A SCIENTIFIC PROOF OF THE EXISTENCE OF GOD

Author: William S. Hatcher
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Few things would be as revolutionary in contemporary society as a compelling scientific proof of the existence of God, and William S. Hatcher's article comes close enough to that elusive goal to startle a few dogmatic atheists, all the more so since it relies on the traditionally touchy subject of evolution.

The gist of Hatcher's proof—which is adapted from parts of 'Abdu'l-Bahá's Tablet to Dr. Auguste Forel—is this: over time, evolution has given rise to increasingly complex forms of life (systems). According to the second law of thermodynamics, the most complex organizations are the least likely to have resulted from random forces. On the contrary, we would expect entropy (disorder) to increase over time in the absence of an external influence. By standard scientific methodology, we can thus infer that there is some force that is causing this "significant, persistent deviation from randomness" (13). This much seems conclusive; it is a powerful argument, indeed, for what Hatcher calls "the evolutionary force."

Hatcher implicitly dismisses the conventional theory of evolution on the grounds that it is essentially random, and is, therefore, improbable as an explanation of evolving complex systems. Natural selection, however, involves more than simply a postulate of random changes; it might be more accurately understood as a feedback process. Closer analysis suggests that this process may have sufficient force of natural law to produce the observed evolutionary pattern, at least in principle.

In statistics, to say that "all logical possibilities occur with equal relative frequency" (7) is to define a uniform probability distribution, not randomness per se. It is quite possible (in fact, much more common) for a probability distribution, which is inherently random, to exhibit greater weight over some ranges than others. This is typically the outcome of an underlying non-random relationship or law. A weighted die would be a simple example. We will distinguish here between randomness with equal relative probabilities, which we might call "pure" randomness, and randomness in the statistical sense, which means only that the specific outcome in any one case cannot be predicted in advance.

Genetic mutations may be purely random, as may be the particular survival challenges (with all of their minute possible variations) that face any single organism; the feedback process between the two, however, is not. A better-adapted organism has particular skills or strengths that enable it to do positive things (or avoid negative things) that other members of its species cannot. That greater ability is not random, even in the general sense; it is certain—in other words, it is a "law." The evolutionary process as a whole, which captures an interaction between the purely random and the certain components, is therefore

a random process, but not a purely random one. The feedback "law" alters the probability distribution of future gene pools in a systematic way.

This point might be made clearer by reference to the example of the brick house which Hatcher employs. It would certainly be surprising to see a pile of bricks transformed into a house by a random series of tornadoes. However, suppose that we introduce a feedback into this system by hypothesizing some sort of "super-Lego" bricks, such that if the wind should, by chance, force any brick into sequential, ordered alignment, that brick becomes firmly fixed in place and cannot be dislodged by any future tornadoes. The dynamic picture is now completely changed. Since it is probable that such an alignment will occur from time to time, we would expect that every so often another brick will be added to the structure of the house. Now it is no longer so unlikely that the purely random action of the wind will turn the pile of bricks into a house—in fact, it has become almost inevitable sooner or later. (Only "almost" because there is always the vanishingly remote possibility that an infinite series of coincidences will persistently prevent at least one needed brick from ever coming into an ordered alignment.)

A somewhat more realistic numerical illustration of the feedback effect can be devised, using biological evolution as the model. Suppose that the probability that a member of some species will experience a random genetic mutation providing greater immunity to disease *X* is 1% (probably a highly charitable estimate of the efficacy of "pure" random evolution!); there is the same probability of this mutation reversing itself (a requirement of "pure" randomness). Suppose also that the probability that these organisms will survive disease *X* and reproduce (if less immune) is 80%, but the odds improve to 95% for those individuals with the higher level of immunity. Notice that this model—a very simple illustration of the theory of natural selection—appears to be entirely random, i.e., it appears to be based solely on probabilities and not on anything known for certain. In statistical terminology, it is stochastic.

In an initial population of 10,000, we would expect on average 1% (100 individuals) to be highly immune and the other 9,900 to be less immune. The second generation is drawn from two sources, descendants of the surviving highly immune, and of the surviving less immune. Thus, we would expect an average second-generation highly immune population of:

100 x 95% x 99%	94.05	descendants of the surviving highly immune, less those who mutate back to less immunity
9900 x 80% x 1%	79.20	descendants of the surviving less immune who mutate to high immunity
	173.25	

Correspondingly, we would expect an average second-generation, less-immune population of:

100 x 95% x 1%	0.95
9900 x 80% x 99%	7840.80
	7841.75

The total new population is 7841.75 + 173.25 = 8015.[1] The expected percentage of highly immune individuals in the second generation is therefore 173.25 / 8015 x 100% = 2.16%, which is higher than the 1% in the first-generation population. Subsequent iterations of this exercise yield the figures 3.51%, 5.05%, and 6.82%—a process that will continue until the figure reaches 100%. Clearly, there is a persistent deviation from pure randomness in the dynamics of this population's genetic make-up. The percentage of highly immune individuals is systematically increasing as a result of an ostensibly random process. Why? Because there is one element in this model—the differential survival rate—which is itself systematic, and not random.

Of course, the figures given above are only averages; we would anticipate some variation around these expected values if this model of evolution is genuinely stochastic. However, it would be extremely improbable for the percentage of highly immune individuals to consistently decrease or even remain constant over several generations (although this is a remote logical possibility). In sum, while this model is random, it is not purely random. In more technical terms, there is a correlation between an individual organism's genetic make-up and its generational position (time). The relationship is stochastic, but they are not statistically independent because the processes of mutation and natural selection are not independent of one another.

This would seem to suggest that natural selection is in itself a "law," which, together with an external supply of energy such as solar radiation, is adequate to explain deviations from pure randomness in the evolution of life forms. There are several caveats, however.

The author notes that evolution has consistently moved in the direction of more complex living systems. The "law" of natural selection suggests only that a random process with appropriate feedback will tend to adapt to environmental demands and not necessarily move towards increased complexity as such. The observed pattern of evolution would be probable only if complexity were a significantly

1. This total is smaller than before only because this example assumes 1-for-1 reproduction, and some individuals died without reproducing; relaxing this assumption does not alter the conclusion as long as both genetic types reproduce at equal rates. Nor would the general conclusion be changed by sexual reproduction, which introduces the possibility of parents with two different sets of genes, although this would complicate the numerical analysis.

advantageous survival characteristic. This is an uncertain proposition. While complexity offers much greater flexibility to a system, at the same time it substantially increases the system's vulnerability to random misfortune—there are a great many more things that can go wrong with a human body than with a microorganism. To argue that there must be a net advantage to complexity in the process of natural selection on the grounds that complex life forms have in fact evolved would be, in the present context, circular logic.

Second, there still remains the question of just how much time it might take for the purely random part of the evolutionary process to produce the sequence of fortuitous chances, which the feedback mechanism then reinforces. The author reminds us that the finite history of the observable universe cannot have permitted unlimited experimentation. It should be pointed out, however, that the time horizon need not be infinite for the hypothesis "a random system with feedback produced the observed pattern of evolution" to assume some plausible probability (say, 30%). In fact, any probability less than 100% is attainable within some large but nevertheless finite time horizon, and that time is certainly much shorter than if a purely random process were hypothesized. Exactly how long would be needed, of course, depends on such factors as the typical extent and frequency of genetic mutation; relative probabilities of "helpful" versus "harmful" mutations; reproduction rates; the strength of the feedback process (the survival rate differential in the above example); and the subjective "plausibility limit," or what statisticians call a critical value. These, other than the last, are empirical questions, albeit questions that may prove almost impossible to answer.

A third set of considerations is related to the above. Adaptive evolution becomes a much more complex proposition when the environment (and hence the preferred genetic make-up) is itself changing over time. The remarkable macro-symbiosis of life on earth demands that a theory of evolution explain not only the development of species but also the development of a planetary ecosystem—which leaves considerably less room for "errors" due to counter-productive mutations, or equivalently, implies a significantly greater time horizon for any given critical value. Furthermore, if abrupt environmental changes have occurred several times during the earth's history—as scientific evidence seems to suggest—then the evolutionary process may have attained this intricate balance not just once but on several occasions, each time in a period much shorter than the full lifespan of the planet. The author may well have these considerations in mind, although his explicit statement seems to be in terms of individual species: ". . . higher, more complex forms of life followed simpler, less complex forms" (12).

A fourth question concerns what might be loosely called pre- and post-biological evolution. Is there any feedback process that would play the same role in the development of protons and planets, or of cities and civilizations, as

natural selection appears to do in the development of living organisms? Can highly organized inorganic systems be expected to pass on their characteristics with a higher probability than less organized ones? The case of human social evolution is even more intriguing. While it is not difficult to imagine a number of survival feedback mechanisms related to social structure, a random/feedback process may still be an inadequate explanation. The time span involved is extremely short—social complexity has increased many times over in just a few thousand years—and the human experience, at least in historical times, encompasses a relatively small number of distinct communities. While a brief glance at the past does reveal a few instances of failed social systems and many examples of stagnation and decay, there is a general impression of non-random progress. To be fair, the possibility of conscious and intelligent choice by the evolving entities significantly offsets these concerns.

Finally, what sort of feedback might explain the ready transitions between the different phases of evolution? Why would we expect the evolution of inorganic matter to produce an environment favorable to the emergence of life and its progressive evolution? What might have prompted life to evolve in a way that encouraged the development of not merely sentient beings, but sentient beings who are intrinsically social and propelled to create increasingly complex societies?

Some readers may question the author's transition from "the evolutionary force" to "God," which at first glance seems to be the weakest link in his argument. Surely we can imagine some law of physical or even spiritual reality that would govern the pattern of evolution without having to appeal to direct divine intervention. This is a legitimate point. However, it quickly leads to the question of the origin of that law—did it, too, evolve?—and sets the investigator off on an infinite logical regress that 'Abdu'l-Bahá considers "manifestly impossible."[2]

At some point the author's question—which is really 'Abdu'l-Bahá's often-repeated question—must be faced: Is it reasonable to suppose that a force capable of producing the human being is at least as subtle as human beings? "The only alternative is to believe that a blind, unconscious force, devoid of any intelligence, has somehow brought into being a creature who is endowed with conscious intelligence" (15)—and not only that, but has also brought into being a sophisticated dynamic system capable of having that creature evolve from

2. Bahá'u'lláh and 'Abdu'l-Bahá, *Bahá'í World Faith*, rev. ed. (Wilmette, Ill.: Bahá'í Publishing Trust, 1956) 343. This is not to deny the possibility that the universe has always existed. Indeed, Bahá'u'lláh asserts both that the universe has always existed and that it was created by God. This seems paradoxical only because we are conditioned to perceive cause and effect in terms of time, yet time is itself a dimension of the universe and therefore a created reality (*Tablets of Bahá'u'lláh Revealed after the Kitáb-i-Aqdas*, comp. Research Dept. of the Universal House of Justice, trans. H. Taherzadeh et al., 2d ed. [Wilmette, Ill.: Bahá'í Publishing Trust, 1988] 140).

apparent chaos into its present state and beyond that into whatever even more refined systems future evolution of the human reality might unfold.

In summary, the much discussed theory of natural selection is more robust than simple randomness; it does indeed provide for an "evolutionary force." However, the strength of that force, the scope of its applicability, and the speed with which it is likely to operate are all open to discussion. It may well be that even a random process enhanced by a feedback mechanism stands a negligible chance of having produced the striking sequence of complexification in physical, biological, and social reality that human intelligence has uncovered. It is difficult to avoid the intuition that evolution has some single-minded purpose.

Of course, the determined skeptic can argue that our perspective is biased—the miracle of human consciousness may not be a miracle but simply a remote chance occurrence in a vast sea of less successful evolutionary experiments. Perhaps. But as the author points out with subtle humor, such an assertion is no different from, and no more scientific than, the belief "that every observed instance of the operation of gravity, from the beginning of recorded history until the present moment, is nothing but an incredible coincidence" (8). Even for that observation alone, his article deserves to be widely read.

GORDON DICKS

AUTHOR'S RESPONSE TO COMMENTARY ON "A SCIENTIFIC PROOF OF THE EXISTENCE OF GOD"

Commentator: Gordon Dicks
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Gordon Dicks has written a careful and cogent commentary, which, within the space of a few pages, expertly discusses many of the issues implicit in my evolution-based argument for the existence of God. I have no quarrel with any part of his commentary and consider it an excellent companion piece to my article for anyone interested in the more technical side of (the current form of) neo-Darwinian evolutionary theory. Indeed, his commentary provides a sound basis for a few further comments that will, I hope, allow for an even greater clarification of some of these issues.

To begin with, Dicks is quite correct in pointing out that the retroprojected mechanisms of neo-Darwinian evolutionary theory are not purely random. However, as he also points out further on, the non-random features can function only in the presence of a host of assumptions concerning such things as the rate and nature of favorable mutations, the (relative) selective advantage of spontaneous increases in complexity, and the nature and stability of the ecosystem at every stage of the evolutionary process. All of these parameters are involved in creating a dynamical system that would have the features necessary to account for the process of evolution (and in particular for the continual complexification involved in evolution). The simple point is that the necessary critical values of these parameters cannot reasonably be held to have occurred by chance.

Thus, as the commentator himself quite clearly acknowledges, all of these questions involving evolutionary *theory* do not diminish in the least the strength of the argument for the existence of an evolutionary force (based on the *facts* of evolution); they only raise questions about the various mechanisms by which this force may have acted. Here, it is most important to understand that my argument does not seek to prove that God (in some *a priori* notion) has intervened in the evolutionary process in a given way. Rather, my argument first establishes the objective existence of an evolutionary force, and Dicks agrees that "this much seems conclusive" (p#). My argument then proceeds by pointing out that humanity, being the end product or outcome of evolution, is thus the creation of that force. This *fact* justifies my regarding the evolutionary force (whatever it is and however it has acted) as God. It is *our* God, the God of humanity, because it is our creator. My argument does not seek to attribute to God, so defined, attributes other than what can reasonably and plausibly be attributed to the evolutionary force on the basis of its being the cause of human existence. But, as it turns out, that is still quite a lot (which is one of the points of 'Abdu'l-Bahá's argument). In particular, I argue that God has will and conscious intelligence.

Thus, the logic of my proof does not strictly necessitate a consideration of the various strengths and weaknesses of the neo-Darwinian theory of evolution. However, in a previous discussion of these questions, I did in fact undertake a brief criticism of certain aspects of neo-Darwinism.[1] Let me therefore take the opportunity afforded by this commentary to amplify and elaborate these criticisms.

In his discussion, Dicks appears to use the term "natural selection" to refer to the combined process of mutations (genetic change) on the one hand, and the cumulative effect on populations of phenotypical environmental impact on the other. In accordance with Darwin's original terminology, I will henceforth use the term "natural selection" to refer only to the latter and will refer to the former simply as "mutation." Now, natural selection, in this narrow and more specific sense, can never, under any circumstances, be the source of complexification. This is because *natural selection decreases genetic diversity* (or *variability*). Natural selection favors the proliferation of (positively selects) certain *existing* genotypes by reducing or eliminating (negatively selecting) other (competing) forms.

Moreover, it is most important to stress that natural selection operates strictly on the phenotypical not genotypical level; it has no direct influence on the physical genes themselves. But, insofar as given physical types in a population are due to specific genes, natural selection can affect the total gene pool of a population by giving a reproductive advantage to the positively selected phenotypes (and thus, indirectly, to the related genotypes). If this differential is sufficiently strong and persistent, it can result in either the reduction within or the disappearance from the total gene pool of those alleles associated with the negatively selected phenotypes. In this process, no new forms are created and no new genes enter the gene pool. However, some forms may be eliminated and some alleles with them. Natural selection is thus a kind of purification process by which certain alleomorphs (genetic forms) are purged from the population.

Clearly and indisputably, this (narrow) process of natural selection could never, even theoretically, account for the progressive complexification of life forms in the evolutionary process. In fact, without mutation, and once the effect of a given set of selective pressures have played themselves out, a closed population in a stable environment will converge to a stable equilibrium state (Hardy-Weinberg) in which the proportion of all alleles is constant, i.e., in which no further genetic change occurs.

How, then, could Darwin have possibly thought that natural selection explained evolution? The answer is simple: Darwin, like others of his day, was a Lamarckian. Darwin formulated his theory of natural selection before the birth

1. See Hatcher, "The Unity of Religion and Science," *The Science of Religion*, *Bahá'í Studies* 2: 23.

of modern genetics, and he tacitly assumed that acquired (phenotypical) characteristics could be inherited, that is, passed on to the next generation. If we add this explicit assumption to the operation of natural selection, the picture changes drastically. Now, every individual organism becomes an active participant in the process of evolution. Any creative or adaptive response of an organism can be passed on to the subsequent generation, and since creativity tends to beget more creativity, one can easily see how a steady upward movement of complexification could be generated.

In such circumstances, my argument for the existence of an "evolutionary force" is still valid, but this force can now be conceived as the total sum of individual adaptive responses. In this case, the force of evolution would be distributed—it would "reside in the particulars" à la Aristotle, rather than having an objective existence outside the process of evolution itself, à la Plato. (One would still have to account for the origin and genesis of the individual creativity involved in this process, but that is another matter.)

However, the advent of modern genetics utterly refuted the Lamarckian theory of the inheritability of acquired characteristics and thus dashed all hopes of explaining evolution by natural selection alone. This gave birth to the neo-Darwinian theory, described by Dicks, which attributes the source of novel physical forms in evolution to mutation, that is, to spontaneous genetic change. In this theory, mutations are assumed to be totally (purely) random in the sense explained by Dicks. Thus, according to the second law of thermodynamics, only an infinitesimal number of mutations will be *favorable*, i.e., will represent an increase in order or complexity. In fact, if one takes the typically neo-Darwinian materialistic–reductionistic view of evolution, even the assumption of pure randomness is probably overly optimistic, because the known physical causes of mutations are such events as incomplete chemical processes or radiation trauma—events that by their very nature tend to produce unfavorable mutations. Thus, rather than being uniform, the distribution of mutations would, under such assumptions, most probably be skewed in the direction of unfavorability.

In any case, under the neo-Darwinian assumptions, mutations favorable to increased complexity would, at best, only be *sporadic* (or *sparse*), i.e., insufficiently frequent to allow for any significant process of convergence towards greater complexity resulting from the operation of natural selection. Indeed, to achieve multigenerational convergence towards complexity, one needs *much more* than an occasional favorable mutation. One needs a certain minimal, transgenerational rate of favorable mutations within the same population for a considerable length of time (e.g., as in Dicks's hypothetical example of a 1% constant rate). Moreover, in order to have a *process* of complexification, one would need a consistent string of favorable mutations within the same (increasingly narrow) mutant subpopulation. This requirement multiplies the (already infinitesimal) probabilities for individual favorable

mutationevents, thereby further and significantly reducing the probability that such a process could occur spontaneously.

Finally, the alternation between long periods of stasis and short periods of rapid change towards complexification, which the fossil record seems to show, shortens considerably the time interval during which successive processes of complexification could have occurred. This, again, decreases dramatically the probability values in favor of a spontaneous increase in complexity.

Thus, to sum up: according to the neo-Darwinian theory, the only source of new forms (and thus of upward movement) in the process of evolution is mutation, and mutation is assumed (perhaps optimistically) to be purely random. Thus, in spite of the operation of natural selection, which, under certain circumstances, can positively select newly generated genotypes, the movement towards greater complexity in evolution is nevertheless confronted with the essentially pure randomness of mutation (again, under neo-Darwinian assumptions). The neo-Darwinian theory does not, therefore, really diminish the force of 'Abdu'l-Bahá's argument (or my reformulation thereof).

Let me say a closing word about another pertinent point raised by this commentator, namely the question of the selectivity of complexity. It is fairly easy to see that, in most instances, evolution towards a more complex form would have a negative selective value during the initial stages of the process. For example, a complex and flexible organ like the eye has a positive selective value only when it is more or less fully formed. Let us imagine the process of an eye evolving beginning with, say, a mutation-generated, light-sensitive spot on the skin. Under most conceivable environmental circumstances, such a spot would increase the vulnerability of the organism without conferring any immediate selective advantage, and such would be the case for an unimaginable number of generations, during which an incredible number of further, favorable mutations would have to occur. Moreover, the subsequent favorable mutations would have to occur among the already mutated population for there to be any evolution towards higher complexity. As in the above, this requirement multiplies the individual probabilities for mutation, rendering such a process even less likely (and to a significant extent).

Similar arguments can be given to show that such characteristically human capacities as the propensity for abstract thought (with its requirement of temporary suspension of practical activities) would have had a strongly negative survival value at any stage of biological evolution.[2]

In recognition of this fundamental weakness in neo-Darwinism, some neo-Darwinian theorists (e.g., Hans Mohr, *Structure and Significance of Science* 200)[3] have argued that a mutation-generated change in physical characteristics

2. See my discussion of this point in *Logic and Logos* (Oxford: George Ronald, 1990) 14–17.

3. Hans Mohr, *Structure and Significance of Science* (New York: Springer Verlag, 1977).

(e.g., a light-sensitive spot) must have also been accompanied by a parallel mutation of the central propensity structure of the organism's nervous system, thereby fortuitously endowing the organism with the capacity to use the newly mutated characteristic in a positive way. Such gratuitous assumptions do not buttress neo-Darwinian theory but rather are logically equivalent to postulating the existence of the evolutionary force (i.e., as the unseen cause of the necessary combination and sequence of favorable mutations).

WILLIAM S. HATCHER

A SCIENTIFIC PROOF OF THE EXISTENCE OF GOD

Author: William S. Hatcher
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I appreciate Dr. William Hatcher's attempts to reconcile the teachings of science and religion in his article. This is important work. However, I have difficulty with this particular attempt on both theological and scientific grounds.

First, my theological objection. I think that the author's argument relies on the miraculous to "prove" the existence of God. In this respect, it is like using the miraculous to prove the legitimacy of a Manifestation of God. In that area, Bahá'í scriptures have finally freed us from using the performance of miracles as a proof. The first proof of a Manifestation is that Manifestation's own person. Beyond that, the proofs are his words, their power, persuasion, beauty, and fruits. The "miraculous" is therefore considered to be a very poor proof of the existence of God's Manifestations. I would imagine the same could be said about using it to "prove" the existence of God.

Now, my scientific objections to the author's proofs. First, I'll summarize his argument, then I'll discuss my objections. His argument goes like this:

The second law of thermodynamics says that the natural movement of stuff in the universe is towards randomness and disorder. Therefore, the spontaneous or natural occurrence of any life form is a highly improbable event. The more complex the life form, the more improbable its appearance. And furthermore, in the case of highly complex life forms, like humans, the appearance is so improbable as to be miraculous. And so the argument ends by saying that, since evolution is so improbable as to be miraculous, there must be a God to have performed the miracle.

The author's argument as he summarized it on page 13:

> . . . evolution is clearly an example of a process that exhibits a significant, persistent deviation from randomness. Within a specified and limited time-frame, there was a persistent and recurrent movement from more probable to less probable configurations. It is therefore unscientific and irrational to attribute this process to chance.

His argument disregards the astronomical and geological scale of genetic trials.

Consider this: If you had a pair of dice and each die had one hundred sides to it, what would be the chance of rolling a "33-33"? The answer is "100 times 100 to one," or "10,000 to one," a highly improbable occurrence. However, if you had a moderately fast computer running those trials at the rate of 100,000 per second, you would produce this highly improbable result at the rate of ten every second. Improbability has to be thought about in the context of how many trials are made and how quickly they are made.

Every sexual encounter is an experiment in genetics, a genetic trial. And it is

important to think about the number of such genetic experiments that occur every day on Earth in the kingdoms of plants and animals and microscopic creatures. How many times does mating occur on Earth in any minute? Then we have to expand the time scale to allow for the millions of days that have occurred since life appeared on Earth.

What comes out is an astronomical number of trials occurring at an astronomical rate over a geological time scale. Therefore, it is not scientifically necessary to invoke the miraculous to account for improbably complex life forms.

I have some additional objections. The author equates growth and complexification, and needs this connection for his later argument. I believe he is saying that as a fetus grows into adulthood it becomes more complex. In my understanding, there is no change in complexity in an individual organism through its lifespan. The level of complexity is folded in the DNA code, and there is no change in the basic pattern as it is unfolded through the life cycle. Evolutionary change may mark an increase in complexity, but this does not happen in an individual lifetime.

Another point: The author says that the stability of a system depends on energy. In my understanding, systems depend on energy only in a collateral fashion. They depend on energy indirectly. The stability of a system depends on its flexibility. A system is stable if it can respond to the demands of its environment without losing its integrity. Energy is not a consideration. A hungry cat is no less a cat than a well-fed one. A plant growing in poor light is no less organized than one growing in good light.

I enjoyed the article, but finally I found the above-mentioned considerations to be rather fundamental flaws.

PHILIP BELOVE

AUTHOR'S RESPONSE TO COMMENTARY ON "A SCIENTIFIC PROOF OF THE EXISTENCE OF GOD"

Commentator: Philip Belove
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I believe that Philip Belove's criticisms of my article, "A Scientific Proof of the Existence of God," reflect a significant degree of misunderstanding of that article and the proof it contains. The commentary reformulates the latter in terms of "miracles" or "the miraculous," notions that do not appear in the article and which are entirely unrelated to the proof. On this basis, he then declares that my approach to the question of God's existence violates a theological principle, relating to proofs by miracles, contained in the Bahá'í scriptures. However, as the introductory portion of my article makes clear, my proof is itself based quite directly on the Bahá'í scriptures, more specifically the writings of 'Abdu'l-Bahá.

The commentator never defines what he means by the terms "miracle" and "miraculous." It would therefore contribute more to confusion than to clarification were I to try to comment upon them here. However, perhaps a few comments about what my proof, in fact, is will help make it absolutely clear that no notion of "the miraculous" is in any way involved.

To begin with, it is most important to understand that the proof does not seek to prove that God (according to some *a priori* notion or category) has intervened in the evolutionary process in a given way. Rather, my reasoning first establishes the objective existence of an evolutionary force, i.e., a force that is responsible for the process of evolution. The proof then proceeds by pointing out that humanity, being the end product or outcome of the process of evolution, is thus the creation of the evolutionary force. This *fact* justifies my regarding the evolutionary force (whatever it is and however it has acted) as God. It is *our* God, the God of humanity, because it is *our* creator. My proof does not seek to attribute to God, so defined, attributes other than what can reasonably and plausibly be attributed to the evolutionary force on the basis of its being the cause of human existence. But, as it turns out, that is still quite a lot (which is one of the main points of 'Abdu'l-Bahá's articulation of the evolution-based proof of God's existence). In particular, the proof shows (in the manner of 'Abdu'l-Bahá) that this force has will and conscious intelligence.

My argument for the existence of an evolutionary force is a standard type of scientific argument, a kind of argument that occurs frequently in all branches of science. As explained in the brief discussion of systems theory in my article, existing physical systems exhibit various, different dynamic profiles. Some of these profiles can be plausibly explained under assumptions of randomness, while others cannot. My thesis is that evolution represents a physical system

whose dynamic profile cannot be reasonably explained under assumptions of randomness. This is no more nor less a "miracle" than any non-random system. Of course, this is a particularly interesting non-random system for us, because it is the non-random system that produced us.

The commentary next raises the objection that my reasoning does not take into account the "number of trials" involved in evolution. It asserts that every act of mating represents a distinct trial in the evolutionary process. This view strongly contradicts the current body of scientific knowledge regarding genetics, which holds that, in the absence of mutation, mating simply selects (in general, randomly) a certain number of existing genes from the total (currently existing) gene pool. In evolution, a genuine "trial" occurs only when there is a mutation *favorable to an increase in complexity and having a certain selective advantage for the organism in which the mutation occurs.* Whether such a trial would be successful, i.e., lead to a long-term increase in organismic complexity of the given species, would depend on a host of factors relating to the nature and stability of the selective pressures operating within the given ecosystem. However, in any case, according to the second law of thermodynamics, and *under assumptions of randomness,* mutations favorable to an increase in complexity are *sparse* or *sporadic,* i.e., too infrequent to explain a persistent movement towards greater complexity in the evolutionary process. This question is more fully treated in my answer to the insightful comments and observations of Gordon Dicks contained in the present issue of *The Journal of Bahá'í Studies,* to which I refer this commentator and other interested readers.

This commentary now raises questions concerning the relationship between growth and complexity. In general growth can be *both* quantitative and qualitative. It is qualitative growth that represents an increase in complexity, whereas purely quantitative growth means an increase in the number (quantity) of systems (e.g., organisms) with no increase in their complexity, and without their being organized into a macrosystem. The facts of evolution clearly indicate that both quantitative and qualitative growth have occurred in the evolutionary process, but it is the increasing complexity of emerging higher life forms that represents a movement from the probable towards the improbable in evolution.

The increase in complexity during evolution can be viewed either phenotypically, as the observable complexification in the physical structure and dynamics of organisms, or else genotypically, as the gradual emergence of an increasingly complex genetic configuration, which allows for the externally observed phenotypical complexification. My argument works the same whichever way the process of complexification is viewed.

The commentator is correct in asserting that (in the absence of mutation) there is no increase in genetic complexity during the lifetime of a single organism: the individual's genetic endowment is totally determined at the

moment a given sperm fertilizes a given egg. However, the growth process that transforms the single fertilized cell into a multibillion-celled organism is both quantitative and qualitative. If the growth of the embryo were purely quantitative, it would result simply in a cell colony, i.e., in the replication of several billion identical cells, not in an integrated organism. But, because of cell differentiation, the consequent specialization of cell functioning, and the integration of the differentiated cells into an organically functioning macrosystem, the development of the embryo represents a significant increase in complexity. Of course, as the commentator indicates, all the physical complexity of the mature organism is implicit in the genetic potential of the original, single fertilized egg. However, this observation does not alter the fact that the growth of the embryo represents an increase in complexity and not just an unstructured multiplication of cells.

Finally, the commentary raises questions about the thermodynamics of systemic stability. Science has shown that complex systems require continual inputs of energy in order to remain in a stable (or periodically fluctuating) state. This is why we breathe in and out every few seconds. The continual oxygenation of various body metabolites releases a steady flow of energy throughout the body but particularly to the brain and central nervous system, which control the moment-to-moment stasis of the total organism. Ceasing to breathe for even a few seconds initiates a (reversible, at first) decrease in this flow of energy, leading (if continued for a few minutes) to the immediate death of brain cells, irreversibly destroying the previous level of organismic stasis. If breathing is stopped for a little longer, death by suffocation ensues, after which the system begins a steady and irreversible disintegration.

A similar pattern can be observed in plants that are uprooted and thereby deprived of access to continual inputs of energy from their natural milieu. Perhaps it is useful to recall the point mentioned in my article that the stasis or growth of a system results only from energy input that is *appropriate* (to the parameters of the system), not arbitrary. What is appropriate can vary widely from one system to another: some systems are highly inefficient, requiring massive amounts of energy input on an ongoing basis in order to remain stable. Others (such as the human organism) are incredibly efficient and can function for extended periods of time with only modest energy input (e.g., as in respiration). But even such energy-efficient systems will regularly need more substantial energy inputs (such as food and water) if they are to maintain themselves. Thus, both the short- and long-term stability of complex physical systems depend on appropriate energy input.

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