " such as an unevolved intelligence or vital force " for any event is to enter the territory of religion. For materialists, this is equivalent to departing from reality into fantasy.

The second, or testability model defines science strictly in terms of accepted procedures for testing hypotheses, such as repeatable experiments. Within the second model, whatever is testable is eligible for consideration. Whether some phenomenon could have been produced by unintelligent material causes, or whether an intelligent cause must be postulated, is eligible for investigation whether the phenomenon in question is a possible prehistoric artifact, a radio signal from space, or a biological cell.

I will illustrate the difference by quoting the famous opening verse of the Gospel of John: "In the beginning was the Word." To a materialist that is mythology, and scientific nonsense. A materialist might paraphrase or parody the opening verses of John with this alternative:

In the beginning were the particles, And the particles formed galaxies and planets, And on at least one planet the particles became complex living stuff And the stuff imagined God, But eventually discovered Evolution.

Which is correct the original verse or the parody? To a materialist, only the parody deserves serious consideration. To one who adheres to the testability model of science, either possibility is acceptable. In biology, one can test the visible and measurable qualities of organisms to see if they are such that unintelligent material processes could produce them. It is possible that organisms contain some feature, such as extremely complex specified information, which cannot plausibly be ascribed to unaided material causes alone. In that case the real existence of a necessary intelligent cause must be taken seriously as a candidate for further confirmation or falsification.

For this purpose, it does not matter whether the intelligence is thought to belong to God, or to some alien race of intelligent beings, or to some entity we cannot yet imagine.

The difference between the two models becomes of practical significance in light of recent works arguing that intelligent causes may have been active in the history of life. Should a hypothesis of intelligent design in biology be rejected a priori as inconsistent with materialism, or should it be considered eligible for fair-minded testing?

## **1. Science as applied materialist philosophy**

Richard Dawkins has expressed the scientific materialist outlook on the "mind first" concept with his characteristic pungency:

But of course any God capable of intelligently designing as complex as the DNA/protein replicating machinery must have been at least as complex and organized as that machine itself. Far more so if we suppose him additionally capable of such advanced functions as listening to prayers and forgiving sins. To explain the origin of the DNA/protein machine by invoking a supernatural Designer is to explain precisely nothing, for it leaves unexplained the origin of the Designer. You have to say something like "God was always there," and if you allow yourself that kind of lazy way out, you might as well say that "DNA was always there," or "Life was always there," and be done with it. [Dawkins, *The Blind Watchmaker*, Longman, 1986, p. 141.]

There is a lot of middle ground, however, between a statement that "explains precisely nothing" and a statement that does not explain everything. Admittedly, the naked statement that "God created life" does not explain very much, but neither does the naked statement that "life somehow evolved." That is why the validity or invalidity of the neo-Darwinian mechanism (or some precisely specified materialist alternative) is such an important question for theology and philosophy, as well as science. If I say that "the first life form was designed by intelligence," my statement explains something, even if I can say nothing about the identity of the designer or the means by which the design was executed. What it explains (if it is true) is that we are on the wrong road if we are seeking to discover how life can be made without a designing intelligence. Detailed truth builds upon basic truth. If we base our research on counterfactual assumptions we are likely to be heading up a blind alley.

It is also illogical to reject a basic starting point simply because it is a starting point, and therefore rests upon something whose origin is unexplained. The nature of explanation is that one thing is explained on the basis of something else which is taken for granted, and the chain of explanation must either end at some point or go around in an endless circle. A mind-first

approach starts with mind in existence, and a matter-first approach starts with matter in existence. (This symmetry remains even when materialists obscure it by invoking devices such as an eternal cycle of evolving universes, or the replacement of "matter" by fluctuations in a quantum vacuum, or equations employing imaginary time that portray a universe without a beginning.) The advantage of starting with matter is that matter seems simpler, even though humans are no more able to make matter from nothing than mind from nothing. Other things being equal, a simple starting point is preferable to a complex one. This is the kernel of truth in the paragraph by Dawkins previously quoted. But are the other things equal? The advantage of starting with mind is that mind has capacities which matter lacks, capacities which may be necessary to explain the world. If there is convincing evidence that mindless matter can produce life, and even mind, then the matter-first position holds the advantage. But if matter lacks those capacities, then it will be more productive of truth to start with mind. It is not scientific to assume that matter has such capabilities merely because that is what scientists would like to believe.

Dawkins is one of many scientists who hold that materialism and science are effectively the same thing. Another fervent materialist, Harvard University geneticist Richard Lewontin, has written that the key to educating the public about science is not to emphasize the teaching of particular facts and theories, but rather to teach students to believe in materialism as a philosophy and in "Science, as the only begetter of truth." In Lewontin's words, "We exist as material beings in a material world, all of whose phenomena are the consequences of material relations among material entities." He even invokes another verse of John's Gospel in this connection, proclaiming that materialism is "the truth that makes you free." (It sets you free from priests and superstition.) Lewontin is as skeptical as I am about much of what passes as evolutionary theory, including the adaptationist theories of Richard Dawkins, which he dismisses as "just-so stories." He is also keenly aware that it is not only in disreputable fields like astrology or the softer sciences that one may find biased testing or inflated claims. Pseudoscience sometimes thrives in prestigious universities and hospitals, with the support of powerful government agencies. Why, then, should we trust science? Here is Lewontin's answer:

We take the side of science in spite of the patent absurdity of some of its constructs, in spite of its failure to fulfill many of its extravagant promises of health and life, in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our a priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door.... To appeal to an omnipotent deity is to allow that at any moment the regularities of nature may be ruptured, than miracles may happen.

[All quotes are from Lewontin, "Billions and Billions of Demons," in the New York Review of Books, January 9, 1997.]

To say that the commitment to materialism is a priori is to imply that science should stick to materialism even if scientific testing does not support the claim that matter can create life or mind. This degree of commitment is thought to be required because the existence of a creating mind threatens the picture of a world that is ruled only by law and chance. But the omnipotent deity as law maker could be viewed as underwriting the natural laws rather than threatening them, even if rare exceptions are allowed. Once again, we seem to be encountering the "all or nothing" fallacy that excludes the huge middle ground in between. Modern legal systems authorize the President or Prime Minister to pardon criminals, but this provision for discretionary exceptions does not prevent a lawyer from telling a convicted narcotics dealer approximately how long he can expect to spend in prison. (Scientific predictions are also often approximate or statistical.) Medical doctors occasionally encounter astonishing cures or remissions that elude explanation. However they explain the anomalies, the doctors rightly retain their trust in the efficacy of scientific medicine for the great majority of cases.

The Divine Foot does not threaten a science that is content to be one important road to truth, but it does threaten "Science as the only begetter of truth." Is it really in the best interest of science itself to claim the power to explain everything? It is easy to see why ambitious scientists would be attracted to a philosophy that maximizes the explanatory power of science, but this very advantage creates a paradox. If science explains literally everything in terms of physical causes, then it also explains the scientific mind and its thoughts. If matter is ultimately all there is, and if our brains are the product of mindless chemical combinations, and if "the mind is merely what the brain does," then our thoughts and theories are products of mindless forces. This disquieting point remains valid even if the relationship between chemistry and thought is deemed to be complex, as in the "computational theory of the mind." A computer may come up with some astonishing answers, but it computes within the boundaries set by its designer. The computer Deep Blue plays chess much better than its programmers could, but it will never defy them and choose to write poetry instead.

On materialist assumptions it is mysterious that we can reach truth by scientific investigation, exploiting mental capacities that would have been useless in the conditions in which they supposedly evolved. One common materialist speculation is that the most advanced human mental capacities are accidental products of a big brain explosion that just happened to produce a great deal more capability than primitive man could make use of at the time. I would say that such an explanation explains precisely nothing, especially when it comes from scientists who indignantly reject the idea that brain size is a reliable measure of human intelligence today. When we consider all the implications, scientists may have as much reason as theologians to be suspicious of materialist reductionism when it is applied to the mind.

Don't misunderstand me; I am no anti-rationalist. I am convinced that we really do have the ability to reason from sound premises to true conclusions, when our minds are operating as they

should, and that our best theories correspond at least approximately to "the way things really are." The question is whether the ability to theorize, which is different in kind from anything in the animal world, can be explained from a materialist starting point. Widespread ambivalence on this point helps to explain why there is so much resistance, even among materialists, to extending Darwinian explanations from the body (where they are dubious enough) to the mind. The Pope wants the Darwinists to leave the mind to the Church, and Stephen Jay Gould wants them to leave it to left-wing politics. Richard Dawkins says that "we are survival machines -- robot vehicles blindly programmed to preserve the selfish molecules known as genes." (The Selfish Gene, Preface to 1976 edition) A little later he is fomenting robot rebellion: "Let us understand what our own selfish genes are up to, because we may then at least have the chance to upset their designs, something that no other species has ever aspired to." (The Selfish Gene, 1989 edition, p. 3.) Dawkins ally Steven Pinker said it most dramatically:

Well into my procreating years I am, so far, voluntarily childless, having squandered my biological resources reading and writing, doing research, helping out friends and students, and jogging in circles, ignoring the solemn imperative to spread my genes. By Darwinian standards I am a horrible mistake, a pathetic loser, not one iota less than if I were a card-carrying member of Queer Nation. But I am happy to be that way, and if my genes don't like it, they can jump in the lake. (Steven Pinker, How the Mind Works, Norton, 1997, p. 52.)

So it seems that we can rebel against our creator, eat the forbidden fruit, and strike off on our own. Pinker, otherwise a materialist of the purest water, introduces a different metaphysical starting point by insisting upon that self-governing "I." A consistent materialist knows that "I" is no more than a place holder for the material causes that produce the experience of subjectivity. But "I" wonder if there is such a thing as a truly consistent materialist.

Despite these logical disadvantages, materialism as a definition of science has some apparent advantages that ensure its continuing popularity among scientists. An a priori adherence to materialism allows scientists to assume certain things that they very much wish to believe. They can assume, for example, that lifeless chemicals are endowed with the power to combine spontaneously to produce living organisms. This remarkable doctrine, decisively repudiated by Pasteur in the 19th Century when it was called "spontaneous generation," would be very difficult to prove, to put it mildly. But it is easy to assume, and spontaneous generation must have happened at least once if materialism is true. Thus Graham Cairns-Smith, who has brilliantly debunked the reigning "RNA-first" theory in origin of life studies, remains as convinced as Stanley Miller himself that the solution to the problem lies with chemistry. But is that conviction more than a leap of faith?

Similarly, try to present convincing evidence that the Darwinian mutation/selection mechanism really does have the kind of creative power needed to make complex organs like wings and eyes and brains or even cells. By "convincing" evidence I mean evidence which is convincing to

someone who is inclined to doubt, not just to those who are already convinced. Everybody with even a cursory knowledge of the literature knows that the textbook examples (Kettlewell's peppered moths, Grant's finch beaks) describe relatively trivial changes that involve no innovation or increase in genetic information. Debate this point (as I have) and you will find that most Darwinists quickly retreat to the vague claim that "evolution has occurred." But when materialism is assumed as the very basis of science, they can re-emerge a few logical steps later in triumph. Something had to guide evolution, to produce those wonders of apparent design, and natural selection is just about the only materialist contender.

That is why we can have a Conference like this one, on the origin of life no, make that the origin of intelligent life -- in the universe. Without the a priori starting point in materialism, we might have to abandon the project on the ground that the available data are not sufficient even for informed speculation. I am the last person to want to spoil a party, particularly one as pleasant as this one, but I will take the risk. Is there a better way to define "science?"

## **2. The challenge of intelligent design theory.**

The challenge that materialist theories of evolution face today can be summarized briefly. First, Richard Dawkins himself began *The Blind Watchmaker*, his influential restatement of neo-Darwinism, with the observation that "biology is the study of complicated things that give the appearance of having been designed for a purpose." Dawkins also agrees that living organisms contain vast quantities of genetic information, far more than in a typical computer program. In Dawkins' own words:

Physics books may be complicated, but ... the objects and phenomena that a physics book describes are simpler than a single cell in the body of its author. And the author consists of trillions of those cells, many of them different from each other, organized with intricate architecture and precision-engineering into a working machine capable of writing a book.... Each nucleus... contains a digitally coded database larger, in information content, than all 30 volumes of the *Encyclopedia Britannica* put together. And this figure is for each cell, not all the cells of the body put together. (*The Blind Watchmaker*, pp. 2-3)

Complex specified information of this kind is something that, in all ordinary human experience, is produced only by intelligence. Moreover, the information is fundamentally distinct from the medium in which it is inscribed, so that it cannot be explained or understood solely in terms of physical or chemical laws. This is an aspect of reality that we encounter every day in reading a book, or a document on a computer screen.. The information is not a product, "emergent" or otherwise, of the laws which govern the combining of ink and paper. Something else in this case

the mind and meaning of the author has to be taken into account. Another distinguished evolutionary biologist, George C. Williams, has put the point eloquently:

Evolutionary biologists have failed to realize that they work with two more or less incommensurable domains: that of information and that of matter.... These two domains can never be brought together in any kind of the sense usually implied by the term "reductionism." ...The gene is a package of information, not an object. The pattern of base pairs in a DNA molecule specifies the gene. But the DNA molecule is the medium, not the message. Maintaining this distinction between the medium and the message is absolutely indispensable to clarity of thought about evolution.

Putting these points together: we see that to account for life (in this case, the cell), we have to explain not only the origin of the chemicals but also the origin of the information. The neo-Darwinian explanation is well-known. It assumes that a very simple replicating organism started one way or another. Thereafter, the theory ascribes the increases in information to random mutation, and insists that the vast quantity of information can be provided by mutation in very small doses, if each dose immediately adds to the ability of the organism to survive and reproduce.

There are many excellent reasons for doubting the adequacy of this kind of explanation. Random changes (such as copying errors in the DNA) do not generate increases in information, whether they are small or large. It is not necessarily easier to provide the same amount of information in multitudinous small doses, rather than a single large one. Each increment is less unlikely, but the price one pays is that one has to have a great many increments, each of which must supply the precise kind of new information required. To illustrate the point with an analogy: It is hard enough to earn one million dollars by winning the grand prize in a lottery, but it is no easier to achieve that feat by winning a \$100 prize 10,000 times.

Even if mutation is capable of providing the increments in genetic information, what we know of organisms does not support the assumption that the complexity can be built up by individual steps which are increasingly adaptive. This is the central point of biochemist Michael Behe's book *Darwin's Black Box*, (Free Press 1996), which has had a wide readership in the United States and is being translated into many other languages. According to Behe, Dawkins' blind watchmaker thesis is a relic of a nineteenth century science which lacked the understanding of biological mechanisms that recent advances in molecular biology have provided. The biologists who established the still-dominant Darwinian orthodoxy thought of the cell as an undifferentiated blob of "protoplasm." The organism (and especially the cell) was to them a "black box" -- a machine which does wonderful things by some mechanism nobody knows. Behe explains that biochemists are now able to explore part of the insides of that black box, and what they find inside is "irreducible complexity." A system is irreducibly complex if it is "composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning." Life at the molecular level is replete with such systems, and biologists for the most part do not even attempt to explain how they could have come into existence by the Darwinian mechanism. The few examples that are do try to meet the problem are replete with hand-waving. Crucial components "appear" or "arise" out of nowhere, as required.

That's enough for now. I don't need to make the entire case for intelligent design, but merely to make the argument that there is something here worth examining on a fair basis. I emphasize that, although I am talking about a minority viewpoint I am not relying on anything that can be dismissed as fringe science. Behe is a research biochemist with impeccable qualifications. His scientific descriptions are echoed by his materialist colleagues; it is only the philosophy that causes disagreements. The more theoretical aspects of intelligent design are discussed in (among many other places) two books from Cambridge University Press from scientific scholars with appropriate pedigrees. [Hubert Yockey, *Information Theory and Molecular Biology* (Cambridge University Press 1992); William Dembski, *The Design Inference* (Cambridge University Press, 1998).

If living systems are composed of complex specified information, and if information is fundamentally distinct from matter, and if contemporary evolutionary science has failed to provide an adequate information-generating mechanism, then it is reasonable to conclude at least provisionally that the materialist cause is flunking the test. The materialists have a right to reply, of course, and they may win the argument in the end. But -- if science is based on testability rather than on a priori adherence to materialism -- they will need to respond with scientific evidence that shows that natural selection (or some other specific mechanism) can create as advertised.

I published a version of this argument in the October, 1996 issue of the journal *Biology and Philosophy*, mainly in the hope that Dawkins and Williams would respond. They did respond in the same issue. Along with the expected ad hominem arguments, they both made the same substantive point, which is correct as far as it goes. They said that the mere fact that information and matter are separate kinds of entities does not mean that the information has to be supplied by intelligence if the information content is sufficiently low. As Williams put it:

Johnson's argument is based on some obvious fallacies, such as information requiring an intelligent author. The pattern of slow-moving waves in sand dunes records information about what the wind has been doing lately. Their shadow pattern observed late in the day is information about the structure of the dunes and less directly about the wind. The only author recognizable here is the wind. Similar patternings must arise in any complex molecular, including the prebiotic. If one kind of molecular pattern influences others in ways that increase the incidence of that pattern, a hypercycle subject to natural selection has arisen. That would be analogous to some pattern of dune shadows making it more likely that the responsible winds would occur more frequently. That the author of genetic information is as stupid as the wind is apparent in the functionally stupid historical constraints discussed in Chapter 6 of my 1992 book [citing apparently suboptimal biological systems]. [George C. Williams, "Reply to Johnson," in *Biology and Philosophy* (Vol. 11, n. 4, October, 1996), p. 541. (Emphasis added).

I think Williams' argument misses the main point, but I do like the way he defines the issue. Evolutionary biology has traditionally asked the wrong questions, such as "do organisms vary?" or Darwin's "are the species immutable?" Of course organisms vary, and of course the species are not immutable. The more interesting question is: "where does the genetic information come from?" Some kinds of information can be produced by unintelligent causes; other kinds can not. The kind of information recorded in sand dunes illustrates the former; the kind of information recorded in physics textbooks, and even more in the mind of the physicist, represents the latter. Information theory is the branch of science that explicates the difference, and the latest word on the subject is to be found in William Dembski's book, *The Design Inference*. There are speculative ideas, such as Eigen's hypercycles and the Darwin/Dawkins blind watchmaker mechanism, that claim to bridge the gap. The question is: are these mechanisms convincing when you view them from a metaphysically neutral posture, or only when you view them with an a priori commitment to materialism?

### **3. Conclusion**

A quote from the late Carl Sagan captures the essential issue. In a book published shortly before his death he said:

At the heart of science is an essential balance between two seemingly contradictory attitudes -- an openness to new ideas, no matter how bizarre or counterproductive, and the most ruthless scrutiny of all ideas, old and new... Consider this claim: As I walk along, time -- as measured by my wristwatch or my aging process -- slows down.... Here's another: Matter and antimatter are all the time, throughout the universe, being created from nothing. Here's a third: once in a very great while, your car will spontaneously ooze through the brick wall of your garage and be found the next morning on the street. They're all absurd! But the first is a statement of special relativity, and the other two are consequences of quantum mechanics (vacuum fluctuations and barrier tunneling, they're called). Like it or not, that's the way the world is. If you insist it's ridiculous, you'll be forever closed to some of the major findings on the rules that govern the universe. Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark*, p. 306 (Random House 1995).

"Like it or not, that's the way the world is." Sagan understood that prejudice of every kind is the ultimate enemy of science, but he could not grasp the possibility that he might be guilty of the fault he ascribed to others. He was incapable of conceiving that his own faction might have so strong a wish that materialism be true that they would be willing to set up an a priori philosophical principle as their God, and exempt it from the ruthless scrutiny that science otherwise requires.. (I know this for a fact, because I tried without success to explain the concept to Sagan in a long dinner conversation at Cornell University hosted by our mutual friend William Provine. Sagan didn't just disagree -- he couldn't grasp the concept.) If Sagan could have removed the plank from his own eye, he would have seen better to remove the splinter from his brother's eye.

True believers in the scientific method, among whom I count myself, do not exempt ourselves from scientific standards. If we prefer to believe in divine creation we recognize that the facts may not support our preference, and if we prefer to believe in materialism we do the same. That

insistence on questioning what we might want to believe, and applying the same critical standards to ourselves that we recommend to others, is how I define "science." How do you define it?