

Miracles and Modern Scientific Thought

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Since the "Enlightenment" it is widely accepted that the belief in miracles and a commitment to modern scientific methodology are incompatible. This study will examine the arguments of important anti-supernatural thinkers from Spinoza to the present with a view to finding any common threads. Next, we will analyze the nature of miracles in the light of scientific methodology to see if they are irresolvably incompatible. Finally, we will see if a way can be found to retain the integrity of science without denying the credibility of the supernatural.

I. The Arguments Against Miracles.

A. Benedict Spinoza (1632-1677).

We will begin our study with the Jewish philosopher, Benedict Spinoza. Arguing from a Newtonian concept of nature, Spinoza insisted that "nothing then, comes to pass in nature in contravention to her universal laws, nay, nothing does not agree with them and follow from them, for . . . she keeps a fixed and immutable order." In fact "a miracle, whether in contravention to, or beyond, nature, is a mere absurdity." Spinoza was dogmatic about the impossibility of miracles when he proclaimed, "We may, then, be absolutely certain that every event which is truly described in Scripture necessarily happened, like everything else, according to natural laws." [1]

In support of his crucial premise Spinoza insisted that Nature "keeps a fixed and *immutable* Order." That is to say, everything "*necessarily* happened . . . according to natural laws." And "nothing comes to pass in nature in contravention to her *universal* laws . . ." [2]

Spinoza's argument can be summarized as follows:

1. Miracles are violations of natural laws.
2. Natural laws are immutable.
3. It is impossible for immutable laws to be violated.
4. Therefore, miracles are impossible.

Put in this form it is clear that the second premise is crucial: natural laws are universal or immutable. Just how does one know this? Laying aside for the moment Spinoza's deductive rationalism, from a strictly empirical point of view Spinoza's answer is: we know this by *universal observation*. That is, we *always* observe physical objects fall in accordance with Newton's law of gravitation. There are *no known exceptions*. But a miracle would be an exception. Hence, miracles are contrary to universal scientific observation.

B. David Hume (1711-1776).

Next, let us consider briefly Hume's argument against miracles. David Hume said of his argument: "I flatter myself that I have discovered an argument . . . which, if just, will, with the wise and learned, be an everlasting check to all kinds of superstitious delusion, and consequently will be useful as long as the world endures." [3]

Just what is this "final" argument against the miraculous? In Hume's own words:

1. "A miracle is a violation of the laws of nature."
2. "Firm and unalterable experience has established these laws."
3. "A wise man proportions his belief to the evidence."
4. Therefore, "the proof against miracles . . . is as entire as any argument from experience can possibly be imagined." [4]

In this form the crucial premise is the second one which Hume explains as follows: "There must, therefore, be a uniform experience against every miraculous event. Otherwise the event would not merit that appellation." So "nothing is esteemed a miracle if it ever happened in the common course of nature." [5]

Here again the essence of the argument depends on man's repeated observation. For the common course of nature provides us with uniform experience of natural regularities. However, there is a difference between Hume and Spinoza. For Spinoza a scientific law was *universal* and immutable; hence, miracles were absolutely *impossible*. For Hume human experience is *uniform* and, thus, miracles may be possible but they are *incredible*. So between Spinoza and Hume there was a softening of the basis for naturalism which corresponds to the later softening of the understanding of a scientific law. A scientific law is not necessarily universal (with no *possible* exception); it is simply *uniform* (with no credible exception). But even in this weaker form, Hume's argument rests upon the *regularity* of nature as opposed to the claim for highly irregular events (such as miracles).

C. Immanuel Kant (1724-1804).

There is a widely neglected argument against miracles tucked away in Kant's famous book, *Religion Within the Limits of Reason Alone*. In his own words, Kant reasons this way:

Those whose judgment in these matters is so inclined that they suppose themselves to be helpless without miracles, believe that they soften the blow which reason suffers from them by holding that they happen but *seldom*. [but we can ask] *How seldom?* Once in a hundred years? . . . Here we can determine nothing on the basis of knowledge of the object . . . but only on the basis of the maxims which are necessary to the use of our reason. Thus, miracles must be admitted as [occurring] *daily* (though indeed hidden under the guise of natural events) or else *never* . . . Since the former alternative [that they occur daily] is not at all compatible with reason, nothing remains but to adopt the later maxim—for this principle remains ever a mere maxim for making judgments, not a theoretical assertion. [For example, with regard to the] admirable conservation of the species in the plant and animal kingdoms, . . . no one, indeed, can claim to comprehend whether or not the direct influence of the Creator is required on each occasion. [Kant insists] they are *for us*, . . . nothing but natural effects and *ought* never to be adjudged otherwise . . . To venture beyond these limits is rashness and immodesty . . . [6]

1. The heart of Kant's argument can be summarized as follows:
2. Everything in our experience (the world *to us*) is determined by practical reason.
3. Practical reason operates according to universal laws.
4. Miracles occur either (1) daily, (2) seldom, or (3) never.
5. But what occurs daily is not a miracle since it occurs regularly according to natural laws.
6. And what occurs seldom is not determined by any law.
7. But all scientific knowledge must be determined by practical reason which operates on universal laws.
8. Therefore, it is rationally necessary for us to conclude that miracles *never* occur.

Stated this way the critical premise is the second one which claims that practical reason operates according to universal laws. In support of this premise Kant wrote, "In the affairs of life, therefore, it is impossible for us to count on miracles or to take them into consideration at all in our use of reason (and reason must be used in every incident of life)."[7]

In brief, miracles are theoretically possible but they are *practically* impossible. We must live *as if* they never occur. If we lived any other way it would overthrow the dictates of practical reason and erode the basis for both science and morality. For both science and morality are based on universal principles. Once more we can see that the key element in the anti-supernatural argument is the regularity of the operational laws of the universe. Kant believed these regular events to be universal. To deny them by admitting miracles, Kant thought, would be to deny the very basis of a rational and moral life.

D. Antony Flew (1923-).

In his article on "Miracles" in *The Encyclopedia of Philosophy*, Flew notes that "Hume was primarily concerned, not with the question of fact, but with that of evidence. The problem was how the occurrence of a miracle could be proved, rather than whether any such events had ever occurred." However, adds Flew, "our sole ground for characterizing the reported occurrence as miraculous is at the same time a sufficient reason for calling it physically impossible." Why is this so? Because "the critical historian, confronted with some story of a miracle, will usually dismiss it out of hand" On what grounds? Flew answers, "To justify his procedure he will have to appeal to precisely the principle which Hume advanced: the 'absolute impossibility or miraculous nature' of the events attested must, 'in the eyes of all reasonable people . . . alone be regarded as a sufficient refutation.'" In short, even though miracles are not *logically* impossible, they are *scientifically* impossible. "For it is only and precisely by presuming that the laws that hold today held in the past . . . that we can rationally interpret the *detritus* [fragments] of the past as evidence and from it construct our account of what actually happened." [8]

Flew's argument against miracles can be summarized this way:

1. Miracles are by nature particular and unrepeatable.
2. Natural events are by nature general and repeatable.
3. Now, in practice, the evidence for the general and repeatable is always greater than that for the particular and unrepeatable.
4. Therefore, in practice, the evidence will always be greater against miracles than for them.

Like the arguments of Spinoza, Hume, and Kant, the key to Flew's argument is premise number 3 which counts as greater evidence events which are regular or repeatable. For science by its very nature is not based on the exceptional or the odd but on the normal and the usual.

E. Alastair McKinnon.

Other contemporary philosophers have offered arguments with similar premises against supernatural acts. Alastair McKinnon's argument is an example. It can be summarized as follows:[9]

1. A scientific law is a generalization based on observation.
2. Any exception to a scientific law invalidates that law as such and calls for a revision of it.
3. A miracle is an exception to a scientific law.
4. Therefore, a "miracle" would call for a revision of a law and the recognition of a broader law (which thereby explains the "miracle" as a natural event).

Here the critical premise is the second one. It is admitted by all that a scientific law is a generalization based on observation. But not all would insist that a single exception would invalidate a law. Even some anti-supernaturalists admit that "This a priori argument can be refuted by noting that a supernaturally

caused exception to a scientific law would *not* invalidate it, because scientific laws are designed to express *natural* regularities." [10] But in the case of a miracle we have "a special and non-repeatable" exception.

From a strictly scientific perspective a non-repeatable exception is an anomaly. And scientists do not overthrow established laws on the basis of singular, unrepeatable anomalies. In fact, they are more likely to attribute the anomaly to faulty observation. At any rate, scientists do not revise laws based on unrepeatable exceptions, since scientifically the irregular never outweighs the regular.

F. The Common Thread.

Even in this admittedly unsuccessful anti-supernatural argument is hidden the premise of an apparently successful one, namely the evidence for the regular and repeatable is always greater than that for the irregular and singular. Science is based on uniform experience, not anomalies. Regularity is the basis of a scientific understanding. Therefore, science as such can never accept the miraculous. Thus the principle of regularity seems to be the common thread of the anti- supernatural arguments.

II. The Nature of Science

A. Two Fundamental Principles of Science.

It seems beyond question that science involves at least two things: *observation* and *repetition*. No scientific law emerges unless there has been some observation of natural phenomena. This observation need not be strictly empirical. Microscopes and telescopes are legitimate extensions of man's empirical senses. Nor need one observe the actual event directly, as long as there are observed phenomena associated with the event. But there must be observation of some recurring pattern or else there is no scientific basis for drawing conclusions.

The events of the past, such as are indicated by the rock and fossil record, are not an exception to the need for observation. There were no human scientific observers of the origin of the universe or the origin of living things. However, our scientific understanding of these events is dependent, nonetheless, on observations. It is not dependent on past observation of these events but on present observation of similar events. That is, all understanding of the past is based on the principle of uniformity, to wit, "the present is the key to the past." [11] This principle of uniformity means that processes observed in the present are the basis for a scientific approach to unobserved processes in the past. So even in the case of unavailable past events science is based on observation of similar events which repeatedly happen in the present.

B. Repetition and the Odd.

Science is so firmly based in regular repeatable events in the present that even when an odd event occurs scientists do not consider it part of a scientific explanation. Thus experiments that cannot be repeated are given little or no validity. At least unrepeatable events are never made the basis for an operational law of science.

In a thought provoking article on miracles one contemporary philosopher argued that: [12]

1. No event can be attributed to a rational agent unless its occurrence is regular and repeatable.
2. Miracles are by nature not regular or repeatable.
3. Therefore, no miracle can be attributed to any rational agent (e.g., to God).

The crux of the argument is what he called the "repeatability requirement." [13] Unless an event can be repeated over and over again we have no right to claim we know who (or what) caused it. For example, one should not make a causal connection between the golfer's type of swing and a once-in-a-life-time-hole-in-one he shot. Rather than drawing a direct causal connection between them, we would consider it a lucky

shot. And scientific analysis is not based on fluke relations but on repeated relations. This is why scientists use the principle of concomitant variation. For unless there is a direct correlation between the presence and absence of the cause and the presence and absence of the effect, then there is here no scientific basis for believing it is the cause.

This same point applies whether the cause is a natural force or an intelligent being. With regard to an intelligent cause, certainly no one would believe that there is a scientifically established causal connection between one's intellectual ability to pick a winning horse and a one-time win at the racetrack. For unless the intelligent being can do it over and over we would believe the result was a matter of luck, not a matter of scientific intelligence. Likewise, with regard to non-intelligent causes, there is no scientific basis for belief in a causal connection between spilt letters of alphabet cereal and a fan which blew them into the word "careful." Unless the fan does this repeatedly with randomly dropped letters we would consider this one-time event an anomaly. In such a case no scientific causal connection will be drawn between the apparent message and the fan.

So whether we are dealing with non-intelligent or intelligent causes, there must be a relationship repeatedly observed before one can consider the connection scientifically based. But this repeated relation is precisely what we do not-indeed, cannot-have with miracles because they are *one-time* events. Hence, by nature, singularities such as miracles would seem to be ruled out of the realm of science.

III. Science and the Supernatural.

If all scientific understanding of the universe is based on observed repetitions and if miracles are by nature singularities, then are not miracles automatically ruled out on scientific grounds? For miracles are by nature singular (unusual) events which are caused by an intelligent being (namely, God) beyond the realm of natural law.

A. Are Miracles a Matter of Faith?

For the supernaturalist there seem to be two basic avenues of escape from this argument. First, he could simply admit there is no scientific basis for belief in miracles. Simply because miracles are not subject to repetition does not mean they do not occur. After all, a hole-in-one has happened; desperation shots have gone through the hoop, and some have won at the lottery on the first ticket. So all the theist needs to admit is that singular events (such as miracles) are not subject to scientific analysis. That is, there may be no way to have a scientific understanding of them; they might be understood only by "faith." In this sense, what the non-supernaturalist would call a "fluke" the supernaturalist may choose (by faith) to see as the "hand of God." Thus the theist could admit that there is no *scientific way* to differentiate between a natural statistical improbability and a miracle. Both would have the same empirical data associated with them and neither would be based in the scientific principle of repeatability.

Of course, if the theist admits this then the naturalist has won a major victory. For the theist has admitted that there is no *scientific* basis for a belief in either the creation of the universe or of life, to say nothing of the resurrection of Christ. Further, the anti-supernaturalist could press his argument that there is no *rational* or *evidential* grounds for belief in miracles either. For all rational connections seem to be based on previously observed causal connections. And all empirical evidence is likewise dependent on empirical observations of regular events. In brief, if the supernaturalist admits there is no regularly observed phenomena as a basis for miracles, then he has given up any basis for *knowing* they have happened. It has become simply a matter of unjustifiable *faith* in believing they have happened. If this is so then his faith is empirically unfalsifiable. This would not differ in principle from someone who claims his watch works because a little invisible green gremlin changes the time each second.

B. A Scientific Basis for the Miraculous.

However, before all is given up to fideism let us suggest another possibility which offers a *scientific* basis for belief in miracles. This approach is grounded on the most fundamental principle of science—the very principle of regularity used to argue against miracles. In order to understand this approach let us first try to pinpoint the basic problem in the arguments against miracles. The essence of the argument goes like this:

1. Only what is observed to occur over and over again can be the basis for a scientific understanding of what caused the event.[14]
2. Singular events like miracles are not repeated over and over again.
3. Therefore, there is no scientific basis for an understanding of what caused a singularity such as a miracle.

1. Antisupernaturalism Proves too Much.

The first and most obvious problem with this argument is that it seems to prove too much. For if the argument is valid, then it would prove that there is no scientific basis for some events considered to be scientific by non-supernaturalistic scientists. For example, the Big Bang theory is considered by most astronomers to be a viable scientific explanation of the origin of the universe,[15] but so far as the scientific evidence goes the Big Bang occurred only once. It has not been repeated. It is a singularity. Hence, if the repeatability requirement is pressed it would eliminate one of the most widely held scientific views on the origin of the universe.

Further, most non-supernaturalist scientists believe in the spontaneous generation of first life on earth.[16] And even naturalists who believe life began in outer space, must acknowledge that it began by spontaneous generation somewhere out there. But to bring the problem back down to earth, most scientists believe that life began here only once. At the very least the spontaneous generation of life has not happened over and over again. What is more, we do not observe it happening spontaneously over and over again in the present. But if repeatability in the present is essential to a scientific understanding of an event, then the belief in spontaneous generation is not scientific either.[17]

The same logic applies to the naturalistic theory of macro-evolution. According to this belief, the evolutionary development of life occurred only once. Each new forward development occurred only once. For example fish evolved into reptiles only once, and reptiles evolved into birds only once. and so on. These events have never happened again. Yet naturalistic scientists believe it is scientific to speak of macro-evolution. Some even call evolution a "fact," not merely a theory.[18] But if it is unscientific to believe in singularities, then it would also be unscientific to believe in macro-evolution. In short, the naturalist's argument against singularities proves too much; it proves that even some of his naturalistic explanations are not science either.

2. Naturalism Neglects Uniformity.

In one of the strangest ironies in the history of thought, naturalism has destroyed its own argument by its own basic premise. For we have seen that from Spinoza to the present the repeatability or regularity requirement has been part of the anti-supernaturalists' argument against miracles. Scientific laws are based on repetition of events. Miracles are not repeated over and over. Therefore, miracles are not scientific.

Not only do naturalists hold to the need for regularities but they also believe there are scientific explanations for singular events (such as the origin of life). But how do they know this? The answer seems to be the principle of uniformity. That is, they insist that we can understand past *singularities* in terms of present *regularities*. For we observe over and over in the present that when certain chemicals (gases) are put together under certain circumstances that amino acids, which are the basic elements of life, are the result. Hence, we can assume that the same thing would occur under similar circumstances in the past.

The same is true of macro-evolution. Scientists have observed over and over in the present that small changes occur in animals. Hence, they assume that given long periods of time in the past these small

changes could add up to the large changes needed to explain a common ancestry of all life. So here too the principle of uniformity is the key. That is, even though the past event is a *singularity* which the naturalist did not observe, nevertheless, there are present *regularities* (which are observed to occur over and over again) which are used as the scientific basis for understanding these past singularities. In this way what is repeated in the present is the key to understanding what happened only once in the past. Thus, the naturalist can avoid the charge that his view about past singularities is unscientific. It is scientific, they can insist, because their understanding of a singular event is based on similar regular events which happen all the time.

What is true of past singularities is also true of present ones. For example, one need only see one Mount Rushmore to know that some intelligence carved these faces on the mountain. For *repeated* experiences of similar situations are a sufficient basis for knowing that what caused this *singular* event must have been intelligent. There is an analogous situation here to the astronomical search for extra-terrestrial intelligence. Carl Sagan believes that even a *single* message from outer space would prove the existence of highly intelligent beings there.[19] How does he know this? Because he has *repeated* experiences of similar messages caused by intelligent beings. So the general principle can be stated as follows: *all singularities must be understood in terms of similar regularities.*

This being the case, the objection of the supernaturalist about their belief in singularities without a scientific basis in repetition seems to have collapsed. For if one can know there is an intelligent cause of a single message (or event), based on repeated experience of similar situations, then why cannot one know there was an intelligent cause for the origin of life? In short, the answer of the naturalist opens the door wide for a scientific explanation for a supernatural origin of life. For if repetition is the key to understanding singularities, then a supernaturalist can argue that there was a supernatural cause for the origin of first life. For this reasoning is also based on repeated observation. The argument has two sides, both of which are based in repeated observation.

First, all observational evidence indicates that the non-living never produces the living. Pasteur's experiments disproved spontaneous generation long ago.[20] There is a *uniform* and universally available experience as a basis for this conclusion, and there are no verified exceptions. Hence, the argument against spontaneous generation is as firmly scientific as any such argument can be.

There appears to be one exception to this principle that life only produces life. Are not scientists able to produce life? That is, cannot life be created by intelligent beings? In response to this two things should be noted. First of all, scientists have not yet created life from non-living chemicals. They have only succeeded in producing some biologically interesting chemicals, such as amino acids. Furthermore, even in these experiments the role of the experimenters plays a crucial role in the success of the experiment.[21] Thus intelligent intervention is necessary in the production of these results. Hence, even if scientists could produce life, it would show that it took an intelligent form of life to produce a less than intelligent form of life. And the production of an intelligent robot would also show that only intelligence produces intelligence. So in any event, the creation of life (whether non-intelligent or intelligent life) always takes an intelligent source of life to accomplish it. But if this is so, then here again scientific observation would lead us to believe that the first living thing must have had an intelligent cause.

Second, this leads us to the other side to this scientific argument for an intelligent origin of life.

1. The only cause repeatedly observed to be adequate to produce information is intelligence.
2. Now the information in the first single cell which emerged on earth would fill a whole volume of an encyclopedia.[22]
3. But observation of regularities are the scientific basis for understanding singularities.
4. Hence, there is a scientific basis (in repeated observation) for believing that first life was caused by some intelligence beyond the natural world.
5. But since this kind of singularity produced by a supernatural intelligent being would be a miracle by definition, then we have a firm scientific basis for believing in miracles.

In short, repetition in the present does give us a firm scientific basis for believing in an intelligent intervention into the natural world. To borrow Hume's term, we have "uniform experience" on which to base our belief in the miraculous origin of life. For we never observe an encyclopedia resulting from an explosion in a printing shop. We never observe a fan blowing on alphabet cereal produce a scientific research paper. No one would conclude Mount Rushmore resulted from wind or rain erosion. Why? Our uniform experience teaches us that the kind of information conveyed on Mount Rushmore never results from natural laws but only from intelligent intervention.

Summary and Conclusion

Since the rise of modern science anti-supernatural arguments have stressed the principle of uniformity. They have argued that:

1. Scientific understanding is always based on constant repetition of events.
2. Miracles are not constantly repeated.
3. Therefore, there is no scientific way to understand miracles.

Two things should be noted about this argument. First, this form of the argument does not deny that unusual events like miracles may occur, any more than it denies a hole-in-one may occur. It simply says that scientific law is based on regularities. And until one can establish a constant conjunction between antecedent and consequent factors there is no scientific basis for assuming a causal connection between them.

Second, neither does this argument deny that there is any scientific way to analyze singularities, such as the origin of the universe, or the origin of life, or receiving one message from outer space. It simply says that *observed regularities* must be the basis for analyzing *singularities*. For example, if we observe over and over again that a certain kind of effect regularly results from a certain kind of cause then when we discover even a *singular* case of this kind of effect (whether from the past or present), we have a scientific basis for assuming it had the same kind of cause too. This same assumption is behind the naturalists' search for a chemical basis for the origins of life and an evolutionary basis for the origin of species. In both cases repeatable observations in the present are used as a basis for understanding the singularity of origin in the past. Without this principle of uniformity there would be no way of getting at singularities in either the past or the present.

Certainly we must grant that this is a legitimate procedure to base all scientific understanding in the principle of regularity. However, the question is this: Does such a procedure eliminate a scientific understanding of miracles? In order to better understand our answer to this question let us reformulate the naturalist argument in the light of the two qualifications noted above.

- 1) Scientific understanding is always based on constant repetition of events.
 - 1a) This repetition need not be a repetition of the event we are analyzing but only of other similar events.
- 2) Miracles are not constantly repeated events.
 - 2b) Therefore, miracles need not be eliminated from the realm of scientific understanding.

Once the argument is put in this form we can see that all one needs to do to establish a basis for singularities such as miracles is to find some constantly repeated process as a basis for understanding them. This we believe can be done by adding these premises:

- 4) Constant repetition informs us that wherever complex information is conveyed there was an intelligent cause.

5) There are some scientific singularities (such as the origin of first life) where complex information is conveyed.

6) Therefore, there is a scientific basis for positing an intelligent non-natural cause for the origin of first life.

Certainly no one can reasonably deny the information comes from an informer. This is a uniform experience. The only apparent exceptions are flukes which cannot be repeated constantly. So firmly established is our uniform experience that only intelligence causes information that we would consider it highly unscientific for a geology teacher to insist that his students continue to study the faces on Mount Rushmore until they can find some natural law of erosion which can explain them. Furthermore, one does not have to see more than one Mount Rushmore to know that it was formed by intelligence, not by natural processes of erosion. For uniform experience of similar situations indicates that these kinds of forms on rocks always result from intelligent intervention. Likewise, if a single sentence or paragraph is repeatedly observed to result from intelligence, then the encyclopedia full of information contained in the first simple form of life surely must have had an intelligent cause too.

Should someone protest that there is still a chance-remote as it may be- that life arose naturally, we need only remind them that science is not based on flukes or anomalies. It is based on regularities and repetition. And we have no observed regularly repeated conjunctions that would provide a scientific basis for us to believe in such an unrepeated singularity. In brief, the principle of repeatability which naturalists use to attack miracles actually boomerangs to support the miraculous. Naturalism is defeated at its own game of science on its own principles.

NOTES

1. Benedict De Spinoza, *Tractatus Theologico-Pliticus*, in *The Chief Works of Benedict de Spinoza*, trans. R. H. M. Elwes (London: George Bell and Sons, 1883), 1:83, 87, 92.
2. *Ibid.*, p. 83.
3. David Hume, *An Inquiry Concerning Human Understanding*, ed. C. W. Hendel (New York: Bobbs-Merrill, 1955), 10.1.118.
4. *Ibid.*, pp. 118-123.
5. *Ibid.*, pp. 10.1.122-123.
6. Immanuel Kant, *Religion Within the Limits of Reason Alone*, 2nd ed., trans. T. M. Green and H. H. Hudson (New York: Harper Torchbook, 1960), pp. 83-84.
7. *Ibid.*, p. 82.
8. Anthony Flew, "Miracles" in *The Encyclopedia of Philosophy*, ed. Paul Edwards (New York: The Macmillan Company and The Free Press, 1967), 5.346-353.
9. Alastair McKinnon, "Miracle' and 'Paradox'" in *American Philosophical Quarterly* 4 (Oct. 1967): 308-14.
10. Malcolm L. Diamond, "Miracles," *Religious Studies* 9 (Sept., 1973), 316-317.
11. Charles Lyell (1797-1876), the father of modern uniformitarianism, wrote: It may be necessary in the present state of science to supply some part of the assumed course of nature hypothetically; but if so, this must be done without any violation of probability, and always consistently with the analogy of what is known both of the past and present economy of our system." See his *Principles of Geology* (New York: D. Appleton and Company, 1887), p. 229.
12. George D. Chryssides, "Miracles and Agents," *Religious Studies* 11 (Sept., 1975), 319-27.
13. *Ibid.*, p. 322.
14. This point was made by Paley in his famous watchmaker argument, but it seems to have been largely lost in the subsequent arguments against God. For example, Paley used phrases like "we observe," "our observer," "each observation," "Our observation" over and over again. He even used the phrase "uniform experience" as the basis for his belief in an intelligent Designer of nature. (See William Paley, *A View of the Evidences of Christianity* (Cambridge: J. Hall & Sons, 1875), 6th ed., pp. 10, 11, 20, 29 and especially 37-38.

15. See Robert Jastrow, *God and the Astronomers* (New York: W. W. Norton & Company, Inc., 1978), especially pp. 14, 111, 116 and 120f.
16. George Wald wrote, "We tell this story [about Pasteur's experiments] to beginning students of biology as though it represents a triumph of reason over mysticism. In fact it is very nearly the opposite. The reasonable view was to believe in spontaneous generation; the only alternative, to believe in a single, primary act of supernatural creation. There is no third position." See "The Origin of Life" in *Scientific American* (Aug., 1954), p. 48; reprinted in *Life: Origin and Evolution*, ed. C. E. Folsome (San Francisco: W. H. Freeman and Company, 1979).
17. Many scientists recognize this point. J. W. N. Sullivan wrote: "So far as actual evidence goes, this is still the only possible conclusion. But since it is a conclusion that seems to lead back to some supernatural creative act, it is a conclusion that scientific men find very difficult of acceptance" (*The Limitations of Science*, New York: Mentor Book, 1963, p. 94). Speaking of spontaneous generation, Robert Jastrow said, the "theory is also an act of faith. The act of faith consists in assuming that the scientific view of the origin of life is correct, without having concrete evidence to support that belief" (*Until the Sun Dies*, New York: W. W. Norton and Company, 1977, p. 63).
18. Isaac Asimov said, "Scientists who deal with evolution as their field of specialization may argue over the mechanism behind evolutionary development, but none questions the fact of evolution itself" (*Science Digest*, October, 1981, p. 86).
19. Sagan wrote: "There are others who believe that our problems are soluble, that humanity is still in its childhood, that one day soon we will grow up. The receipt of a *single message* from space would show that it is possible to live through such technological adolescence: the transmitting civilization, after all, has survived. Such knowledge, it seems to me, might be worth a great price" (*Broca's Brain*, New York: Random House, 1979, p. 275, emphasis added).
20. See Note 17 above.
21. See the excellent new book by some creative scientists on this point: Charles Thaxton, Walter Bradley, and Roger Olsen, *The Mystery of Life's Origin: Reassessing Current Theories* (New York: Philosophical Library, 1984).
22. The information in a complex form of life is much greater. Carl Sagan pointed out that "If written out in English, say, that information [in the human brain] would fill some twenty million volumes, as many as in the world's largest libraries" (*Cosmos*, New York: Random House, 1980, p. 278).