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A Scientific Proof of the Existence of God*

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Abstract

Of the various systems that we can actually observe in the physical world, some (e.g., the movement of small dust particles suspended in the air) appear to be perfectly random (or chaotic); whereas, others (e.g., the growth of leaved plants) exhibit a high degree of order and structure. Whenever scientists encounter a phenomenon or system that exhibits a significant evolution towards order, but without any observable reason for such movement, they suspect the cause to be the objective action of some unseen force (e.g., the unseen force of gravity that, in the presence of a large mass like the earth, causes the persistent downward movement of unsupported objects). Using this method, modern physics has now validated the existence of at least four basic forces (gravity, the strong and the weak nuclear forces, and electromagnetic force), and continues to examine the possibility that other, hitherto undetected, forces may exist. In 1921 'Abdu'l-Bahá presented a cogent scientific argument for the existence of an objective, unseen force as the only reasonable explanation for the phenomenon of biological evolution. In the years since 'Abdu'l-Bahá's proof was first published, the findings of science have tended to show that, indeed, the phenomenon of evolution represents a persistent movement from disorder towards order of the kind that strongly suggests the action of some unobservable force different from all other forces so far discovered. In this article, we present a somewhat detailed reformulation of 'Abdu'l-Bahá's argument using certain contemporary scientific terms that were not current at the time 'Abdu'l-Bahá wrote.

Résumé

Si l'on considère les systèmes physiques facilement observables, on voit que certains (par exemple, le mouvement des grains de poussière suspendus dans l'air) paraîssent parfaitement aléaioire (ou chaotique) tandis que d'autres systèmes (par exemple, la croissance des plantes feuillues) témoignent d'un, niveau très élévé d'ordre et de structure. Chaque fois que la science rencontre un phénomène qui démontre, sans raison apparente, une évolution significative vers un état ordonné, on soupçonne que la cause en est l'action objective d'une force non directement observable (par example, la force invisible de la gravitation qui, dans la présence d'une grande masse telle la terre, produit la descente en flèche d'objets libres). En se servant de cette méthode, la physique moderne a réussi à valider l'existence d'au moins quatre forces fondamentales (la gravitation, les forces nucléaires faible et forte, et la force électromagnétique) et poursuit la recherche pour déceler d'autres forces encore inconnues. En 1921, 'Abdu'l-Bahá a présenté un argument scientifique qui tend à démontrer l'existence d'une force invisible comme cause du phénomène de l'évolution biologique des espèces. Depuis la publication de la preuve d''Abdu'l-Bahá, l'étude scientfique de l'évolution tend en effet à confirmer que l'émergence des espèces biologiques supérieures représente un mouvement persistant du désordre vers l'ordre, ce qui suggère fortement l'existence d'une force directrice, distincte des autres forces connues jusqu'à maintenant. Dans le présent article, nous donnons une formulation détaillée de la preuve d''Abdu'l-Bahá en nous servant de termes scientifique actuels dont certains n'étaient pas encore utilisés quand 'Abdu'l-Bahá a écrit son texte.

Resumen

De los distintos sistemas que en el presente podemos observar en el mundo físico, algunos, (por ejemplo, el movimiento de pequeñas partículas de polvo suspendidas en el aire) aparentan estar perfectamente al azar (o caóticos) mientras otros, (v.gr., el crecimiento de plantas foliformes) demuestran un alto grado de orden y estructura. Cuando quiera que los científicos tropiezan con algún fenómeno o sistema que demuestra, en forma significativa, evolución hacia el orden, sin razón observable que justifique ese movimiento, sospechan que la causa es to acción objetiva de una fuerza desapercibida (v.gr., la fuerza desapercibida de la gravedad que en presencia de una gran masa como to tierra, causa el movimiento descendente y persistente de objetos no sostenidos). Utilizando este método, la fisica moderna ha dado validez a la existencia de por lo menos cuatro fuerzas básicas (la gravedad, las fuerzas fuerte y débil nucleares, y la fuerza electromagnética), y continúa estudiando la posibilidad de la existencia

de otras fuerzas hasta ahora no descubiertas. En 1921 ‘Abdu’l-Bahá presentó un argumento científico persuasivo en pro de la existencia de una fuerza objetiva, no visible, como única explicación razonable del fenómeno de evolución biológica. En los años transcurridos desde que primero se publicó la prueba de ‘Abdu’l-Bahá las observaciones de la ciencia demuestran que, efectivamente, el fenómeno de la evolución representa movimiento persistente del desorden hacia el orden de una manera que fuertemente sugiere la acción de una fuerza no observada que en sí es diferente de toda fuerza hasta ahora descubierta. En esto disertación formulamos de nuevo, en forma algo minuciosa, el argumento de ‘Abdu’l-Bahá valiéndonos de ciertos términos científicos contemporáneos no corrientes en aquel tiempo.

> If thou wishest the divine knowledge and recognition,… apply thyself to rational and authoritative arguments. For arguments are a guide to the path, and by this the heart will be turned unto the Sun of Truth. And when the heart is turned unto the Sun, then the eye will be opened and will recognize the Sun through the Sun itself. Then there will be no need of arguments, for the Sun is altogether independent, and absolute independence is in need of nothing, including proofs.
>
> — ‘Abdu’l-Bahá

‘Abdu’l-Bahá’s counsel to the seeker after God seems to say at least two things: first, that rational arguments are useful and necessary starting points in the approach to God and, second, that the deepest and most adequate knowledge of God goes far beyond such arguments and is essentially transrational.

Interestingly, ‘Abdu’l-Bahá stresses that the result of studying rational arguments will be to turn the heart towards God. This suggests that generating logical proofs of the existence of God is not an end in itself, but rather a means of opening oneself to a deeper experience of the divine presence. Nevertheless, every major philosopher and every religious tradition have presented proofs of God’s existence, and ‘Abdu’l-Bahá himself has presented a significant number of such proofs in his own writings. Most of the proofs given by ‘Abdu’l-Bahá are variants of classical philosophical arguments, starting with Aristotle’s well-known argument for the existence of a primal cause.

However, in his tablet written in 1921 to the Swiss scientist Auguste Forel, ‘Abdu’l-Bahá offers a distinctly modern proof of the existence of God, based on certain facts and principles associated with the phenomenon of biological evolution (*Bahá’í World Faith* 336–48). He argues that the cause of the composition (and decomposition) of living beings must be an unobservable, objectively existing, voluntary force (thus, a conscious force external to the process of evolution itself). Since this force has produced humanity, it must be greater than humans and is, therefore, a Being endowed with superhuman capacities (*Bahá‘í World Faith* 342–43).

This particular argument may conceivably be original with ‘Abdu’l-Bahá. Certainly it could not have been given in that form much before the early twentieth century because the scientific theory of evolution on which it is based was developed only in the nineteenth century. Moreover, most scientists who accepted the theory of evolution were philosophical materialists, holding that evolution made God irrelevant instead of proving God’s existence. Though arguments similar to ‘Abdu’l-Bahá’s have appeared in the more recent literature on the philosophy of science,[1] I have yet to discover any that are earlier or even contemporaneous with ‘Abdu’l-Bahá’s tablet to Auguste Forel.[2]

The argument based on evolution is not the only proof of God’s existence given in the tablet to Auguste Forel. However, the evolution-based argument is unique in the way it uses sophisticated scientific ideas, and its cogency and force are liable to be underestimated by anyone not familiar with certain fundamental principles of thermodynamics.[3] Thus, rather than undertaking a historical—critical approach to ‘Abdu’l-Bahá’s proof, we propose, in the present article, to give a thoroughly modern formulation of his argument, using scientific terms that were not necessarily current at the time ‘Abdu’l-Bahá wrote. In taking this approach, we hope to convey something of the full strength of ‘Abdu’l-Bahá’s argument. Therefore, the remainder of this article will consist of an extended and careful reformulation of ‘Abdu’l-Bahá’s proof in contemporary scientific language.

The Nature of Scientific Proof

Since our proof purports to be *scientific*, we need to begin by a brief discussion of the nature of science and of proof in science. This discussion is all the more important because there are so many commonly held misconceptions about the nature of scientific proof.

Science is composed of two fundamental aspects. One aspect is its concrete or observable dimension: we accumulate observations of some phenomenon and record these observations in the form of *observation statements*. This record constitutes our body of observed truths or *facts* about the given phenomenon.

The second aspect of science is its abstract or theoretical dimension. Having accumulated a certain number of observation statements about a phenomenon, we seek an explanation for these observations. We want to understand

how the various facts about the phenomenon are related to each other. In other words, we seek to understand how or why the phenomenon occurs and how it operates. This quest leads us to formulate an hypothesis (or. if you will, a theory) that represents our mental conception of the underlying dynamic of the phenomenon. Such a theory is usually expressed in a language that uses *abstract* terms, i.e., terms referring to nonobservable entities or forces (e.g., entities like electrons or forces like the strong nuclear force). Observation statements, in contrast, will use *concrete* terms, that is, terms referring to observable entities or configurations.

The way we test the truth of observation statements is by making further, more exacting, observations and measurements. However, because of the natural, intrinsic limitations of the human sensory apparatus and nervous system, we can never entirely eliminate errors from our observations of a given phenomenon, no matter how careful and exacting we may be. This is particularly true of phenomena that are extremely small (perhaps microscopic) or extremely remote (say, distant stars), but it is true in general, even of ordinarily accessible, everyday phenomena. Thus, the truth value of facts (observation statements) is always relative. The widely held belief that the facts of science are absolute or incontrovertible is therefore a misconception.

Testing the truth of the theoretical statements of science is a still more complicated process. We begin by deducing new observation statements as logical consequences of the theory; then we test these observation statements in the usual way. In other words, if our theory says that such-and-such a thing must happen, then we look to see if such-and-such a thing does in fact happen; if our theory says that snow is white, then we look to see if snow is, in fact, white. The new observation statements deduced from a theory are called *predictions* of the theory, and if they are confirmed by our experience, then we say the theory is *valid*, meaning "validated or confirmed by observation."

Thus, the truth value of a theoretical statement of science is also relative, for even if all current predictions of a theory are confirmed by observation, nothing excludes the possibility that in the future new predictions will prove false. There is also the possibility that newly conceived experiments will lead to the future falsification of current predictions, which, on the basis of current experience, appear justified.

With regard to the truth value of theories, we are therefore in a paradoxical, somewhat humorous situation. It is possible to prove almost absolutely that a theory is false, because if some of the theory's predictions flagrantly contradict highly authenticated observations, then the theory cannot be true. It will have to be abandoned or else modified in some way. But no matter how many predictions of a theory have been confirmed through observation, the possibility always remains of the theory's future falsification as a result either of novel predictions that contradict known evidence or novel evidence that contradicts known predictions.

Towards the beginning of this century, it was thought possible to establish rules of so-called inductive logic that would allow us to pass from a set of particulars to a general conclusion with the same degree of precision that deductive logic allows us to pass from general principles to particular conclusions. However, it is now known that this is not possible, even in principle. A theorem of mathematical logic has established that, in general, there are an infinite number of mutually incompatible theories consistent with any given, finite set of facts. Since the finitude of human beings guarantees that there will always be only a finite set of facts for any given phenomenon, it follows that no set of observation statements ever determines a unique theory as an explanation for the phenomenon. As one logician has expressed it: theory is underdetermined by fact (Quine, *Word and Object* 78).

Thus, fact gathering and theory making are, in some respects, mutually independent. Whereas fact gathering is a slow, gradual process, theory making involves a creative, discontinuous leap of the imagination. When gathering facts, we seek to know how things are. When conceiving a theory, we try to imagine how things might be.

It follows incontrovertibly from these considerations that none of the truths of science can ever be considered as proved absolutely. The notion of absolute proof is simply not part of science. The widespread belief that the essential characteristic of scientific truth is its absoluteness and exactness (in supposed contrast to the relativity and imprecision of truth in philosophy or religion) is a misconception. Though some people may deplore this relativity of scientific truth, it has a quite positive aspect because it makes truth seeking in science an enterprise that is dynamic and progressive rather than static and sterile. Moreover, the efficiency of scientific method has been powerfully confirmed by its success in generating an increasing number of highly validated theories resulting from its systematic application during the last several hundred years.

To summarize, a proposition may be said to be scientifically proved when we have rendered that proposition considerably more *plausible* (meaning *probably true*) than all known, logically possible alternatives. Thus, to speak of a scientific proof of God's existence is to affirm that we can render the proposition that God exists considerably more plausible than any of the known alternatives (and, in particular, the alternative that God does not exist). In other words, we can know that God exists with the same degree of certainty that we know the strong nuclear force or electrons exist. Having dealt with these methodological issues, we now begin the proof proper.[4]

Visible and Invisible Reality

We first establish the principle of the objective existence of an invisible world, i.e., a portion of reality external to human subjectivity but inaccessible to human observation. In other words, there are forces and entities we cannot observe directly but which exist objectively, that is, independently of any human perception.

Let us start with a very simple example. Suppose we hold a small object like a pencil between our thumb and forefinger and then release it. We observe that it falls to the floor, and we say that the force of gravity causes it to fall. But let us look again. Do we actually *see* any downward force acting upon the pencil, something pulling or pushing it? Clearly, not. We do not observe the force of gravity at all. Rather we deduce the existence of some unseen force (called gravity) acting upon unsupported objects in order to explain their otherwise inexplicable downward movement.

Now, let us look once again more carefully at the initial configuration of the pencil and ask the following question: at the moment the pencil is released, what are the logically (physically) possible directions it can take, *based strictly on what we can observe in the configuration*? The answer, clearly, is that any direction is logically possible. Nothing we can observe physically blocks the pencil from following any direction; nor can we observe anything that seems to favor one direction more than the others. Yet, what we do *in fact* observe is that one of the directions (downward) is privileged, for no matter how many times we repeat the simple experiment of releasing the pencil, it is the downward direction that is taken. Thus, what we observe in fact is a persistent and significant deviation from randomness (chance).

In science, we say that the behavior of an observable phenomenon is *random* (due to chance) if all logical possibilities occur with equal relative frequency. In other words, if the behavior of an unsupported object like the just released pencil was in fact random, then we would expect that some of these other logical possibilities would actually occur from time to time. However, what we observe is not only that the various logical possibilities do not occur with the same relative frequency but also that one of these possibilities is uniquely privileged in being exclusively chosen. Thus, what we actually observe is *a persistent, consistent, and significant deviation from randomness*, and it is this deviation from randomness (without any observable reason for such deviation) that leads us to appeal to the existence of an unobserved force as the *cause* of the observed non-random behavior.

This example concerning gravity illustrates a general principle of scientific method: Whenever we encounter an observable phenomenon that, for no observable reason, exhibits a persistent deviation from randomness, we feel logically justified in asserting that the observed non-random behavior is due to the action of some unobserved force or entity. Indeed, to do otherwise would be grossly illogical and unscientific. The existence of each of the four basic forces of current physics (gravity, the strong and the weak nuclear forces, and electromagnetic force) was deduced in this manner. So basic is this principle that all of science would collapse were it to be discarded.

However, let us note that we have not proved absolutely that gravity exists. It is logically possible (though, of course, highly implausible) 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. A skeptic (an “agravitist”) could say: “I understand why you believe that gravity exists, but I prefer to believe that there is no such unseen force.” It is possible the skeptic might say that we will wake up tomorrow to find a world in total chaos and disorder, with unsupported objects flying in all directions, and we will then realize that all we have experienced for thousands of years has been just a series of very remarkable coincidences.

As we know from our discussion of scientific methodology above, we cannot refute such a skeptic in any absolute way. We can, of course, point out just how infinitesimal is the probability that he or she is right, but the skeptic is nonetheless free to choose to persist in an implausible belief. However, the skeptic cannot maintain anti-gravity skepticism while claiming to be scientific and rational in so doing. We have established that the existence of an unseen force of gravity is by far the most plausible of all known alternatives, and anyone who deliberately chooses a less plausible alternative is by definition unscientific and irrational. (Again, this is not the same as acknowledging that there are other logical possibilities, however implausible.)

Returning now to our example of the downward falling of unsupported objects, observe that we have shown much more than the simple existence of invisible or unobservable forces or entities. We have shown that observable effects can well have unobservable causes. We have shown that there are many instances of observable behavior that cannot be explained observably. In more philosophical language, we have shown that the visible world is not self-sufficient, that it does not contain a “sufficient reason” for itself: the phenomena of visible reality are produced by (or arise from) invisible reality.

Let us illustrate this truth with a simple analogy. Imagine that we are standing on the shore of an immense ocean. The ocean and its hidden depths represent the immensity of invisible reality. Occasionally a fish jumps out of the ocean into the air and then returns to the ocean. The brief moment during which the fish is out of the water represents a phenomenon of visible reality.

This analogy expresses very well the view of physical reality that derives from modern physics (in particular from quantum theory): the perceived macro-objects of visible reality consist of billions upon billions of little energy packets called *elementary particles* in relative but temporary equilibrium states and in continual motion. These particles arise from invisible reality (pure energy) and, whenever their equilibrium states are destroyed, they return to invisible reality.

Random and Non-Random Phenomena in Science

In the foregoing discussion, we have established the following methodological principle of science: Whenever any phenomenon exhibits an observable, persistent, significant deviation from random behavior, without any observable cause, then we are justified in inferring the existence of an unseen force or entity as the cause of the phenomenon. We now need to go further and to ask whether there is any principle of science that can tell us what is probable and what is improbable. Probable configurations or phenomena are those that are most likely random; whereas, improbable configurations are more likely to result from the action of some invisible force (when, of course, there is no observable cause).

There is indeed such a principle. It is the second law of thermodynamics (the so-called entropy principle), first put forth by the French engineer Carnot (1796–1832) and the German physicist Clausius (1822–1888). We will consider two statements or formulations of this law, one informal and heuristic, the second more precise and formal. However, both formulations are scientifically correct.

The first statement is: Disorder is probable and order is improbable. Or, with a bit more elaboration: Order, structure, and complexity are improbable; while disorder, simplicity, and uniformity are probable. On a common-sense level we can see why this is true: for, order represents a few specific configurations; whereas, any logically possible configuration represents disorder. Let us pursue this point a bit further.

Suppose we compare a pile of bricks and a well-built brick house. The pile of bricks represents disorder and the brick house represents order. If we want to transform a brick house into a pile of bricks, brick by brick, we can do this in any logically possible way. We can take any brick for the first brick, any brick for the second brick, and so on. All possibilities lead to a pile of bricks. But if we want to transform a pile of bricks into a brick house, we cannot do this in any possible way. We cannot, for example, place any upper brick before we have placed a certain appropriate number of lower bricks. Thus, transforming a brick house into a pile of bricks represents a process that leads from order to disorder, or from the improbable towards the probable. And transforming a pile of bricks into a well-built brick house represents a process that leads from disorder to order, i.e., from the probable towards the improbable.

Thus, if we built a brick house in the woods and left it to the forces of nature for fifty years, we would not be surprised to find that the house had degenerated into a pile of bricks. But if we left a pile of bricks under the same conditions for fifty years, we would be very surprised to find a well-built brick house in its place. The surprise we would feel in such a case represents our intuition of the truth of the second law of thermodynamics.[5]

Let us now give the second, more formal statement of the law. We begin with a few definitions. By a *physical system* we mean any physical entity (object) or any collection of such entities. The entities that make up a physical system are its *components*, and any collection of components of a system forms a *subsystem*. An *isolated* physical system is one that receives no energy from outside the system. We now state: in any isolated physical system, disorder will increase. Moreover, if the system remains isolated, then disorder in the system will increase until the state known as maximum entropy or total disorder is attained. This is a *stable state* of the system in that, once attained, no further change will occur unless energy is furnished to the system from the outside, in some appropriate manner. Informally stated: Any system degenerates towards disorder if "left to itself."

This formulation of the second law of thermodynamics leads naturally to the question of whether or not there are any truly isolated physical systems. As far as we know, there are no totally isolated systems (unless the whole physical universe is a closed system, which may or may not be the case). For example, most of the energy of the solar system comes from the sun, but there is some radiation and energy input from outside the solar system. However, there are many relatively isolated systems, and in these systems the operation of the second law of thermodynamics has always been confirmed. Indeed, this law is one of the most universally verified and highly validated of all laws and principles of science.

One very important point should be stressed here. The second law of thermodynamics states that any isolated system will necessarily degenerate towards disorder, but this does not exclude the possibility that non-isolated systems may also degenerate! To avoid degeneration towards disorder, it is not usually sufficient just to furnish raw energy to the system. Energy must be furnished in such a way, and in such a form, that the system can convert some of the energy into order (or use the energy to complexify its structure). How such a thing may happen will depend

on the nature of the system itself (the relationships that exist between the components within the system), the way the system evolves, and the way it interacts with the outside.

Let us give two examples. The Brownian motion of air molecules in a closed room is assumed to be totally random. Suppose a bottle of a highly volatile perfume is unstoppered in this room. The initial configuration, with all the perfume in the bottle, represents order. Once the perfume is released and begins to volatilize, the Brownian motion of air molecules will rather quickly spread the perfume until it is uniformly distributed throughout the room. This is the natural degeneration towards disorder, wholly explainable by the random nature of Brownian motion. Suppose, now, that we modify the experiment by adding radiant heat from a source outside the room. The increased air temperature in the room will only increase the speed of the Brownian motion, thereby hastening the spread of the perfume (and thus the degeneration towards disorder of the system). In this case, the input of energy from outside the system will not result in any evolution towards order.

As a second example, consider the growth (complexification) of leaved plant systems on the earth. Such growth depends on the process of photosynthesis within the leaf subsystem of the plant. Photosynthesis uses direct sunlight as an outside energy source. If sunlight were eliminated entirely and replaced by another form of energy (say, heat), the growth of those plants would not occur. Thus, the internal structure of a leaved plant allows it to utilize a certain form of outside energy (direct sunlight) to increase its complexity, thus, to evolve towards greater order. But other forms of energy input may not result in growth and complexification (indeed, excessive or inappropriate energy input may well destroy the system).

Thus, the observable world (visible reality) is composed of physical systems. Some are evolving from less probable to more probable states; some are (more or less) static or stable; and some are evolving from more probable to less probable states. Systems of the first type can be understood as the result of a random process. The stable systems are either in a state of maximum entropy or else maintained in a constant (or periodically fluctuating) state by means of continual inputs of energy from outside (e.g., the *dissipative systems* of Prigogine [Prigogine and Stengers, *Order Out of Chaos*]). Those that exhibit evolution from more probable to less probable states cannot be the result of a random process. The cause of such a growth pattern can only be some observable input of energy (e.g., plant growth on earth that is fuelled by solar energy) or else some nonobservable (invisible) force. It is this latter case that we will now consider.[6]

God Exists

Let us now think of all the physical systems in the observable universe and ask which of these systems is the most complex, the most highly ordered, the most structured. The answer is clear and unequivocal: It is the human being, and in particular the human brain and central nervous system, which, beyond any possible doubt, constitute the most sophisticated set of behaving entities in the known universe (see, for example, the series of four volumes *The Neurosciences*). According to any standard of comparison, and with regard to any known physical system, natural or artificial, the physical human being is by far the most highly ordered and complex. In the following, unless otherwise noted, whenever we speak of the human being, we will mean the physical human being and not the human being in any metaphorical, cultural, or spiritual sense.

We can already draw a first conclusion: Since the human being is the most highly ordered structure in the known observable universe, the human being is the most improbable of all physical systems and thus the least likely to have been produced by a random process. So, let us take a look at the process that did produce the human being—the process we call *evolution*.

First, we need to establish the facts (as far as we know them) of the process of evolution. The observables of the phenomenon of evolution are primarily the fossil record, found in the layers of sediment in various locations all over the earth. If there were contradictions or ambiguities in this record, we would have a major problem in interpreting these data. However, such is not the case. All these sedimentary layers show the same basic configuration, namely, that higher, more complex forms of life followed simpler, less complex forms. In other words, the process of evolution was a process of complexification, of moving from relative simplicity and disorder towards relative complexity and order. It was therefore a process of moving from more probable configurations towards less probable configurations.

Although we can easily become involved in intricate discussions about exactly how long the physical universe, the solar system, or the earth have existed, or how long conditions for life existed on earth before life actually appeared, the basic pattern is unequivocally clear. The earth has existed for some billions of years (many expert opinions fix the age of the earth at about 4.5 billion years). The first, and most rudimentary, life forms are thought to have been blue-green algae, which may have appeared as early as 2 billion years ago. In any case, following the initial appearance of the algae, there was a long period (perhaps a billion years) during which they remained the only life forms. After the algae became abundant, other early forms of plant life appeared.

Through radioactive dating and other methods, it has been established with a high degree of certainty that the first crude forms of invertebrate animal life could not have appeared earlier than about 600 million years ago. Thus, the *process* of evolution, from one-celled animals to the emergence of the mature human being (about 50,000 years ago), took no longer than 600 million years, which, from the geological perspective, is a fairly short time-span. This shows that there was no time for anything like an "unlimited" or "open-ended" experimentation in evolution. Moreover, it is estimated that roughly a thousand species intervened between the appearance of one-celled organisms and the mature human being. In each case, the transition from one species to another was a process leading from a lower (and therefore more probable) to a higher (and thus less probable) configuration. Finally, the evidence from the fossil record consistently shows that evolution was not a smooth, gradual process. Rather, there were long periods of stasis and stability (the so-called plateaus), punctuated by much shorter periods of rapid change (towards complexification).

Thus, 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. Indeed, just the transition from one species to the next could, if left to chance, take about as long as the lifespan of the earth itself, and to account for the whole evolutionary process we would have to multiply this figure by a thousand, yielding a figure much greater than the estimated lifespan of the entire universe (from the "beginning" until the present).

In the light of these considerations, we have a scientific right—indeed we are compelled by the logic of scientific methodology—to conclude that the process of evolution is the result of the action of some unobservable force. In particular, we human beings are the "end product" of evolution and thus owe our existence to this force. It seems reasonable to call this force "God," but anyone uncomfortable with that name can simply call it "the evolutionary force" (or, more precisely, "the force that produced evolution and thus produced the human being"). Moreover, it is most reasonable to suppose that the force of evolution is different from all other forces that science has so far discovered or hypothesized, because according to our present knowledge, no other force could have produced the phenomenon of evolution.[7]

Now, just as in the case of gravity, a skeptic can refuse to accept the existence of the evolutionary force by choosing to believe that evolution was a random process, a series of highly unlikely coincidences; but in making such a choice the skeptic relinquishes any claim to be acting scientifically or rationally. From the point of view of scientific methodology, one must always choose the most likely among all known, logically possible alternatives. Although it is logically possible that evolution was a random process, it is clearly not the most likely possibility. Such a skeptic, especially a practicing scientist, needs to explain why he or she accepts and follows this basic principle of scientific methodology elsewhere but makes an exception in the case of evolution. If one has no trouble believing in gravity or the strong nuclear force, based on evidence of a kind similar to that for the evolutionary force, then why irrationally resist belief in the force of evolution?

We claim to have fulfilled our intention of giving a scientific proof of God's existence. We have shown, on the basis of an observable phenomenon (the coming into existence of the human being), that the existence of a nonobservable cause is the most reasonable of all known logical possibilities. However, one could well ask the following further question: to what extent are we justified in calling the motive force of evolution "God"? Why do we not call gravity or the strong nuclear force "God"? We deal with this issue in the following section.

The Nature of God

For the remainder of this discussion, let us accept as established the existence of an unseen force that is the cause of the process of evolution and thus of the human being, the end product of this process. It might seem at first that our identification of such a cause with God is rather arbitrary and gratuitous. However, a little reflection shows that this is not so.

To begin with, we know that this force is capable of producing a being having all of the subtlety and refinement that we humans are capable of exhibiting. We do not call gravity or the strong nuclear force "God" because the effects these forces produce are not so marvelous as the effect produced by the evolutionary force. In the same spirit that has motivated our basic approach throughout this article, we can ask whether or not it is reasonable to suppose that a force capable of producing an effect such as the human being is at least as subtle as humans. This hypothesis seems as reasonable as (if not more reasonable than) any other logical possibility.

In fact, we know certainly that this force is capable of doing at least one thing that we could never do, namely the bringing into being of the human race. Indeed, the human race did not even exist during all of the time that this force was driving evolution forward. We are the result of the action of this force, and we owe our existence to it. It has created us.

In our discussion of visible and invisible reality, we have already noted that, from the point of view of modern physics, invisible reality produces visible reality and, in fact, encompasses or surpasses visible reality. Thus, the invisible cause of evolution (and therefore of the human being) might also be plausibly supposed to encompass or surpass humans. In particular, we know from our own experience of ourselves that we have a conscious intellect and a free will. It is therefore not unreasonable that the force or entity which is the cause of our existence might also have such faculties as consciousness, intelligence, and will—and most probably to a degree much superior to us. 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.

Indeed, if we know anything at all, we know that we have a conscious subjectivity, because our knowledge of anything is mediated to us by this very subjectivity. Our subjectivity is thus the most basic condition of our existence. It is the inner space in which each of us lives, and we know that our subjectivity and our consciousness are the result of the action of this force. In this way, the knowledge of the nature of the force that has created us is most appropriately explored through a deeper knowledge of that which is most immediately accessible to us, i.e., our own inmost selves. It seems, therefore, that our knowledge of the existence and the nature of God is on the most solid foundation it could possibly be.[8]

Notes

1. For example, many of the elements of ‘Abdu’l-Bahá’s argument can be found in a series of books written by the French scientist and philosopher Pierre Lecomte do Noüy, beginning with *L’Homme devant la science* (1939) and ending with *Human Destiny* (1947). After an analysis somewhat similar to that of the present essay, Lecomte do Noüy concludes boldly that “an explanation of the evolution of life by chance alone is untenable today” (*Human Destiny* 43). However, for reasons that are too detailed for consideration here, he is much less clear than ‘Abdu’l-Bahá in drawing the conclusion that the cause of evolution is an externally acting force. Lecomte do Noüy opts instead for a somewhat unclear and not terribly convincing notion of “telefinalism” in biology. In fairness to Lecomte do Noüy, it must be recognized that he was dealing with these questions at a time when certain fundamental advances in the science of dynamical systems had not yet occurred. A more recent example of another approach to these issues is K. V. Laurikainen, “Quantum Physics, Philosophy, and the Image of God” (1990). Though Laurikainen’s article is insightful, there are some significant points of difference with the approach I have taken here and previously (see Hatcher, *Logic and Logos*, in particular pages 49–51). Among other things, I do not agree with Laurikainen’s subjectivism, and I reject the sharp contrast Laurikainen makes between the methods of quantum mechanics and those of macrophysics and science in general. In other words, I do not feel that quantum mechanics constitutes a methodological exception to general scientific practice. But I do feel that some of the observations Laurikainen makes are accurate and insightful as applied to science in general.

2. In *God Passes By*, Shoghi Effendi characterizes ‘Abdu’l-Bahá’s tablet to Auguste Forel as “one of the most weighty the Master ever wrote” (307–8).

3. The evolution-based argument bears superficial similarity to the classical “proof from design,” which argues that observable reality could not exhibit the order and regularity it does without such structure being the result of a Conscious Designer. However, the evolution-based argument deals with the dynamics of the development of complex physical systems, not just the design or structure resulting from such dynamics. This distinctive feature of ‘Abdu’l-Bahá’s argument sets it quite apart from classical cosmological or design arguments. However, the link between developments in modern physics and the classical design argument has been increasingly recognized. For example, the physicist Laurikainen says: “The old argument from design has, in fact, gained new strength from the development of modern physics. The trend has been toward increasingly general theories that enable one to deduce an increasing number of facts from a small number of basic principles (axioms). This development, in turn, has clearly brought to light a beautiful logical structure in physical reality—strong evidence of a rational origin of existence that is superior to human intelligence. On the other hand, human intelligence seems to be related to this superior intelligence because we are increasingly able to unveil the beautiful secrets of nature. In religious language, this is expressed in the metaphor that humans are created in the image of God” (“Quantum Physics” 402).

4. For an expanded discussion of these methodological issues, together with references in the literature on the subject, see Hatcher, *Logic and Logos*, in particular the essay entitled “Myths, Models and Mysticism” 19–59.

5. This illustration of the entropy principle is based on Hatcher, “Science” 23.

6. The various principles discussed in this section constitute a small part of the theory of dynamical systems. This venerable theory has been recently popularized under the name of “chaos theory,” where the word *chaos* is

roughly (though not exactly and not always) equivalent to the use here of *randomness* or *disorder*. All of these terms refer to a certain category of states of a system (i.e., "chaotic" or disordered states). The current popularization of chaos theory is reminiscent of so-called catastrophe theory, which was similarly popularized about twenty years ago. A "catastrophe" is just an imaginative name given to a certain kind of transition from one state of a dynamical system to another. For a succinct discussion that relates all of these terms to a specific example, see Hatcher, *Logic and Logos* 128–29.

7. This is why the currently accepted theory of evolution attempts to explain the upward movement (the movement towards greater order) in evolution as the fortunate coincidence of two random phenomena: the action of *natural selection* (essentially, random environmental impact) on *random mutations* (spontaneous genetic change). In his presentation of his argument, 'Abdu'l-Bahá considers a third logical possibility different from both chance and the hypothesis of an external force. He calls this third alternative *necessity* or *inherent compulsion*. He immediately rejects this possibility, saying that "the coming together of the various constituent elements of beings… cannot be compulsory, for then the formation must be an inherent property of the constituent parts and the inherent property of a thing can in no wise be dissociated from it but under such circumstances the decomposition of any formation is impossible, for the inherent properties of a thing cannot be separated from it" (*Bahá'í World Faith* 342). We have not included this part of 'Abdu'l-Bahá's argument in our reformulation because it is generally known and accepted by scientists that the process of evolution is not due to any intrinsic necessity, since the physical elements that make up higher life forms such a the human being may very easily occur in other systems and in other forms, Thus, it would appear that 'Abdu'l-Bahá considers this possibility only to give logical completeness to his argument, not because he considers it a genuine physical possibility.

8. According to the Bahá'í writings, the most effective instrument for attaining the quality of self-knowledge that leads to knowledge of the nature of God is the teachings of the Manifestations of God. For a discussion of the role of these historical figures in this connection, see, for example, Hatcher, "Concept."

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