

ORIGINS



HIGHER DIMENSIONS IN SCIENCE

**LIFE FROM
CHEMICALS:
FACT OR FANTASY?**

**A NEW LOOK
AT EVOLUTION**

**BIG QUESTIONS
ABOUT
THE BIG BANG**

**THE MYSTERY OF
CONSCIOUSNESS**

ORIGINS

From the Editors



"I believe we now understand how all the matter and energy of the universe came to exist," states the physicist Paul Davies. "But the scientific version of the creation goes beyond this and holds out the tantalizing

promise that we may even be able to explain how space and time, the very fabric of existence, have arisen out of literally nothing at all." This prospect represents the culmination of the scientific program for answering the most fundamental questions about the nature and origin of the universe.

Since the time of Newton, science has held that all phenomena can be described (at least in principle) in terms of measurable quantities that can be calculated using simple mathematical laws. This premise, which we can call the principle of reductionism, implies that reality is essentially simple and that human beings, through the power of their minds and senses alone, may ultimately be able to fully understand the nature and origin of all phenomena in the universe. Even though the principle of reductionism is certainly unprovable to start with, it has provided the underlying strategy for scientific research, and as scientists have gone from one success to another, their faith in the universal applicability of this principle has grown stronger and stronger.

Yet, the unqualified acceptance of the principle of reductionism has some extremely disturbing consequences. It reduces the universe to a mechanism operating according to impersonal mathematical laws, and it reduces the individual human being to a complex submechanism whose "will" and "feelings" correspond to nothing more than patterns of chemical interaction among molecules.

As a result, values and ethical norms can no longer be understood as fundamental principles, originating from a transcendental creator who defines the ultimate purpose and meaning of human life. Rather, they become mere strategies for survival that originated by chance, were perpetuated because of their effectiveness under certain circumstances, and will be swept aside by inexorable physical transforma-

tion as those circumstances change. In this regard, the physicist Wolfgang Pauli predicted, "We may well reach the point in the not too distant future where the parables and images of the old religions will have lost their persuasive force even for the average person: when that happens, I am afraid that all the old ethics will collapse like a house of cards and that unimaginable horrors will be perpetrated."

Given the serious implications of the reductionistic approach of modern science, we should hesitate to accept it as completely valid unless forced to do so by truly compelling evidence. Many scientists and philosophers maintain that such evidence has already been found in great abundance. Yet a close examination of current scientific theories reveals that this is simply not so. Although scientists have undoubtedly made many significant discoveries, they have been hasty in claiming that they have proven their world system based on the principle of reductionism.

In this magazine we will present a non-technical review of current scientific theories of the origin of the universe, the origin of living organisms, and the nature of the conscious self. Our basic finding is that the reductionistic world view of modern science is by no means solidly established: we therefore outline an alternative view in which the world is understood to be only partially quantifiable and in which both purpose and spiritual qualities are granted existence.

Such a theoretical system should enable us to link the areas of knowledge now separated into the domains of science and religion. One good model for such a link may be found in the Vedic (Vaisnava) philosophy of India, which contains a sophisticated intellectual framework that embraces both a highly detailed account of the physical universe and a verifiable description of non-physical phenomena such as consciousness. We have therefore chosen to present our alternative world view in the context of this system of thought.

Reductionistic thinkers do not have a monopoly on knowledge of life and the universe. Reasonable alternative views deserve as much serious consideration as the reductionistic approach. Otherwise, scientists' claims that they are unbiased and objective certainly ring hollow, and people are denied true freedom of choice.

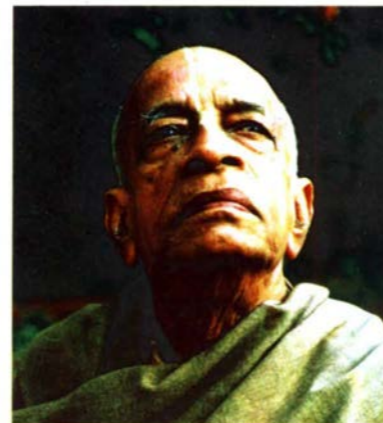
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His Divine Grace A. C. Bhaktivedanta Swami Prabhupada
 Founder-*Acarya* of the International Society for Krishna Consciousness

We dedicate this magazine to our beloved spiritual master and guide, who brought the essence of India's timeless Vedic knowledge to the Western world.

—The Editors



The dreaded singularity:
 a mathematical impossibility, p.2



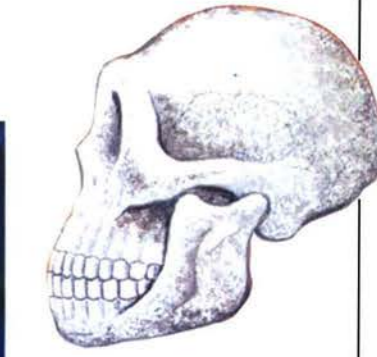
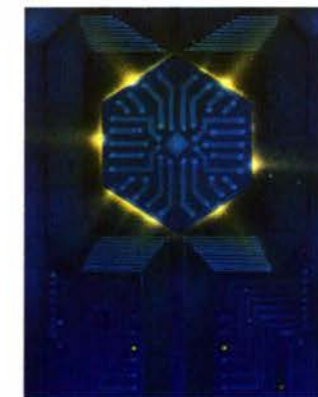
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COSMOLOGY

BIG QUESTIONS ABOUT THE BIG BANG

For years, the big bang theory has been put forward by scientists as the only viable explanation of the origin of the universe. But upon closer examination, it appears that the little-publicized shortcomings of the theory may prove to be insurmountable. p. 2

PSYCHOLOGY

THE MYSTERY OF CONSCIOUSNESS

Consciousness is a fact of life. We all have it. But can modern science explain it within its current mechanistic framework? It appears not. p. 16.

BIOLOGY

LIFE FROM CHEMICALS: FACT OR FANTASY?

In Darwin's time, scientists thought the living cell to be no more than a simple bag of chemicals. They could readily imagine that the first such cell might have spontaneously evolved from a mixture of organic chemicals. But as modern biochemical research uncovers the incredible complexity of even the simplest microorganisms, it is not so clear that chemical evolution is adequate to explain the origin of life. p. 28

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Certain types of evidence have traditionally been cited as proof for the idea that one species gives rise to another by purely physical processes. But upon critical examination, it appears the same evidence can be used to show that intelligent design may have played a part in the origin of species. p. 36

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According to the scientific establishment, the "fact" of evolution is clearly evident in the fossil record. But it appears that the record of the rocks has been carefully edited to support current evolutionary theory. p. 48

PHILOSOPHY OF SCIENCE

HIGHER DIMENSIONAL SCIENCE

At a time when the attempt to explain everything in the universe in terms of simple physical laws is proving unsuccessful, the need for a new strategy of scientific investigation is becoming more and more apparent. p. 56

Cover: To some observers, certain features of the observable universe suggest the existence of an initial absolute source of complex information that might possess intrinsic qualities of intelligence and consciousness.
 Illustration by Warren Hile.

BIG QUESTIONS about the BIG BANG

When examined closely, the cosmologists' confident explanation of the origin and structure of the universe falls apart

Look up at the night sky, full of stars and planets. Where did it all come from? These days most scientists will answer that question with some version of the big bang theory. In the beginning, you'll hear, all matter in the universe was concentrated into a single point at an extremely high temperature, and then it exploded with tremendous force. From an expanding superheated cloud of subatomic particles, atoms gradually formed, then stars, galaxies, planets, and finally life. This litany has now assumed the status of revealed truth. In accounts that deliberately evoke the atmosphere of Genesis, the tale of primal origins is elaborately presented in countless textbooks, paperback popularizations, slick science magazines, and television specials complete with computer-generated effects.

As an exciting, mindgrabbing story it certainly works. And because the big bang story does seem to be based on factual observation and



calculations a big bang model with irregularities in the distribution of matter on the observed scale must still have a singularity in the beginning.⁹

The Question of Origins

The problem of the singularity is simply part of the larger problem of understanding the origin of the initial condition of the universe, whatever it may have happened to be. If a model of universal origins involves a singularity, that certainly creates severe theoretical difficulties. But even if the singularity can somehow be avoided, we are still confronted with the question of where the universe came from. Hoping to sidestep the whole issue of origins, some scientists have proposed the so-called "infinitely rebounding universe," a universe that ex-

universe. This indicates that at some point there must be a beginning and not a regress extending over an infinite period of time.¹⁰ And thus again you confront the question of origins.

Another creative attempt to escape the necessity of dealing with the question of origins is the time-reverse rebounding universe model proposed by English astrophysicist Paul Davies. The universe would expand with time flowing forward and then collapse to a singularity. During the rebound, time flows backward as the universe expands and collapses again into a singularity, the same singularity from which it began its previous forward cycle. In this model, the past becomes the future, and the future becomes the past, thus making the statement "in the beginning"

then arises, how did the initial state get that way? Physicist Alan H. Guth of M.I.T. has proposed a version of the big bang model that automatically produces the required fine tunings, doing away with the necessity for artificially introducing them into the equations. Called the inflationary model, it assumes that within a rapidly expanding, superheated region of the universe a tiny section cools off and then begins to expand much more violently, just as supercooled water rapidly expands when it freezes. It is this phase of rapid expansion that resolves some of the difficulties inherent in the standard big bang theories.

But Guth's version has difficulties of its own. Guth has been forced to fine tune his own equations in order to get them to yield his inflationary universe. Thus he is confronted with the same difficulty his model was supposed to overcome. He had hoped to explain the fine tuning required in the big bang universe, but he requires unexplained tuning of his own. Guth and his collaborator Paul J. Steinhardt admit that in their model "calculations yield reasonable predictions only if the parameters are assigned values in a narrow range. Most theorists (including both of us) regard such fine tuning as implausible."¹¹ They go on to express a hope that in the future mathematical theories will be developed that will enable them to give a plausible expression of their model.

This dependence on as yet unrealized future developments highlights another difficulty with Guth's model. The grand unified theories (GUTs) upon which the inflationary universe is based are completely hypothetical and "have little support from controlled experiments because most of their implications are impossible to measure in the laboratory."¹² (The grand unified theories are very speculative attempts to tie together some of the basic forces of the universe.)

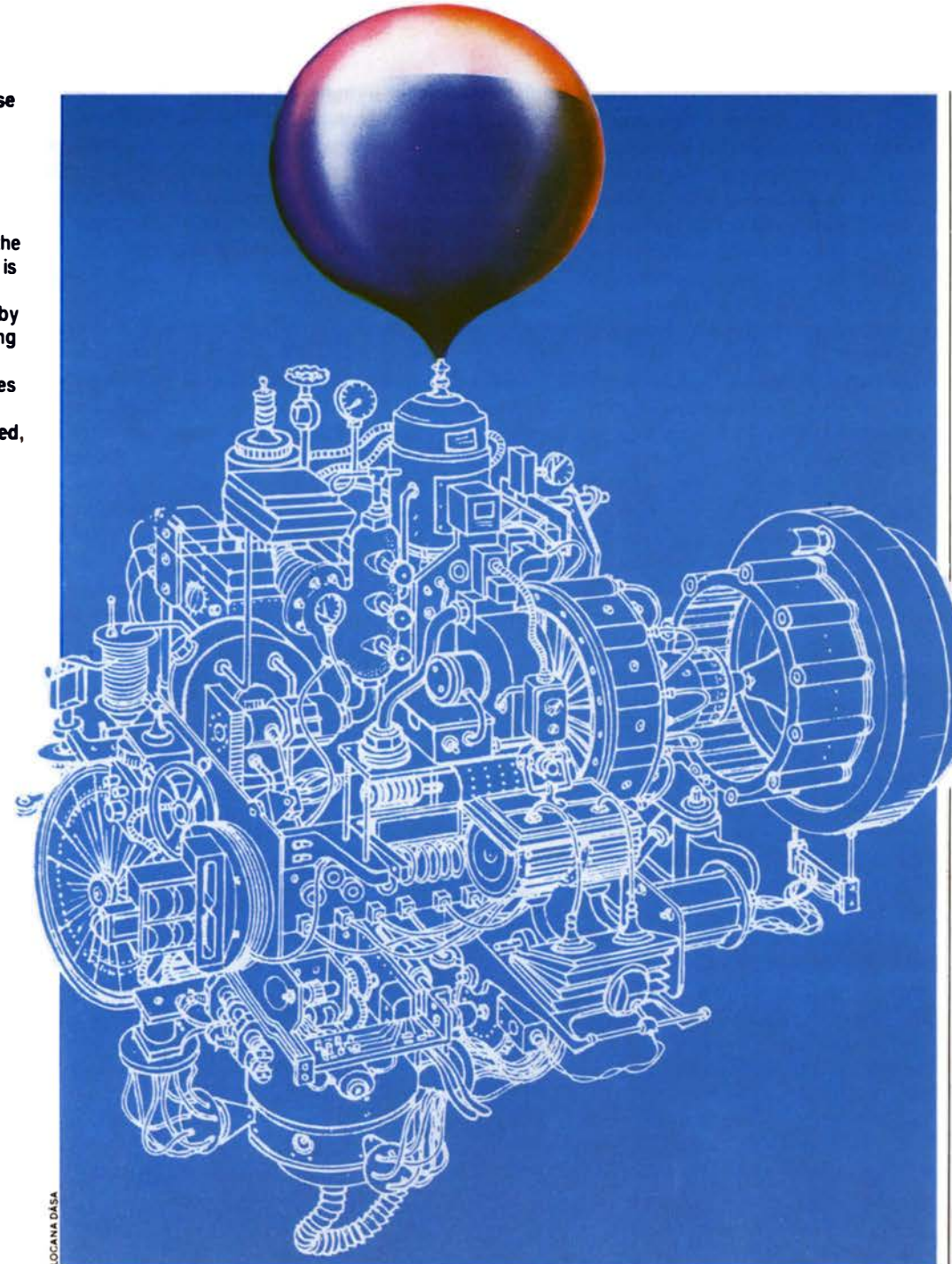
Another problem with Guth's theory is that it does not even attempt to explain the origin of the superheated expanding condition necessary for his inflation to take place. He has toyed with three hypothetical origins. The first is the standard big bang—according to Guth the inflationary episode would take place within the very early stages of it. This model, however, leaves us with the knotty singularity problem already discussed. The second option is to assume an initial condition of random chaos, in which some regions would be hot, others cold, some expanding, some contracting. The inflation would begin in an area that was superheated and expanding. But Guth admits there is no explanation for the origin

meaningless. This scenario gives one small indication of the many imaginative schemes the cosmologists have been forced to resort to in order to explain the origin of the universe.

The Inflationary Universe

Quite apart from the question of where the initial condition of the universe comes from, there are other problems troubling modern cosmologists. In order for the standard big bang theory to predict the distribution of matter we observe within the universe, the initial state has to be fine tuned to an incredible degree. The question

Some cosmologists propose that our complex universe emerged from "literally nothing." Yet the universe predicted by the big bang theory is little more than a simple bubble of gas, and the "nothing" that produces it is the quantum-mechanical vacuum (here represented by the machine). Far from being "nothing," the quantum-mechanical vacuum requires chapters of intricate mathematics to be described, even in current incomplete formulations.



THE IMAGE BANK WEST / MELCHIOR DIGIACOMO

Just as an arrow will not hit a target's center unless accurately aimed, so the big bang model will not yield basic observed features of the universe unless the initial conditions of the universe are carefully adjusted. This raises the question of how the universe came to be "aimed" so precisely.

pands, contracts to a singularity, and then again expands and contracts continually through the course of unlimited time. There is no beginning and no end, only an endless cycle. This resolves the problem of the origin of the universe by proposing that there is no origin and that the material universe has always existed.

But there are some serious problems with this model. First of all, no one has ever proposed a satisfactory mechanism for the bouncing. Furthermore, in *The First Three Minutes* physicist Steven Weinberg points out that with each successive bounce progressive changes must take place in the

of the imagined primordial random chaos.

The third alternative, favored by Guth himself, is that the superheated expanding region emerges quantum-mechanically from nothing. In an article that appeared in 1984 in *Scientific American*, Guth and Paul J. Steinhardt state, "The inflationary model of the universe provides a possible mechanism by which the observed universe could have evolved from an infinitesimal region. It is then tempting to go one step further and speculate that *the entire universe evolved from literally nothing.*"¹³

As attractive as this idea may seem to scientists who balk at any suggestion of a supreme intelligence that designed the universe, it doesn't hold up under close exami-

nation. The literal "nothing" Guth is speaking of is a hypothetical quantum-mechanical vacuum state occurring in a still-to-be-formulated ultimate grand unified theory combining the equations of both quantum mechanics and general relativity. In other words, this vacuum state cannot now be described, even theoretically.

However, physicists have already come up with a description of a simpler kind of quantum-mechanical vacuum state, which can be visualized as containing a sea of "virtual particles," atomic fragments that almost but not quite exist. From time to time some of these subatomic particles pop out of the vacuum into material reality.

Such occurrences are called vacuum fluctuations. The fluctuations cannot be directly observed, but theories based upon them have been corroborated by laboratory experiments. What theoretically occurs is that a particle and antiparticle appear without cause from the vacuum and almost instantaneously negate each other and disappear. Guth and his colleagues postulate that instead of just a tiny particle, the entire universe popped out of the vacuum. And instead of instantaneously disappearing, our universe has somehow persisted for billions of years. The singularity problem is avoided by having the universe pop into being a little bit beyond the stage of singularity.

There are two basic shortcomings in this scenario. First, it involves a truly impressive speculative leap from our limited experience with subatomic particles in the laboratory to the universe as a whole. Stephen Hawking and G.F.R. Ellis sagely warn their colleagues who would without hesitation hurl themselves headlong into such wild speculation. "There is of course a large extrapolation in the assumption that the physical laws one determines in the laboratory should apply to other points of space-time where conditions may be different."¹⁴ Second, it is actually misleading to speak of the quantum-mechanical vacuum as "literally nothing." To describe a quantum-mechanical vacuum, even the relatively simple one of currently existing theory, requires chapters upon chapters of highly abstract mathematics. Such an entity is certainly "something," and this raises the interesting question of where such a complicated "vacuum" might come from.

At this point let us return to the original problem Guth was trying to solve with his

inflationary model: trying to eliminate the need for fine tuning the initial conditions in order to obtain the observed universe. As we have seen, he hasn't succeeded. But another problem is this: does any version of the big bang theory, including Guth's, really predict the observed universe? What Guth says he finally gets out of his complicated initial state is a universe about 4 inches across, filled with nothing more than a uniform superdense, superheated gas. This will expand and cool, but there is no reason to suppose that it will ever become more than a cloud of uniformly distributed gas. In fact, this is all that any of the big bang theories leave you with. So if Guth's present theory requires implausible tinkering simply to yield a universe consisting of uniformly distributed gas, then we can just imagine what would be necessary to get it to yield the universe as we know it today. In a good scientific explanation many complex phenomena can be deduced from a simple theoretical scheme, but in

Guth's inflationary universe—and indeed in the standard big bang theories—we have just the opposite: from a very complex tangle of equations, we just get an expanding uniform ball of gas. Despite this, science magazines run articles about the inflationary model, complete with pages of high-tech illustrations, that give the impression Guth has finally achieved the ultimate goal—explaining the origin of the universe. Not quite, it seems. Perhaps they should run regular columns in the science magazines featuring the universal origin theories of the month.

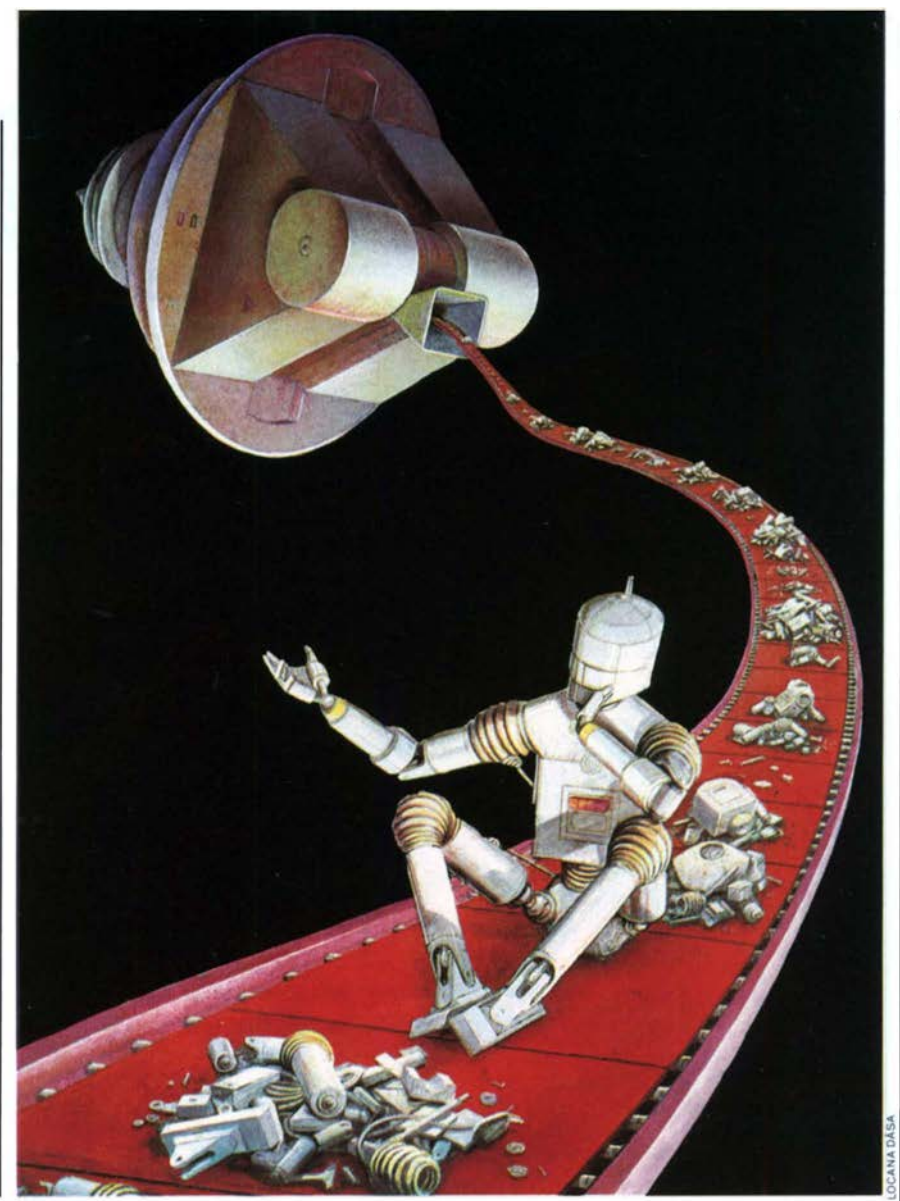
We can just imagine the complexity of the initial conditions necessary to produce the universe as we know it, with all its varied structures and organisms. In our own universe, these conditions seem to have been arranged far too precisely to be explained simply by physical laws. Thus one could conceivably argue in favor of a designer. At this point some noted theorists, unable even to consider such an idea, take

"If I hadn't been properly constructed, I wouldn't be here to ask about it." A sentient robot constructed by a random machine assembler might try to explain its origin in this way. Some scientists suggest that this is how our origin should be explained.

shelter of what they call "the anthropic principle."

They propose that the quantum-mechanical vacuum is producing universes by the millions. The great majority are not constituted so as to produce life. These universes therefore do not contain observers who could study their conditions. However, other universes, including our own, are constituted so as to have produced observers, and it is therefore not surprising that these observers would discover that their universe possesses some rather startlingly precise conditions to allow for the existence of life. According to this line of reasoning, the observers should not expect to find anything other than such improbably complex conditions. In effect, supporters of the anthropic principle take the very existence of human beings as the explanation of why the universe is so constituted as to have produced human beings. But this logical sleight of hand isn't an explanation of anything.

Another form of verbal jugglery is to say straight out, as many scientists do, that the universe has occurred by causeless chance. But it must be pointed out that this also is not at all an explanation. To say that



Although cosmologists claim to explain the origin of the universe, their models actually yield little more than a uniform cloud of gas. How the variegated structures within the actual universe came into being is still a mystery.

CHANCE AND THE ORIGIN OF THE UNIVERSE

Some scientists are using the concept of chance in a way that misleads the public. Unable to explain the origin of the universe by physical laws, they assert that it was somehow *caused* by chance. But such statements are not meaningful.

To make any statement about a chance event meaningful, many repetitions of the event in question are required. And these must be observable. For example we can flip a coin many times and note the results. We can see that they correspond to a statistical pattern indicating a 50% probability that heads will turn up rather than tails. The word *chance* therefore does not actually refer to a cause—it refers only to a certain type of pattern in the results of an operation repeated a sufficient number of times. Upon recognizing such a pattern we can say, "There is a 50% chance that the

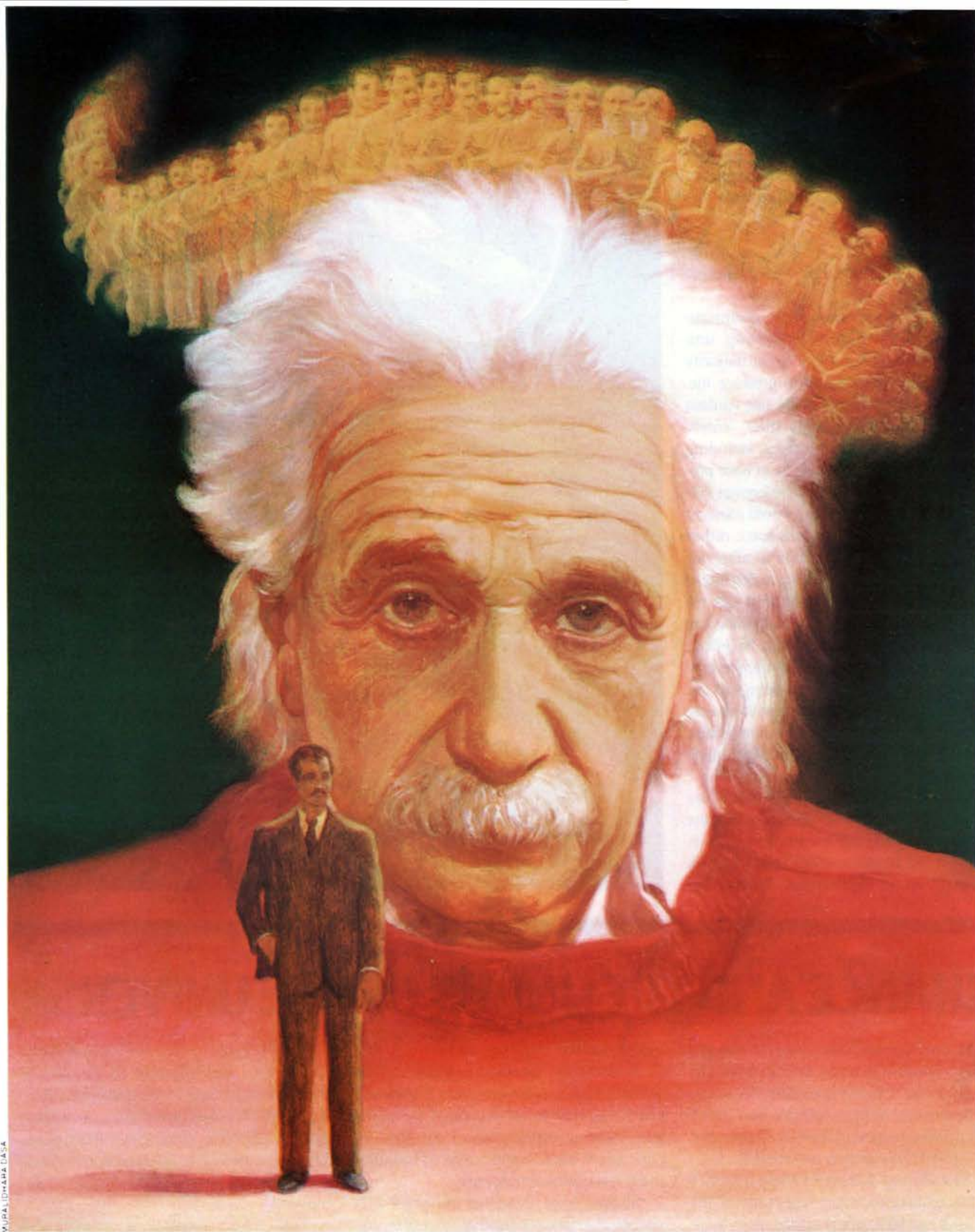
tossed coin will come up heads."

Now imagine we could toss a given coin only once and it came up heads. If someone asked why that result happened, we might give a causal explanation or say that we don't know, but it would not be meaningful to say it happened by chance.

So now what about the universe? It is not possible for us to observe more than one appearance of a universe—we can only see the one we're in. The origin of the universe is thus a one-time event, and statements about it that involve chance are meaningless according to the rules of quantitative science. Nevertheless, some theorists continue to speak of universes emerging from the quantum mechanical vacuum by *chance*. To be quite frank, this is another limitation of quantum mechanics, which is based upon the concept of chance. It may

be valid to apply chance to events that can be repeated and observed in the laboratory, but in the case of the universe, where such repetition and observation are impossible in principle, chance is meaningless. Thus it is useless to attempt to use quantum theory to explain the origin of the universe.

One might imagine a hypothetical trans-universal being who can observe the origin of many universes and compute statistics about them, thus rendering statements about the chance origin of universes meaningful. But how could we obtain such information unless we could actually communicate with this being? This is tantamount to saying there is a God and that we can communicate with Him about the origin of the universe—a possibility modern science rejects.



something happens once by chance is in essence no different than simply saying "it happened" or "there it is." And these statements do not qualify as scientific explanations. In the end you wind up knowing no more than you did before. In other words, by invoking either chance or the anthropic principle the scientists have not actually explained anything about the origin of the universe.

At this point, the theorists could perhaps forgive us for suggesting that their chosen methods might not be quite adequate for the task at hand. Indeed it appears, in addition to the problems we have already discussed, that general relativity and quantum mechanics, the two intellectual tools with which the cosmologists are attempting to define the development of the universe, contain certain flaws. It is true

In Einstein's conception of the universe, a person is not an individual experiencing successive events but a four-dimensional "space-time worm" to which the concept of the passing of time cannot be applied.

that these theories have been very successful in describing certain physical phenomena, but this does not prove they are perfect in all respects.

General relativity describes curved space-time and is an integral part of every current theory of universal origins, including the big bang theory and Guth's inflationary model. If general relativity is in need of revision in any way, then any universal theories based on it will also need to be revised.

One major difficulty with general

past, present, and future, and thus leads to the conclusion that such perceptions are unreal.

In a letter to Michael Besso, Einstein wrote, "You have to accept the idea that subjective time with its emphasis on the now has no objective meaning."¹⁵ When Besso died, Einstein tried to console his widow by writing, "Michael has preceded

The strange properties of quantum mechanics have led some scientists to propose that the entire universe splits continuously into multiple copies in which different histories of events take place.



relativity and Einstein's earlier theory of special relativity is that they rule out time as we commonly understand it. In Newtonian physics, time is treated as a variable separate from space. In this way, it is possible to chart the path of an object moving in space and time in the following way. At a particular point in time, the object is located at a particular point in space. As time varies, the position of the object in space varies.

But in Einstein's theory of relativity, this conception evaporates. Instead, time and space are wedded together in a four-dimensional space-time continuum. It is no longer possible to describe an object as occupying a particular point in space at a particular point in time. A relativistic description of an object will show its spatial and temporal existence in its entirety, merged from beginning to end, wherever it is happening. For instance, a human being would be depicted as the entire progression from embryo to corpse. Such constructs are labeled "space-time worms." And physics does not permit the space-time worm to say, "Now I am an adult and I used to be a child." There is no passage of time: the whole sequence exists as one unit. If we are space-time worms, we are just configurations of matter, not personalities with consciousness. Defining human beings in that way invalidates our individual perception of

me a little in leaving this strange world. This is not important. For us who are convinced physicists, the distinction between past, present, and future is only an illusion, however persistent."¹⁶ This is in effect a denial of consciousness, which entails the reality of the present experienced moment. We experience our present form as real, whereas our infant form exists only in memory. As conscious beings we can definitely experience that we do occupy a particular bodily form at a particular point in time. Despite the fact that relativity theory converts a series of events into a single unified spatio-temporal entity, we actually experience in sequence different points in time. What all this means is that every theory of universal origins built around relativity theory fails to explain our conscious experience of time, thus making these theories, as they stand, incomplete and unacceptable.

Quantum Physics and Reality

All of the current cosmological theories also depend upon quantum mechanics, which defines the activity of atomic and subatomic particles. Quantum physics differs in fundamental ways from classical Newtonian physics. Classical physics con-

cerns itself with the behavior of solid matter, but quantum physics is concerned only with mathematical expressions of observations and measurements. Solid material reality evaporates. Nobel-laureate physicist Werner Heisenberg declared, "It turns out that we can no longer talk of the behavior of the particle apart from the process of observation. In consequence, we are finally led to believe that the laws of nature which we formulate mathematically in quantum theory no longer deal with the particles themselves but with our knowledge of elementary particles."¹⁷ In addition to the experimental apparatus, the observer had to be brought into the analysis as an explicit element distinct from the apparatus.

But there are fundamental problems in applying quantum mechanics to the universe. By definition, the universe includes all observers, so you cannot have an outside observer of a universal physical system. In an attempt to formulate a version of quantum mechanics that does not require an

outside observer, eminent physicists such as John Wheeler have proposed that the universe continuously splits into innumerable copies. Each parallel universe contains observers to see that particular set of quantum alternatives, and according to this theory all of these universes are real.

Reacting to this, Bryce D. Witt, writing in *Physics Today*, states, "I still recall the shock I experienced on first encountering the multiworld concept. The idea of 10 to the 100th plus slightly imperfect copies of oneself all constantly splitting into further copies, which ultimately become unrecognizable, is not easy to reconcile with common sense. Here is schizophrenia with a vengeance."¹⁸ If scientists want a big bang theory of the origin of the universe that can be consistent with quantum mechanics, this is one of the bizarre hypotheses they are forced to come up with.

But even more problems lie ahead on the path of materialistic reduction that most scientists are treading. It's bad enough that both general relativity and quantum me-

“The theory of the formation of galaxies is one of the great outstanding problems in astrophysics.”

—Steven Weinberg

chanics lead to bizarre and unrealistic consequences when applied to cosmological questions. But these difficulties are compounded to an exasperating degree by the fact that scientists' hopes to properly describe the universe and its beginning depend upon combining both theories. The proposed result would be a Grand Unified Theory (GUT) capable of describing all the forces at work in the universe by a single comprehensive mathematical expression. General relativity is required to explain the basic structure of space-time. Quantum mechanics is needed in order to explain the behavior of subatomic particles. Unfortunately these two theories apparently contradict each other.

The first step toward this mathematical integration is quantum field theory, which attempts to describe the behavior of electrons by a combination of quantum mechanics and Einstein's theory of special relativity. This theory has scored some remarkable successes. Yet P.A.M. Dirac, the Nobel-prize-winning English physicist

who invented the theory, confessed, "It seems to be quite impossible to put the theory on a sound mathematical basis."¹⁹ The second and much more difficult step would be to combine general relativity with quantum mechanics, and no one has the faintest idea how to do this. No less an authority than Nobel-laureate physicist Steven Weinberg admits that it may take a century or two to get the mathematics together.²⁰ The cosmologists say they need the GUT to describe the origin of the universe, and they don't have it yet. So that can only mean their big bang and inflationary models are without solid foundation.

Since the days of Newton and Galileo, the program of physical science has been to express everything in mathematical terms. Furthermore the mathematical description must be confirmed by observation and con-



HANS OLESEN

trolled experiments. We have shown that the big bang theories fail to conform to these requirements. Simplicity has also been stressed as a requirement of physical theories, and the big bang theories also fail in that respect, for they are becoming, as we have seen, progressively more outlandishly contorted with each new formulation. They are just what Galileo and Newton would have disliked—storytelling to fill in the gaps of knowledge.

The big bang theories would therefore appear to be something less than actual scientific explanations of the origin of the universe. Nevertheless, in popular magazines and television specials, as well as in the classroom, scientists deliberately give the

public the impression that they have already succeeded in demonstrating exactly how the universe originated simply by physical laws. Nothing could be further from the truth.

What About Galaxies?

We have seen that the cosmologists' attempt to comprehend the universe within the narrow bounds of their narrow materialistic conceptions has failed to explain its origins. Moreover, we have seen that their theories do not even account for what they say is present in the universe now.

For instance, the big bang theory does not account for the existence of galaxies. Imagine a scientist of great genius who had knowledge of the current cosmological theories but no knowledge of observational astronomy. Would he be able to predict that

A cosmic mystery of immense proportions: galaxies may be surrounded by a halo of invisible matter containing up to nine times their visible mass.

galaxies would form? The answer is no. A universe made up of a uniformly distributed cloud of gas is the only result consistent with the standard formulations of the theory. This cloud would have a density of perhaps one atom per several cubic feet, making it little better than a perfect vacuum. To get anything else requires special modifications of the initial conditions of the universe, and scientists find such modifications difficult to justify. Traditionally, a scientific theory is considered acceptable if

starting from the initial framework you can straightforwardly predict things. A theory that has to be monkeyed around with to a considerable degree to obtain valid predictions is of questionable value.

As Steven Weinberg says in *The First Three Minutes*, "The theory of the formation of galaxies is one of the great outstanding problems in astrophysics, a problem that today seems far from solution."²¹ Then without skipping a beat he says, "But that is another story." But no, wait a minute—that is exactly the story! If the big bang theory can't explain the initial cause of the universe or major features of the universe such as galaxies, then what does it explain? Not very much, it would seem.

Missing Mass

The big bang theory is supposed to explain the universe, but a major problem is that many features of the universe are not understood clearly enough to be the subject of such explanation. One big mystery is the problem of missing mass. Physicist David Schramm of the University of Chicago explains, "From all the light being emitted by the Milky Way, we can estimate that our galaxy contains the mass of about one hundred billion suns. But once we take this same object [the Milky Way] and see how it interacts with another galaxy, such as our neighbor Andromeda, we find that our galaxy is gravitating toward Andromeda as though it had a mass almost ten times as great."²² It thus appears that over 90% of the mass of the universe is missing. Ghostly subatomic particles called neutrinos have been put forward as the solution. Originally, however, the invisible neutrino was assigned no mass by physicists, but now it has suddenly been assigned mass sufficient to account for the missing matter in the universe as a whole. How convenient.

So even when we leave aside the questions of primal origins and get down to the picture of the universe as it is today, there are still many unanswered questions. The scientists will assert to the public with an air of absolute conviction that they know the universe extends x millions of light years and that it has existed for a total of y billion years. They say that they have identified all the major bodies in the universe for what they are—distant stars, galaxies, nebulae, quasars, and so forth. Yet even the local Milky Way galaxy is not clearly understood.



RAMAPRASADA DEESA

For example, in *Scientific American* noted astronomer Bart J. Bok wrote, "I remember the mid 1970s as a time when I and my fellow [Milky Way] watchers were notably self-assured . . . we did not suspect it would soon be necessary to revise the radius of the Milky Way upward by a factor of three or more and to increase its mass by as much as a factor of 10."²³ If such basic measurements recently had to be drastically revised after so many decades of observation, then what might the future hold? Will there be even more drastic revisions?

Even when we get down to our own solar system, we find there are fundamental problems. The traditional account for the origin of planets—that they have condensed from clouds of cosmic dust and gas—is on very shaky ground because the equations for the interactions of the gas clouds have never been satisfactorily solved. William McRae, professor of astronomy at England's Sussex University and past president of the Royal Astronomical Society, states, "The problem of the origin of the solar system is perhaps the most notable of all unsolved problems in astronomy."²⁴

It should be clear at this point to any impartial onlooker that the strategy of materialistic reduction followed by cosmologists

For over a century scientists have held that planets formed from the gravitational contraction of clouds of gas. But they have not been able to show this mathematically or verify it observationally.

has not allowed them to arrive at firm conclusions about the origin and nature of the universe, despite their public posturing. There is certainly no compelling reason for anyone to insist that the ultimate answers to cosmological questions *must* be contained in simple mathematically expressed physical laws. Indeed, the quantitative method has proved inadequate for explaining many phenomena very close at hand, what to speak of explaining the vast universe. Therefore it is certainly too early to exclude alternative approaches, approaches that may involve nonphysical explanations—explanations involving principles that go beyond the known laws of physics.

A Different Picture of Reality

There may in fact be nonphysical causes at work in the history of the universe, and there may even be nonphysical regions of the cosmos as well. Physicist David Bohm admits, "The possibility is always open that there may exist an unlimited variety of additional properties, qualities, entities, systems, levels, etc., to which apply correspondingly new kinds of laws of nature."²⁵ Thus it is quite possible that as our understanding of natural laws continues to evolve, a picture of reality quite different

from the one most people now accept may emerge.

As we have already seen, with infinitely rebounding and infinitely splitting universes, some of the models and concepts proposed by the cosmologists already challenge our commonsense conception of things. Do not think that these strange ideas are out of the mainstream of scientific thought. All the notions we have considered so far are actually the most staid and respectable speculations.

Let us now look at some even more outlandish ideas currently running loose in the world of modern cosmology. Scientist John Gribbin, author of *White Holes*, a book summarizing these topics, admirably calls them "the latest series of imaginative leaps made by the creative thinkers today we call scientists—rather than prophets, seers, or oracles."²⁶ One is the white hole—a quasar that pours out galaxies in a cosmic gusher. Gribbin says, "Could the white holes actually fragment themselves so that galaxies would repro-



Some theologians try to reconcile religion and science by saying that the universe obeys only the laws of physics and God is the guarantor of those laws. But this compromise makes religion meaningless by depriving God of His omnipotence and leaving Him no active role in the lives of worshippers.

duce themselves like amoebas, by parthenogenesis? That sounds so unlikely in terms of our everyday experience of the behavior of matter that it's worth looking at the standard theories of galaxy formation to show just how hopeless they are as explanations of the real Universe. Fissioning

white holes might seem like a solution of last resort, but when no other theory provides any kind of satisfactory solution, that solution is surely the one we must accept."²⁷

Another idea seriously entertained by cosmologists is space-time tunnels or "cosmic wormholes." First seriously discussed in 1962 by physicist John Wheeler in his book *Geometrodynamics*, the idea has entered into popular consciousness through fantasy movies such as the *Star Wars* series, where starships hurtle through hyperspace, thus making intergalactic journeys that would normally take millions of years at the speed of light. Some versions of the wormholes see them as entrances to the past and future, or even to other universes.

In the early part of this century, Einstein posited a fourth dimension: now, as the implications of his gravitational field equations are being more fully explored, extra dimensions are being added. Paul Davies, a theoretical physicist, writes, "In addition to the three space dimensions and the one time dimension we perceive in daily life, there are seven extra space dimensions that have hitherto gone unnoticed."²⁸

The point of these descriptions is to show that even the material scientists are being compelled to put forward explanations of the universe that stretch the mind to an incredible degree. But must we stretch our minds only in the directions pointed out by material science? Perhaps minds can be stretched in even other directions. If we can contemplate higher material dimensions, then why not dimensions of an entirely different sort? There is a definite need for new categories of ideas, ideas that will undoubtedly challenge the currently held reductionistic scientific strategy for understanding the universe. That strategy includes the idea that the universe is ultimately simple and can be exhaustively described in terms of quantitative laws.

But suppose this is not so. It certainly appears that the universe is unlimitedly complex and has aspects that may not be approached by quantitative methods. If so, what strategy can be used to gain knowledge about it? The many complex and orderly features of the universe suggest that its cause is an intelligent designer. This idea brings to mind the following possible strategy. If the underlying cause of the universe is a supreme intelligent being, then there is hope that we can understand the ultimate nature of reality by obtaining information from this being. That there is such a

being is certainly a bold proposition, but no more so than the proposal that everything can be explained by simple, mathematically expressed physical laws. And just as in the case of the quantitative strategy, the value of this alternative strategy can only be judged by how successfully it can be applied. It would be unfair to reject it without seeing how well it can be used to gain practical knowledge about reality.

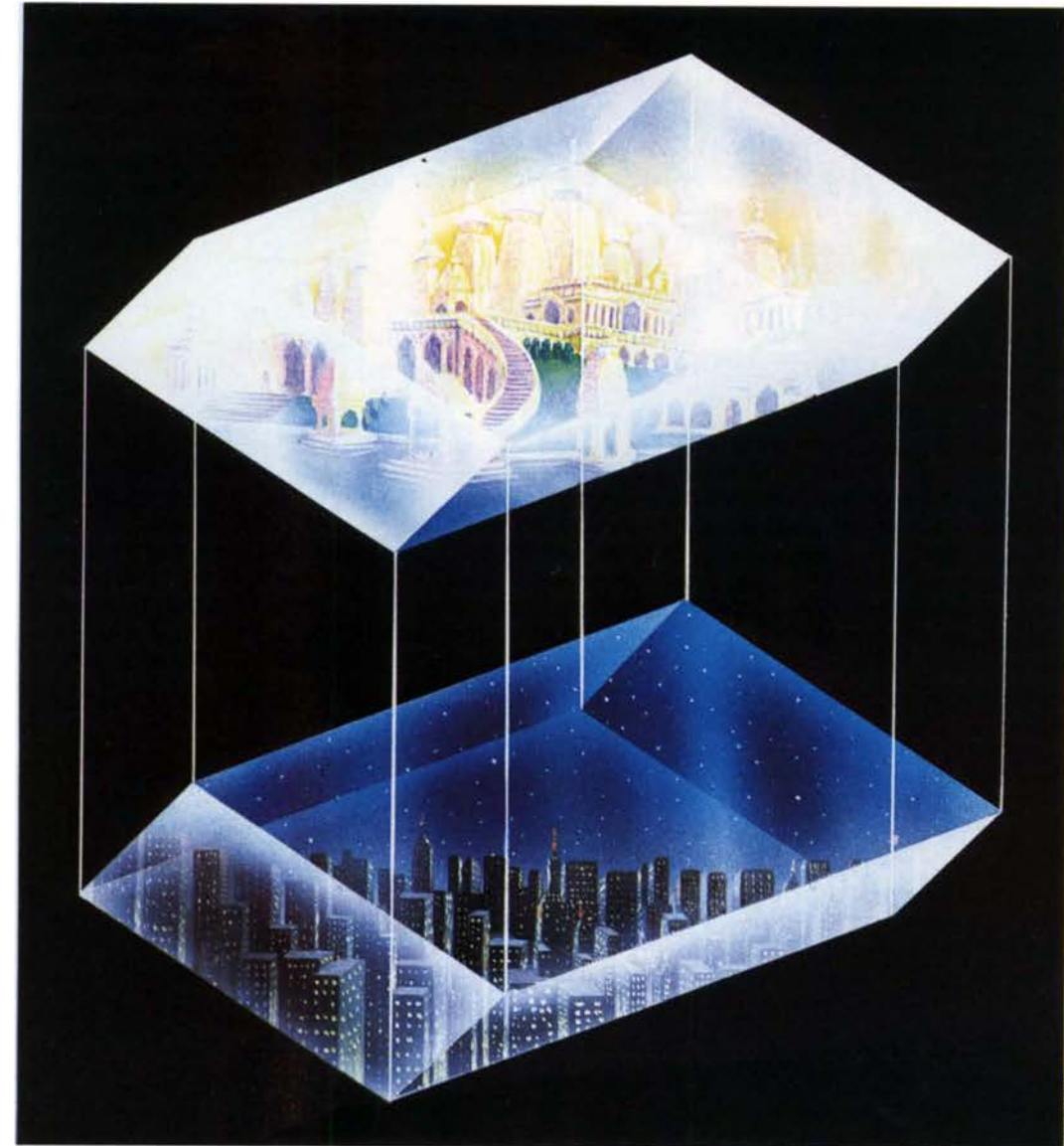
To many the idea of a supreme intelli-

If we can contemplate higher material dimensions, then why not dimensions of an entirely different sort?

gence will bring to mind the world view of Christian fundamentalism, to which people will have varying reactions. But alternatives to the current theories of cosmologists are not limited to the fundamentalist Christian interpretation of Genesis. Just as there are many possible materialistic explanations of the origin of the universe, there are many possible explanations involving a personal creator.

For those seeking to broaden their intellectual options, one very rich source of ideas for understanding the cosmos and our place in it is the Vedic knowledge of ancient India. The Vedas include an extremely sophisticated cosmology. Some of the concepts will be radically different from those now being propagated; others will be surprisingly complementary with current scientific findings. For example, Carl Sagan, while in India filming a segment for his *Cosmos* television series, said, "The most sophisticated ancient cosmological ideas come from India. Hinduism [based on the Vedas] is the only religion in which time scales correspond to scientific cosmology." He noted that the sages of ancient India held that the universe undergoes progressive cycles of creation and destruction over time scales lasting billions of years.

As in modern science, a basic unit of matter is the atom (in Sanskrit, the *anu*), but the Vedas also include particles of consciousness called *jīvātmas* as well as an integrated superior conscious principle called the *paramātmā* (Supersoul). The Supreme Being, seen as the source of a variety of physical and universal energies, is described as a personality simultaneously omnipresent and localized, in whom the universe exists and who exists within every atom of the universe. As we shall see throughout this magazine, such ideas may



Modern physicists have postulated the existence of various dimensions or levels of reality. The Vedic literatures of ancient India also describe various dimensions or levels of reality, including higher material levels, and still higher levels best described as spiritual or transcendental. These correspond to different levels of conscious perception.

give a more complete and coherent understanding of the origin and nature of the universe. Consciousness in particular is a fundamental aspect of reality that cannot be ignored in theories that attempt to comprehensively explain the cosmos.

At a time when scientists are proposing such things as multiply-splitting universes, cosmic wormholes for traveling from one space-time region to another, universes in which time reverses, an eleventh dimension of space-time, etc., the ancient transcendental conceptions found in the Vedas should not be dismissed without due consideration. The big bang and inflationary models, which rest on the shakiest of mathematical and theoretical foundations, have certainly failed to provide adequate answers to fundamental questions about the universe and the galaxies and planets and life forms we find within it today. Perhaps a superconsciousness, a supremely intelligent designer—and not a set

of impersonal mathematical equations—is the ultimate explanation for the universe that now seems so inexplicable.

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THE MYSTERY OF CONSCIOUSNESS

Modern science may delve into the recesses of the brain, but can it explain the phenomenon of consciousness?

Scientific psychology, as the well known saying goes, having first lost its soul, later its consciousness, seems finally to lose its mind altogether.¹ wrote philosopher Herbert Feigl, director of the Minnesota Center for the Philosophy of Science. He thus summarizes one of the most fundamental trends in modern thought—the reduction of all spiritual and mental phenomena exclusively to biochemical brain functions.

Some philosophers have enthusiastically assisted in this task. Gilbert Ryle, renowned professor of metaphysical philosophy at Oxford University, says about the idea that the mind is something nonphysical, "I shall speak of it with deliberate abusiveness, as 'the dogma of the Ghost in the Machine.' I hope to prove that it is entirely false, and false not in detail, but in principle."²

One philosophical school, the eliminative materialists, goes so far as to advocate completely dropping words such as consciousness, feeling, seeing, or pain from the vocabulary of scientific discussion. They claim that these words are purely subjective and thus have no real meaning, even though this is contrary to all practical experience. Describing this approach, philosopher Richard Rorty of Princeton states that a representative of this view would say to someone, "It would make life simpler for us

Since the time of Descartes, science has tried to reduce reality to mathematical form. Yet the conscious experience of form, color, and emotion remains stubbornly in a category of its own.

if you would in the future say, 'My C-fibers are firing' instead of saying 'I'm in pain.'"³

The philosophers, however, are merely following the lead of modern science, which from its very beginnings has been mechanistic. In 1750 the French physician de La Mettrie wrote, "Let us conclude boldly then, that man is a machine."⁴ And in more recent times we find Oxford zoologist Richard Dawkins proclaiming, "We are survival machines—robot vehicles blindly programmed to preserve the selfish molecules known as genes."⁵

Scientist Herbert L. Melzer writes in *The Chemistry of Human Behavior*: "The full range of those emotional and intellectual capabilities which we regard as uniquely human originates in an incredibly complex overlay of neurochemical organization upon highly specialized morphological structures . . . We do not need to mean anything more by the term mind than the total organization of functions, memories, and capabilities that characterize any particular brain."⁶ Many scientists are not troubled by the profoundly depersonalizing social and psychological effects of this view. Professor John Taylor of King's College, London, states: "The mind appears now to be a near-powerless 'epiphenomenon' of the physical brain." He adds that realization of this fact "will cause a complete destruction of people's understanding of their place in the world, as well as undermining the traditional institutions of society." What solution does he propose? He simply urges that we "start to prepare people to live in a deterministic world."⁷

Major movements in modern psychology

have also taken a strictly mechanistic approach to mental phenomena. John B. Watson, a professor of psychology at Johns Hopkins University, was the founder of the behaviorist school. About consciousness, he wrote, "It has never been seen, touched, smelled, tasted, or moved. It is a plain assumption just as unprovable as the old concept of the soul."⁸ Carrying this further, the most famous behavioral psychologist, B. F. Skinner, once declared that he would abolish what he calls "the inner man . . . the man defended by the literatures of freedom and dignity." He further stated, "His abolition has been long overdue. . . . he has been constructed from our ignorance, and as our understanding increases, the very stuff of which he is composed vanishes."⁹

Sigmund Freud's psychology was also based upon an essentially materialistic view of human nature. Early in his career, Freud, then a neuroanatomist, embarked upon an ambitious project to demonstrate that mental phenomena were directly produced by an organic mechanism. Although he eventually gave up the attempt, he remained convinced about his hypothesis. "I . . . have no desire at all," he wrote to a colleague, "to leave the psychology hanging in the air with no organic basis. But beyond the feeling of conviction [that there must be such a basis], I have nothing, either theoretical or therapeutic, to work on, and so I must behave as if I were confronted by psychological factors only. I have no idea why I cannot yet fit it together."¹⁰

In recent times, some scientists have decided that if man is no more than a sophisticated thinking machine it might be



MODEL: RASANTHRA DESE

possible for them to build such machines themselves. A leader in computer research, Marvin Minsky of M.I.T., believes that a machine will soon be created with "the general intelligence of an average human being. . . . The machine will be able to educate itself. . . . In a few months it will be at genius level. . . . A few months after that its power will be incalculable." Then Minsky adds, "If we are lucky, they might decide to keep us as pets."¹¹

Convinced that the new technology of artificial intelligence will enable man to replace almost everything, Professor Arthur Harkins, director of the Graduate Futures Program at the University of Minnesota, says that by the year 2000, people will be getting married to robots and society will begin to ponder the definition of "human."¹² This vision of a future adorned with humanoid computers may appear titillating to science-fiction buffs, but how well does it tally with what it really means to be human? Our thoughts, feelings, and desires lie at the very heart of what we all call the human experience. In their hasty dash to equate sophisticated machines with human beings, many philosophers, psychologists, and scientists have trampled upon some fundamental distinctions between the two.

The reason for their confusion can be traced to the basic strategy of modern science, which holds that *everything* can be explained according to relatively simple physical laws. Armed with this mechanistic assumption scientists can embark upon a study of the brain with the reasonable hope of eventually being able to account for, control, and duplicate all of its functions, including what we call consciousness.

But what if a nonphysical vital principle or force were involved? Then the investigative task becomes hopelessly complicated. So most scientists stick to the strategy of insisting that the brain can be explained by simple physical laws and proceed with their theories and experiments.

As B. F. Skinner says in *Beyond Freedom and Dignity*, "Only then can we turn from the inferred to the observed, from the miraculous to the natural, from the inaccessible to the manipulable."¹³

There is, however, more to the human mind than information processing. It is consciousness itself that is the foundation of all experience, but no one can describe it by numerical expressions in the same way as chemical reactions, the force of gravity, and other physical phenomena. Yet just because it cannot be measured by quantitative means in no way denies its existence—consciousness can clearly be known by experience.

This suggests a serious limitation of the mechanistic approach, namely, that it can only describe behavior connected with consciousness but not consciousness itself. Faced with this difficulty, many scientists, rather than admit that consciousness is beyond physical description, choose to characterize it as nothing more than a complex pattern of behavior. This misconception allows them to suppose that machines and computers of sufficient sophistication can become conscious.

But there are many clear and direct ex-

A machine can easily be built that responds to red light with the statement, "I see a red light," but does the experience of seeing red light accompany this mechanical response?

amples showing how conscious awareness is entirely different from the physical behavior associated with it. For instance, what happens when a person accidentally strikes his thumb with a hammer? Certain characteristic patterns of behavior result—the person may shout, wave his hand, grimace, etc.

An examination of the body's reaction will reveal chemical changes in the blood, patterns of electrochemical impulses in the brain, and so forth. While these measurable effects are part of the event, they are distinct from the experience of pain itself. Although everyone readily understands the sensation of pain because it is a common conscious experience, it cannot be defined in physical terms. Therefore science prefers to confine itself to what can be physically described—namely, patterns of electrochemical impulses. But if the brain is no more than an information processing device for these impulses, then what makes it any different from the machines the scientists themselves use to record experimental data from the brain?

The answer is clear—in describing the functioning of the machine we have no

need to bring in any concept of pain. That is, we have no need to suppose that the machine feels pain. The same thing is true of a description of the brain. Yet we know from experience that a person feels pain. Therefore, the concept "experience of pain" is something independent and distinct from all our ideas and statements about the functioning of machines and of brains.

Let us imagine a second instance—a machine that when exposed to a red light would say, "I see a red light." Such a machine could be built by connecting a photocell with a red filter to an amplifier. When triggered, the amplifier would turn on a tape recorder that plays back the message, "I see a red light."

Although the machine declares that it "sees" a red light, no one in his right mind would imagine that it is actually "seeing" anything. Similarly, a tape recorder receives sound impulses but does not hear, and an automobile moves but does not itself experience motion. While machines perform certain activities that could duplicate those of a human being, all the actions of the machine are reducible to a mechanistic explanation. But in the case of a human being endowed with conscious awareness, physical description is inadequate to describe his personal experience. The human body behaves somewhat like a complex machine, and its actions can be described in physical, measurable terms to some extent. But beyond these physically quantifiable descriptions, which deal exclusively with the mechanics of behavior and perception, is the nonquantifiable realm of consciousness. Admittedly, science has succeeded in accounting for certain observable phenomena in strictly physical terms, but we should not extrapolate and conclude that everything—including consciousness—can be explained mechanistically. Other possibilities not only exist, but are frequently more reasonable and comprehensive, and we should remain open to consider them.

Even Thomas Huxley pointed out the irreducible nature of consciousness. He stated, "I understand the main tenet of materialism to be that there is nothing in the universe but matter and force; and that all the phenomena of nature are explicable by deduction from the properties assignable to these two primitive factors. . . . It seems to me pretty plain that there is a third thing in the universe, to wit, consciousness, which . . . I cannot see to be matter or force, or any conceivable modification of either."¹⁴

Nevertheless, many scientists reject the idea that consciousness has any reality and remain determined to account for it in mechanistic terms.

A popular current theory known as functionalism, which provides a framework for research in artificial intelligence, relegates

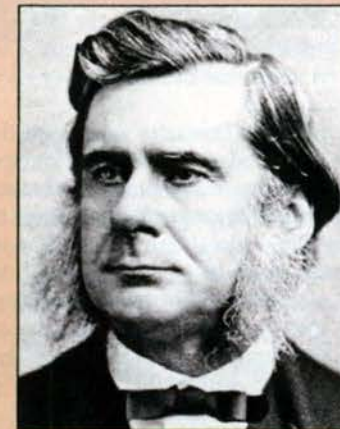
the activities of the mind to computerlike responses to external stimuli. The concept of consciousness is dismissed, and all human feelings and sensations are reduced to mathematical constructs.

For example, in the case of a headache, the experience of pain (which we naturally consider to *be* the headache) is not referred to at all. What then is a headache? Hard as this may be to believe, MIT artificial intelligence researcher Jerry A. Fodor, one of functionalism's main proponents, states, "To have a headache is to be disposed to exhibit a certain pattern of relations between the stimuli one encounters and the responses one exhibits."¹⁵ In other words, what he calls a headache is defined to be some brain software that makes us behave as if we have a headache. But pain itself is left out of the picture, because pain cannot

laureate physicist Eugene Wigner. "There are two kinds of reality or existence: the existence of my consciousness and the reality or existence of everything else," states Wigner. "The latter reality is not absolute but only relative."¹⁷ Wigner observed that external, measurable phenomena are known to him only by virtue of his consciousness, and thus consciousness is, if anything, more real than these phenomena. After extensive research in this area, Alan Gevins of EEG Systems Laboratory in San Francisco concluded that the mind may have transcendent qualities. Gevins says, "When it comes to creativity, inspiration, the more ethereal aspects of the mind—well, they might ultimately be mysterious. I'm not as firm as some of my colleagues in the belief that the mind can be reduced to a flow of electrons."¹⁸

“ There is a third thing in the universe, to wit, consciousness, which I cannot see to be matter or force. ”

—Thomas Huxley



BETTMAN ARCHIVE

be written into a computer program.

Due to this obvious failure to explain personal experiences, even Fodor, who is fully committed to a physical explanation of consciousness, admits that mechanistic theories such as functionalism are incomplete. He states, "Many psychologists who are inclined to accept the functionalistic framework are nonetheless worried about the failure of functionalism to reveal much about the nature of consciousness. Functionalists have made a few ingenious attempts to talk themselves and their colleagues out of this worry, but they have not, in my view, done so with much success. As matters stand, the problem of qualitative content [of consciousness] poses a serious threat to the assertion that functionalism can provide a general theory of the mental."¹⁶

Because the issue of consciousness has raised a fundamental impasse in all mechanistic attempts to explain human existence, some scientists have rejected the widely accepted mechanistic viewpoint. Among the dissenters is renowned Nobel-

A Historical Overview of the Mind-Body Problem

Throughout history, many scientists and philosophers have contemplated how to define the subtle and remarkable mind. The analysis of the relationship between consciousness and the brain is known in Western thought as the "mind-body problem."

We have seen that consciousness cannot be accounted for in physical terms, but that still leaves open many questions. What exactly is consciousness, and how is it related to the brain? If it is simply a product of the brain's higher neural centers it may be possible to account for it by a nonquantitative description of the brain. Or could it be that consciousness is associated with a separate entity connected with the brain? In Western thought, the words *mind* and *self* have been used interchangeably to name this entity. For the time being, therefore, we shall also use the words *mind* and *self* in this specific sense. But we shall later point out a fundamental distinction between the mind and the conscious self.

Traditionally, Western thinkers have regarded consciousness or mind as nonphysical and distinct from the brain. One well known mind-body theory of this type was presented by seventeenth-century French mathematician and philosopher René Descartes. His dualistic conception postulated two kinds of substances—mental and corporal. The essence of a mental substance is that it has thoughts and is conscious of them, and the essence of a corporal substance is that it has position in space. Mind and matter can and do interact and influence one another: matter influencing mind is called sensation, and mind influencing matter is called the exertion of will. Thus his theory became known as interactionism.

Descartes reasoned that mind, as a nonphysical substance, would not occupy position in space. But his opponents insisted that a mind without position in space would be unable to influence the material body, which has a position in space. This was a criticism that Descartes never effectively countered.

One reason for Descartes' failure was the way he conceived of the mental substance. He assumed that if something has certain fundamental characteristics that cannot be described in physical terms, then all of its properties must be beyond physical description. But it is within the realm of possibility that a nonmaterial substance could also possess some properties that can be placed within the framework of

material measurement.

For instance, there is no logical reason to exclude the possibility of a nonmaterial mental substance having position and being able to interact with the brain. But opponents of Descartes' theory, among whom may be numbered most physicists, strongly reject such interactionism because it would violate the laws of conservation of energy and momentum. If a nonphysical entity, the mind, influences the brain, it would tend to alter the brain's energy states, a phenomenon physicists would find unacceptable because it clashes with their equations defining the laws of physics. These equations specify that matter moves solely according to causes governed by physical laws. If nonphysical causes and laws were involved, the equations of physics would no longer suffice to describe the movements of matter.

Here we might point out that as of yet no one has proved that all matter obeys only the physical laws. In particular, no one has ever offered a complete mathematical description of the brain and its functions. Within the human brain there are one hundred billion nerve cells. No one can possibly trace out or monitor all the energy transfers in the brain. Therefore the physicists' objection to interactionism is simply not valid, and is fostered by a desire to impose a particular, restrictive view of the mind's relationship with the brain.

Before Descartes practically all thinkers accepted that the mind or self was different

from the body or brain. Descartes attempted to formulate this dualism in such a way as to overcome the objections of those who were being influenced by the rise of mechanistic science, which had no room for nonphysical substances. But his explanation left so many questions unresolved that most thinkers approaching the mind-body question after Descartes gave up interactionism.

Others made cautious efforts to formulate dualistic models that did not interfere with the known laws of physics. One such idea is epiphenomenalism, the proponents of which include Darwin's champion, Thomas Huxley. Epiphenomenalism presents what seems to be dualism of the mind and brain, but is really an attempt to maintain the superiority of mechanistic views by employing a highly unusual model. Epiphenomenalism states that matter gives rise to a nonphysical consciousness, but these states of consciousness have no influence on matter. This model has two major shortcomings. First, it doesn't explain how consciousness could arise from matter. Second, the idea that consciousness doesn't act upon matter is extremely awkward. In physics, all aspects of a physical system have some effect on the behavior of the total system. Why should consciousness be an exception?

A Nondualistic Approach

Another school of thought, monism, proposes that the mind and the brain are one

and the same. There are a number of monistic models—some deny consciousness and others identify it with the physical structures of the brain.

One such school of monistic thought holds that matter inherently possesses the attribute of consciousness. This view, which can be termed panpsychism, is historically identified with the seventeenth-century Dutch philosopher Baruch Spinoza, who stated, "*Omnia quamvis diversis gradibus animata sunt*"—that everything in existence is to one degree or another animate, or conscious.¹⁹ Spinoza believed in one universal substance, each part of which has both physical and psychic properties. According to this view, even an atom would have some dim atomic awareness, and as more complex organizations of matter developed, then correspondingly more complex forms of consciousness would emerge.

Such ideas are useful for biologists, who almost without exception believe that life has evolved from matter by physical laws. Given this mechanistic assumption, there arises the problem of explaining the origin of consciousness. Panpsychism, which attributes some degree of consciousness to even disorganized matter, provides a possible evolutionary explanation. One proponent of this approach is German zoologist Bernhard Rensch. He posits, in addition to the physical properties of matter, what he calls "parallel psychic components," such as consciousness. "Molecules and atoms should also be credited with basic parallel components of some kind," he states. "These parallel processes can be recognized as such only after the respective molecules have become part of the psychophysical substance (nerve and sense cells) of an organism, so that the parallel components form a complex of conscious phenomena that can be 'experienced.'"²⁰

A major difficulty with this approach to panpsychism involves the unity of consciousness. If every atom is separately conscious, then what mechanism integrates their awareness? Why should a carbon atom in a human brain, for instance, feel any different than when it is in a piece of wood? And since the brain is merely a combination of various atoms, why is the brain's consciousness unified and not just a mere sum total of all these atomic consciousnesses? This difficulty has been recognized by Nobel-laureate neurobiologist John C. Eccles, who wrote, "Hitherto it has been impossible to develop any neurophysiological theory that explains how a diversity of brain events comes to be synthesized so that there is a unified conscious experience of a global or gestalt character. The brain events remain disparate, being essentially the individual actions of countless



neurons that are built into complex circuits."²¹

Scientists such as Rensch, attempting to overcome this problem, have offered the explanation that patterns of matter also have consciousness, and that we are merely one set of these patterns. But if this is so, then two conclusions follow. First, there must exist complex metaphysical laws governing the production of consciousness in response to the presence of certain patterns. Second, the consciousness of the pattern must be—in comparison with the individual consciousness of each element of the pattern—an entirely new metaphysical entity, a "higher" consciousness capable of accounting for our unified human experience. At this point we would have within the human body a rather complicated metaphysical apparatus consisting of varieties of conscious entities (trillions of semi-conscious atoms, patterns possessing higher unifying consciousness) and laws governing their appearance. It would be simpler, however, to revive the concept of the soul—a single irreducible unit of consciousness capable of functioning as the integrator of experience with the body.

John C. Eccles and philosopher Karl R.

Panpsychism attributes atomic consciousness to each atom. Granting this, why should our consciousness be more than a mere collection of disunited atomic experiences?

Popper propose something like this in their book *The Self and Its Brain*. Recognizing the shortcomings of monistic theories, they formulate a version of interactionism between the mind and brain. Eccles states, "The experienced unity [of consciousness] comes, not from a neurophysiological synthesis, but from the proposed integrating character of the self-conscious mind."²²

Popper gives several strong arguments for the nonphysical nature of the mind, pointing out that conscious awareness is real and directly experienced by the conscious self, yet inexplicable by our concepts of matter. He points to the difficulty in all attempts to attribute sophisticated behavior, such as elaborately purposeful action, to intermolecular forces, and explains how such behavior can easily be understood in relation to a mind endowed with purpose and desire.

Although entertaining dualistic ideas concerning the mind and body, Popper and Eccles still cling to the notion that the mind



Some scientists say consciousness cannot influence brain action, since this would violate the laws of physics. But who can show that the billions of neurons in the brain precisely follow these laws? No, one can monitor all the biochemical energy transfers within the brain.

The majority of scientists insist that all mental phenomena are functions of the physical brain and nothing more.

has a material origin, suggesting that it somehow emerges from matter and then interacts with it. But as we have previously observed, such a totally unpredictable appearance of a distinct, nonphysical mind from matter raises, to say the least, severe

The great majority of scientists, however, continue to insist that all mental phenomena are functions of the physical brain and nothing more. One of their most common objections to the idea that the mind could be fundamentally different from the brain is that if you alter the brain the mind is also altered. It has been observed that when the speech center of the brain is damaged, a person may become unable to speak, and that by injecting drugs into the body, mood changes and hallucinations may result, etc. People therefore frequently conclude that the mind must be manifested from the physical brain, for otherwise brain states would not affect mental states.

This is not the only possible interpreta-

would be entirely unable to review his stock. If the brain is such a computerlike instrument, then in cases of brain damage or chemical disturbance we would expect to see an impairment of the mind's functional capacity even though the mind is an entirely separate entity.

Empirical Evidence for a Conscious Self

Thus far we have analyzed the drawbacks of the mechanistic understanding of consciousness and have touched on the history of the mind-body question. In our discussion we have introduced the concept of how the mind interacts with the brain, much like a programmer with his computer. A skeptic might ask if there exists any direct empirical evidence in support of this. There is indeed, although like all empirical evidence it is subject to varying interpretation. Examples of findings showing that the mind is independent of the material brain and body are supplied by research into near death experiences (NDEs) and reincarnation memories.

NDEs include out-of-body experiences—in which people report observing their physical body and events relating to it from a perspective outside of the body during severe illness or physical trauma resulting in unconsciousness. A typical case might involve a person who is resuscitated from a heart attack and reports that he observed, from a point outside his body, the medical personnel endeavoring to revive him. At such times, according to standard medical opinion, the normal functioning of the brain, as indicated by certain brain waves, is impaired, and the patient should be unconscious, if indeed consciousness is just a manifestation of the brain.

Although a percentage of the research on NDEs is unreliable, other work has been presented by individuals with impeccable scientific credentials. For example, Dr. Michael B. Sabom, a cardiologist and professor at the Emory University Medical School, was openly skeptical of NDEs but changed his mind after investigating them.

He formed a control group of 25 'seasoned' cardiac patients who had survived heart attacks but who had never had an out-of-body experience. Sabom asked them to describe their resuscitation from heart attacks. Of these, 20 made a major error in their description of in-hospital cardiopulmonary resuscitation (CPR), three gave a limited but correct description, and two claimed to know nothing of CPR.

Another group consisted of 32 patients who had reported out-of-body experiences. Of these, 26 gave general visual descriptions of their near-death crises, 6 described details corresponding to the medical records of their particular resuscitation, and one man's account was "extremely accurate in portraying the appearance, tech-

tion. Such a correlation could be due to a nonphysical mind using the brain to carry out various functions, in a manner similar to an operator using a computer. This view was held by renowned neurosurgeon Wilder Penfield, whose extensive investigation of brain functions led him to conclude that "it is, in a sense, the mind with its mechanisms that programs the brain."²⁴

The mind may become seemingly dependent upon the brain, just as a businessman engaging a computer for inventory calculation may rely on the computer for his work. Should the computer become damaged, the businessman would certainly become impaired in his ability to function; and if the section of the computer memory dealing with inventory reports is wiped out, he

difficulties—most specifically, how could it happen? Popper and Eccles don't know.

Popper himself admits, "From an evolutionary point of view, I regard the self-conscious mind as an emergent product of the brain. . . . Now I want to emphasize how little is said by saying that the mind is an emergent product of the brain. It has practically no explanatory value, and it hardly amounts to more than putting a question mark in a certain place in human evolution."²³ Those who advocate the emergence of consciousness thus find themselves in the same position as the cosmologists who propose that the universe pops out of nothingness. In each case something qualitatively new unpredictably pops up.



A conscious being whose physical brain is damaged may be compared to a programmer whose computer has broken down.



nique, and sequence of the CPR."²⁵

In the control group, not one person gave a detailed account of the medical procedures involved in their resuscitations, whereas in the group with out-of-body experiences 6 were able to do so, even though they should have been unconscious at the time. This and other studies led Sabom to accept that the patients' NDE experiences were real. Some physicians who doubt the reality of NDEs have suggested that perhaps the subjects were semiconscious and are therefore able to recall their experiences. But Sabom notes that while occa-

sional patients remain semiconscious during surgery, their reports lack visual awareness and tend to be nightmarish in quality, in contrast with the highly visual and pleasant quality of the NDEs.

Others also put forward the possibility that NDEs are the product of a particular cultural or religious background that somehow induce the patient to imagine an NDE. Examining this possibility, Sabom interviewed numerous subjects and found that NDEs occur in 40 percent of randomly interviewed near-death survivors, with no correlation to age, sex, race, area of resi-

During crises such as heart failure, some people, who clinically should have been unconscious, have observed events from a perspective outside their bodies and reported verifiable details later.

dence, size of home community, years of education, occupation, religious background, church attendance, or prior knowledge of the existence of NDEs.

Dr. Russel Noyes and Dr. Richard Blacher have suggested that NDEs are a psychological reaction to one's perception of imminent death, an attempt by the ego to preserve it-

self by taking refuge in a flight of fantasy. Sabom shows, however, that NDEs have been reported in cases of unanticipated near-death crises. For example, one man described, "I was walking across the parking lot to get into my car. . . . I passed out. I don't recall hitting the ground. The next thing I do recall was that I was above the cars, floating. I had a real funny sensation, a floating sensation. I was actually looking down on my own body, with four or five men running toward me. I could hear and understand what these men were saying."²⁶

Based on his extensive research and his thorough analysis of various alternative explanations, Sabom arrived at the following

timite question that has been raised by reports of the NDE."²⁷

Accounts of memories of past lives have also been frequently plagued with inaccuracies and fraud, but at the same time, rigorous, unbiased studies have been carried out by serious researchers. One such investigator is Ian Stevenson, Carlson Professor of Psychiatry at the University of Virginia. Stevenson has extensively investigated spontaneous reincarnation memories recounted by children. In some cases he has been able to positively corroborate what the child has claimed by thoroughly investigating details of the place and people they describe, including the dead person they

thirty strangers, she picked out Mana's husband, mother-in-law, and brother-in-law as well as the girl Minu. These details and many others were extensively researched and corroborated.²⁸

Stevenson is skeptical of the well-known hypnotic age-regression technique, recognizing that the material cannot be properly confirmed and that the mind tends to fabricate illusions, especially under hypnosis. He therefore does not generally accept statements made under hypnosis as evidence. In some cases, however, the statements can be researched and verified, such as the case he titles "A Case of Xenoglossy." In this instance, an American woman living

in Philadelphia was regressed hypnotically and manifested the personality of a Swedish peasant farmer. She spoke fluent Swedish, although she had no prior contact with Swedish in her life; native Swedes confirmed her pronunciation to be fluent, even though many Swedish vowel sounds are extremely difficult for Americans to enunciate.²⁹

Stevenson's studies give convincing evidence that the conscious self can travel from one physical body to the next. Clearly, when one body dies, the contents of its brain are destroyed, and there is no known physical process by which they can influence the contents of another brain. The simplest interpretation is

that the conscious self must be an entity distinct from the brain.

A Nonmechanistic Description of Consciousness

At this point we would like to introduce an alternative solution to the mind-body problem. Rather than cling to the inadequate and overly restrictive confines of models that conform to mechanistic views, we propose a clean break. Let's examine a new paradigm based on the nonmechanistic description of consciousness in the *Bhagavad-gītā*, a rich source of information on the mind-body question from the ancient Vedic tradition of India. It is a view that is at once simple, comprehensive, and logically consistent. In our previous review of the theory of panpsychism the concept of individual atoms possessing a minute degree of consciousness was presented; we noted the many difficulties accompanying this particular theory of consciousness. But what if there were one special atom that was conscious of the entire body? The *Bhagavad-gītā* affirms the presence within the body of a distinct entity, the conscious self, and establishes it as an irreducible,

Accounts of memories of past lives have been frequently plagued with inaccuracies and fraud, but at the same time, rigorous, unbiased studies have been carried out by serious researchers, such as Ian Stevenson, Carlson Professor of Psychiatry at the University of Virginia.

claim to have been. Stevenson has assembled numerous accounts and verified them, always taking great care to screen out fabrications.

An example is the case of Sukla, the daughter of a Bengali railway worker. When she was very young, she would cradle a pil-

low in her arms like a doll and call it by the name Minu. She behaved as if Minu were her daughter, and also spoke of Minu's father and his two brothers. According to Sukla, they all lived in Bhatpara, and she insisted her parents take her there. Sukla's father investigated and learned that there had lived in Bhatpara a woman named Mana who had died a few years before, leaving behind a baby daughter named Minu. Sukla's father became convinced his daughter had previously lived as Mana. When Sukla was brought by her family to Bhatpara, she led them to the house where Mana had lived. Then, from a group of over

conclusion concerning the mind-brain question: "If the human brain is actually composed of two fundamental elements—the 'mind' and the 'brain'—then could the near death crisis event somehow trigger a transient splitting of the mind from the brain in many individuals? . . . My own beliefs on this matter are leaning in this direction. The out-of-body hypothesis simply seems to fit best with the data at hand. . . . Could the mind which splits apart from the physical brain be, in essence, the soul, which continues to exist after final bodily death, according to some religious doctrines? As I see it, this is the ul-



Creative personalities such as Mozart often depend on the phenomenon of inspiration, in which ideas inaccessible by conscious effort spring unbidden into the mind as though from a higher source.

individual quantum or atom of consciousness. The conscious self is superior to the brain and its functions. It is not a hypothetical entity. The existence and nature of the conscious self can be investigated through direct and reproducible experience, which can be obtained by the practice of yoga techniques. The conscious self can be associated with various material bodies, human

and nonhuman, and can transmigrate not only within one species but between species. It is also capable of functioning apart from any material body whatsoever. Its primary characteristics are nonphysical, i.e., they cannot be adequately described in quantitative terms; yet it occupies a definite position in space, and acts to integrate numerous sensations, thoughts, and emotions into one unified state of awareness. The conscious self does not interact with matter according to the known laws of physics, such as the law of gravity or the laws of electromagnetism. Instead, it obeys a different set of laws, which can be called

higher-order psychological laws. These include the law of karma. In the final chapter we will discuss the characteristics of the conscious self in greater detail.

Mozart and Inspiration

The linking mechanism between the conscious self and matter was one of major stumbling blocks in Descartes' dualistic theory. This difficulty is surmounted by the idea of the Supersoul, which according to *Bhagavad-gītā* serves as the interface between the conscious self and the brain. The Supersoul is also said to be the source of memory, knowledge, and forgetfulness.



The Supersoul is expanded within the hearts of all living entities as one undivided being.

Evidence for the Supersoul's existence may be found in the experience of inspiration, in which ideas extremely difficult to conceive by normal mental endeavor enter one's consciousness fully formed, as if from some external source.

Inspiration plays a central role in the solution of difficult problems in all creative human endeavors. From the field of music we will give a striking example in which ideas for musical compositions appeared fully formed in the mind without apparent conscious effort.

Wolfgang Mozart once described how he created his works: "When I feel well and in good humor, or when I am taking a drive or walk . . . thoughts crowd into my mind as easily as you could wish. Whence and how do they come? I do not know and have nothing to do with it. . . . Once I have a theme, another melody comes, linking itself with the first one, in accordance with the needs of the composition as a whole. It does not come to me successively, with its various parts worked out in detail, as they will be later on, but it is in its entirety that my imagination lets me hear it."³⁰

Inspiration also plays a central role in the solution of difficult problems in science and mathematics. Generally, investigators can successfully tackle only routine problems by conscious endeavor alone. Significant advances in science often involve sudden inspiration, which in many instances oc-

curs unexpectedly after a lull in a long period of intense but unsuccessful conscious endeavor.

A typical example is the experience of mathematician Karl Gauss. After trying unsuccessfully for years to prove a certain theorem about whole numbers, Gauss suddenly became aware of the solution. He described this experience as follows: "Finally, two days ago I succeeded. . . . Like a sudden flash of lightning the riddle happened to be solved. I myself cannot say what was the conducting thread which connected what I previously knew with what made my success possible."³¹

From these incidents we discover that the phenomena of inspiration has two significant features. First, its source lies beyond the subject's conscious perception; and second, it provides a subject with information unobtainable by any conscious effort. The famous French mathematician Henri Poincaré, after deeply considering the phenomenon of inspiration in his own work, was led to contemplate an idea reminiscent of the idea of Supersoul. Poincaré called this the subliminal self and described it in this way: "[It] is in no way inferior to the conscious self; it is not purely automatic; it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. What can I say? It knows better how to divine than the conscious self, since it succeeds where that has failed. In a word, is not the subliminal self superior to the conscious self?"³²

Having approached this idea, Poincaré then backs away from it, saying, "I confess that for my part, I should hate to accept it."³³ He then offers a mechanical explanation of how the subliminal self, viewed as a machine, could account for the observed phenomena of inspiration. Poincaré proposed that the "subliminal self" must mechanically put together many combinations of mathematical symbols at random until at last it finds a combination satisfying the desire of the conscious mind for a certain kind of mathematical result.

Yet Poincaré well knew that the number of combinations involved in such a brute-force approach to problem solving could easily exceed the number of operations that the brain could reasonably be expected to perform in a short period of time. Furthermore, Poincaré's proposed mechanism did not account for the qualitatively new features occurring, for example, in the compositions of Mozart—features that seemed to appear as an unexpected gift and were not obviously solutions to any fixed problem.

Since we know so little about the workings of the brain, it is not possible, of course, to completely rule out the possibility that inspiration might be produced by some brain mechanism—a mechanism whose origin would also need to be ex-



As shown in this symbolic illustration, the Supersoul provides the link between the conscious self and the subtle and gross material bodies.

plained. However, it is also not possible at present to prove that inspiration does originate from such a mechanism, and therefore the possibility that the all-pervading super-consciousness may be responsible should not be hastily rejected.

If we pursue this idea, we will find that it yields insight even into the affairs of our daily lives. While most cases of inspiration deal with unusual mental accomplishment, the superior nature of the connecting link between the self and matter can also be appreciated in these ordinary affairs. When we desire to perform physical actions, we generally find that the body acts immediately. We have no clear understanding how our will gives rise to actions. They simply seem to occur automatically, and thus we normally take them for granted and assume "I am doing this." But careful thought reveals that many of these actions appear to be happening under the guidance and control of a power other than our own.

In daily life we constantly make decisions and rely on the power of our intelligence. But what is that intelligence? Like inspiration, intelligence gives direction like a higher authority: the living being cannot act without the use of intelligence. If one fails to take advantage of intelligence and acts without consulting it, he becomes a deranged man and is lost to the world. Thus a living being is dependent on the superior direction of intelligence, and it guides him just as a father gives direction to his son. According to the *Bhagavad-gītā*, this higher source of inspiration and intelligence, which is present and residing within every individual being, is known as the Supersoul, the universal consciousness. The Supersoul, which is always distinct from and superior to the individual soul, is the link between the conscious self and the brain. Without directly contacting the individual conscious self, the Supersoul perceives its desires (much as we detect the fragrance of a flower without touching it) and translates them into action. This coordination between subtle conscious desires and material actions takes place within the framework of higher natural laws, known

collectively as the law of karma. The Supersoul, acting freely in accordance with these laws, which are His own conventions, generates actions in the world of matter. When scientists observe these actions they may appear to be following the known laws of physics. But if we could analyze these actions thoroughly enough, we would find that the Supersoul is above the physical laws as the controller of them.

Thus far, in line with the traditional Western approach, we have considered the conscious self and the mind to be synonymous and have distinguished between them and the body. Here we would like to briefly mention that in *Bhagavad-gītā* a further distinction is made between the conscious self and the mind. According to the *Gītā*, the mind is composed of subtle material elements that are capable of interacting with the brain. In this conception, the mind is really a part of the material body, and indeed can be referred to loosely as the subtle body. The *Bhagavad-gītā* explains that the conscious self is higher than both the mind and the body because it possesses an imperishable, nonphysical nature. When we say that the Supersoul is the link between

the conscious self and the body, what we really mean is that the Supersoul is the link between the conscious self and both the subtle and gross material bodies. The interaction between the Supersoul and the conscious self is, undoubtedly, difficult to evaluate experimentally, but the two are so intimately connected there is full potential within each person for direct awareness of the Supersoul. This potential can be positively developed through the process of yoga, which will be more fully discussed in the final article in this magazine.

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LIFE FROM CHEMICALS

Fact or fantasy?

Did chemical reactions among randomly distributed molecules in the earth's primordial ocean produce the first living cells?



If a scientist were reduced several million times in size, he could personally explore the complexity of life. Here the three-dimensional structure of a protein molecule in a living cell is represented by an arrangement of coils and curved arrows. The daunting intricacy of these molecules has come to symbolize the complexity of living organisms. There are 2,000 kinds of proteins in the simplest bacteria and 800 times as many in a mammalian cell.

Little more than a century ago, science began to entertain notions of life arising from inert chemicals. Through the microscopes of that time, the cell appeared to be no more than a simple bag of chemicals. It therefore seemed reasonable to scientists such as Darwin to imagine that elementary living forms may have arisen from the random combination of organic chemicals in a primordial "soup." But as man probed into the mysteries of the living cell, the idea that life came from chemicals began to appear less reasonable. Yet most scientists today cling to the dogma of chemical evolution.

As time went on, microscopic exploration gradually revealed increasingly complex phenomena within the tiny cell, such as the precise regulation of cellular metabolism by the nucleic acids (DNA and RNA), which involves the sophisticated interaction of thousands of kinds of elaborately structured protein molecules. It was no longer quite so easy to imagine how all this could have occurred by random combination of chemicals.

Describing the remarkably intricate biochemistry of the cell, James D. Watson, codiscoverer of the DNA structure, wrote in his book *Molecular Biology of the Gene*, "We must immediately admit that the structure of the cell will never be understood in the same way as that of water or glucose molecules. Not only will the exact structure of most macromolecules within the cell remain unsolved, but their relative locations within cells can only be vaguely known. It is thus not surprising that many chem-

ists, after brief periods of enthusiasm for studying 'life,' silently return to the world of pure chemistry."

Yet despite ever-increasing awareness of the structural and behavioral complexity of even the simplest living systems, many scientists continue to theorize that life has emerged from a primordial chemical soup without the direction of any higher organizing principles. They imagine that in the course of random chemical bonding, simple molecules combined into complex organic compounds, which eventually integrated themselves into self-reproducing organisms. This scenario is being presented as the undisputed truth about the origin of life in every science classroom around the world—in grade schools, high schools, and colleges and universities. Radio, television, and the popular science publications reinforce the message.

To some, talk about topics such as whether or not life emerged from matter may appear far removed from day-to-day affairs, and thus irrelevant to their own lives. Whether the discussions involve highly reasonable ideas based on solid evidence or vague, unsubstantiated hypotheses rooted in flimsy data and nurtured by scientific prejudice, they seem like subject matter for scholars in ivory towers. But because the answers to fundamental questions about the origin of life determine how we view ourselves and our place in the universe, they profoundly affect our sense of identity, our decisions, our feelings, our relationships, our behavior—in fact, they affect all aspects of our life, including the goals of our

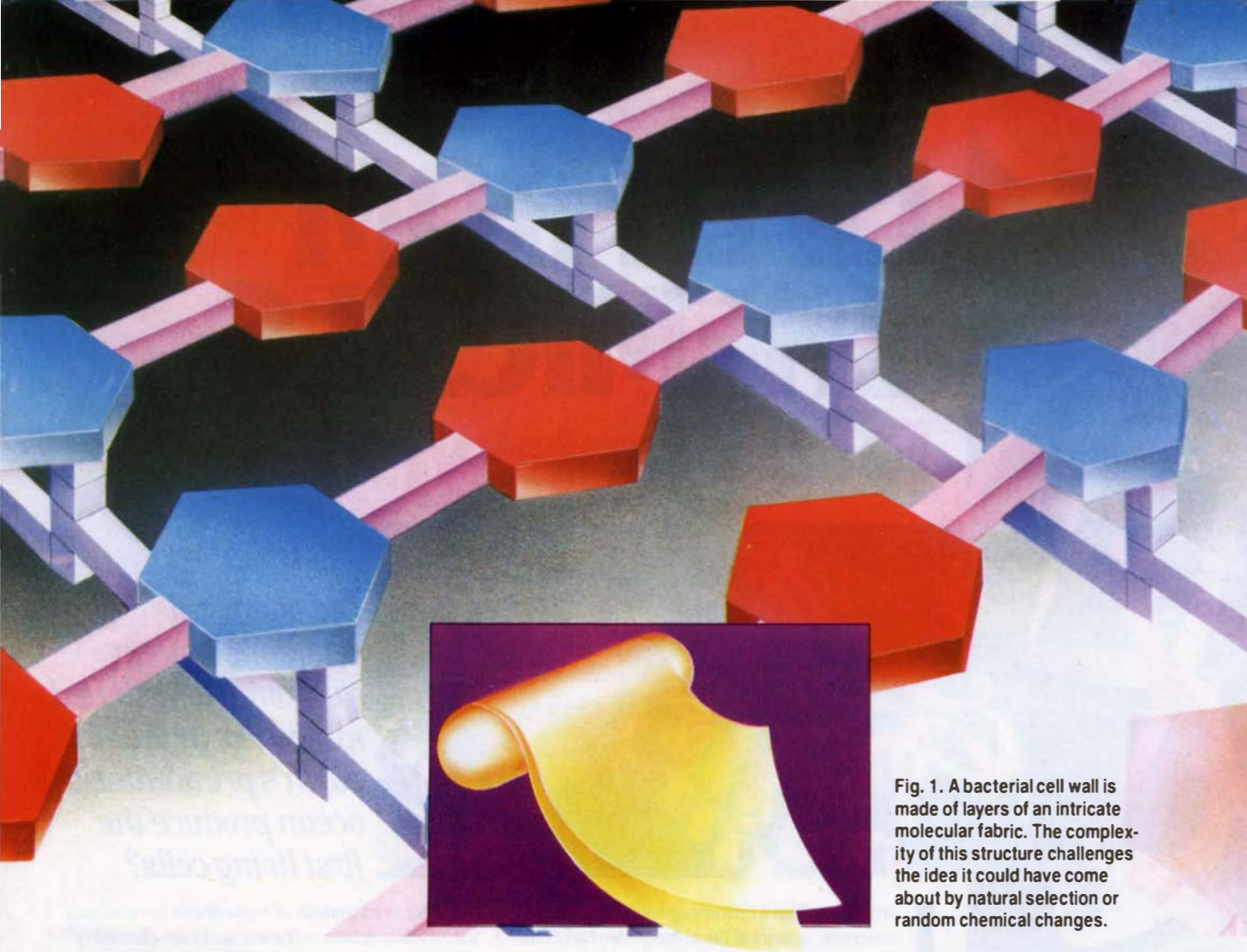


Fig. 1. A bacterial cell wall is made of layers of an intricate molecular fabric. The complexity of this structure challenges the idea it could have come about by natural selection or random chemical changes.

whole secular society.

Before looking at the explanations offered by mechanistic theories on the origin of life and consciousness, we shall first consider three examples of what goes on inside the living cell, thereby helping us appreciate the incredible complexity of even the simplest organisms.

While contemplating these examples, it is crucial that we remember that according to the understanding of modern chemists, the molecules involved are merely submicroscopic units of matter. The remarkable ways in which they combine might lead one to attribute mystical potencies for self-organization to them. Scientists, however, are quick to reject this idea, insisting instead that molecules do nothing more than follow the laws of physics. But just how molecules acting according to these relatively simple mechanistic laws could combine together to produce inconceivably complicated cells has yet to be explained. And how such cells could evolve according to the same laws to produce complex higher organisms is an even knottier question. So despite the rigid adherence of the scientific community to its current mechanistic explanation of chemical evolution, it would seem appropriate for us to remain open to the possibility that other factors may be in-

involved in chemical evolution—perhaps even some kind of self-intelligent organizing principle.

Our first example concerns the bacterial cell's protective wall, which is manufactured from various molecules synthesized within the cell. To construct its wall, the cell initially forms molecular building blocks from simpler compounds by processes involving many sophisticated operations. Once these blocks are assembled, the cell arranges them into a precise weave of horizontal and vertical rows comprising the cell wall (see Fig. 1). This manufacturing process resembles a complex factory assembly operation, wherein specifically designed machines first build component parts from raw materials and then assemble those components into a functioning, finished product.

A second example of the cell's internal complexity is its formation of a fatty acid, palmitic acid, from fourteen molecular subunits. Fatty acids are the chief molecules for energy storage in cells. To manufacture palmitic acid, the cell creates an elaborate, circular "molecular machine" from protein molecules. At the "machine's" center is an arm, also comprised of molecules, that swings through six "work stations" (see Fig. 3). Each time the arm rotates, two mo-

lecular subunits of the fatty acid are added by the action of enzymes at the work stations. (Enzymes are highly complex protein molecules that aid chemical reactions within the cell.) After seven rotations, the required fourteen units are present and the fatty acid is released.

For this rotary assembly machine to work, all six different enzymes must be present in the right order, and the molecular arm must be properly arranged. In general, a complex machine is operable only if all vital parts are present and functioning. For example, it would be hard to imagine an automobile engine being able to run without a fuel pump or camshaft. It's hard to see, therefore, how the molecular machine described above could have come into being through any kind of step-by-step evolution.

Our third example, the action of the enzyme DNA gyrase in cellular reproduction, graphically illustrates the serious problems mechanistic theories face in attempting to explain the origins of complex behavior in cells. In a bacterium such as *E. coli*, the DNA molecule is a loop-shaped, intertwined double helix, which separates into two helices during cellular reproduction. As the upper portion of the helix uncoils, it naturally causes the lower portion to wind upon itself, or supercoil. Since the DNA is

already folded hundreds of times to fit in the cell, supercoiling invariably causes the strands to tangle. This tangling would prohibit reproduction; therefore the cell activates an enzyme, DNA gyrase, that unravels the knots in the DNA strands. The gyrase rearranges the DNA strands as follows. First it cuts one of the overlapping strands, then pulls the other strand through the opening, and finally joins the ends of the cut strand back together. By means of this highly sophisticated operation, the DNA gyrase sorts out the tangle of chromosomes (see Fig. 2).

The question for biochemists is this: How could the DNA gyrase molecule have originated? It must be much too complicated in structure to have come about in one stroke, by the random combinations of molecules in the primordial soup. Scientists might therefore suggest it underwent a process of gradual evolution, step by step. But here's the catch—without DNA gyrase, there would have been no cellular reproduction, and without cellular reproduction, there is no evolutionary process to produce the gyrase. The origin of the gyrase enzyme thus remains one of the great mysteries of cellular evolution.

The above-mentioned three examples indicate the intricate structure and operation of the cell. No one has any experience of a machine that developed without a designer's plan and specifications; therefore it's reasonable to consider the possibility that such complex arrangements came about by a preconceived design. Unfortunately, such commonsense conclusions have no place in the currently dominant theories about the evolution of life. Rather, the proponents of chemical evolution struggle to manufacture alternative explanations that refer only to blind chance and the impersonal laws of physics.

The most common scenario portrayed by chemical-evolution theorists begins more than four billion years ago, when clouds of gases and dust are believed to have condensed on the earth's ancient surface and gradually formed the primal atmosphere. Activated by ultraviolet light and electric bolts, this primitive atmosphere is supposed to have spontaneously given birth to organic chemical compounds, which then, for some 1.5 billion years, accumulated in ancient seas. These organic compounds interacted chemically and eventually formed primitive polypeptides (proteins), polynucleotides (DNA and RNA), polysaccharides (cell sugars), and lipids (fatty acids). A standard college text gives the final step: "From this rich broth of organic molecules and polymers, the primordial organic soup,

the first living organisms are believed to have arisen."²

Unquestionably a provocative and somewhat poetic description—but how well does this grand speculation hold up to even moderate scrutiny? We have already discussed the amazing complexity of even simple living systems, so any claim that blind natural forces originally organized molecules into elaborately functioning systems must explain the exact principles and step-by-step processes involved. This has not been done.

Biochemists may call upon natural selection—the process whereby the varieties of an organism most suitably adapted to a particular environment tend to reproduce and survive—as an explanation. But natural selection cannot be proposed as a mechanism to account for the origin of the first living organism. It cannot act until such a self-replicating system actually exists, because without reproduction there are no new forms for nature to select. And given a simple self-replicating system, it is not enough for scientists to wave their hands and say the magic words "natural selection" in order to explain the appearance of more complex systems. They should be able to specify what exactly would be selected and why. Without being able to do this, they do not even have a theory to be tested and investigated, what to speak of a final demonstration of the truth of such a theory.

Unfortunately, present theories fail to approach this standard. Beginning with the work of Oparin in the 1930s, many scientists have made serious attempts to account for the origin of life from a primordial chemical soup, but none have been successful. Without exception, the models proposed are vague, tentative, incomplete, and sketchily worked out. We will discuss some but not all of these attempts. The central unresolved question is this: How could inert matter, acting according to simple



Fig. 2. The enzyme DNA gyrase can tie and untie knots in a cell's DNA strands (colored tubes) by systematically breaking a strand, passing another strand through the break, and then resealing the break.



Fig. 3. The molecule palmitic acid (a fatty acid that stores energy in cells) is manufactured by a microminiature assembly line, in which the partly constructed molecule rotates past successive molecular work stations.

physical laws alone, generate the remarkable molecular machinery found in even the simplest cell? As Albert L. Lehninger states in his widely used college biochemistry textbook, "At the center of the problem is the process of the self-organization of matter."³ Yet up to now, scientists have failed to demonstrate how this could occur without the intervention of some higher directing force or intelligence.

Two especially well publicized experiments have frequently been misconstrued as being partially successful in producing life from chemicals. One is the work done with amino acids by Stanley Miller, a chemistry professor at the University of California at San Diego. The other is the "protocell experiments" of Sydney Fox, director of the Institute for Molecular and Cellular Evolution at the University of Miami in Coral Gables.

Miller sought to reconstruct conditions he believed existed at the "dawn of life" and thereby generate primitive organic forms from physical elements. Into a flask he placed gases thought to comprise the ancient atmosphere, and by passing a spark through this mixture he produced a brown, tarry substance on the walls of the container. This tarry substance included amino acids, the constituents of protein molecules.

He heralded this as a significant breakthrough and managed to impress many people, both inside and outside the scientific community. Yet Miller's experiments are actually of little, if any, significance. We would expect amino acids to form in Miller's experiment, because this technique automatically produces practically every simple organic molecule found in nature (the vast majority of which are poisonous to present-day life forms). Asked to predict the outcome of Miller's experiments, Harold Urey, a chemist at the University of California, put the whole affair into perspective when he replied, "Bielstein." (*Bielstein* is the German catalog of all known organic chemicals.) Furthermore, amino acids are relatively simple molecules, serving merely as the building blocks of the far more complex protein molecules found in cells. It's not surprising that a simple technique like Miller's produces simple chemical results, but it has yet to be demonstrated that such a simple process can produce complex cellular components and mechanisms. It's quite a step to go from unorganized building blocks to a house.

Chemist Sydney Fox also attempted to demonstrate how chemicals might progressively develop into a living cell. By heating dry amino acids to 280 degrees Fahrenheit and dropping them into water, he produced small drops of protein, which he optimistically labeled "protocells." Fox's protocells, however, were not overly impressive. Structurally, they were nothing more than hollow little globs of jelly, and they were incapable of metabolizing molecules from the

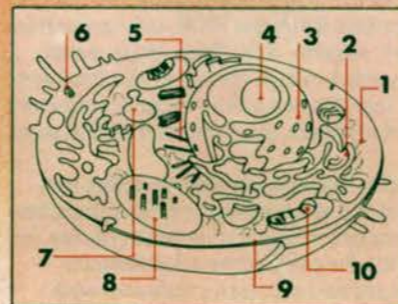
THE INTRICATE MACHINERY OF A LIVING CELL

Once thought to be a simple bag of chemicals, the cell is now understood to be an elaborate system of molecular machinery that surpasses a modern city in complexity



In Darwin's time living cells were regarded as simple bags of chemicals that could have arisen spontaneously from organic compounds. However, it is now clear that cells contain intricate biochemical machinery. The steps by which this machinery may have originated are unknown and difficult to imagine. Thus it is no longer justifiable to simply take it for granted that living cells have evolved from chemicals by physical processes. Some important structures of typical plant and animal cells are depicted in this illustration.

- (1) The ribosomes manufacture protein molecules by following blueprints encoded in messenger RNA. Although they appear here as mere dots, the ribosomes have a complex structure.
- (2) The endoplasmic reticulum consists of a



- complex of membranes that form internal compartments used in the synthesis and transport of various compounds produced by the cell.
- (3) The nucleus contains the hereditary material, DNA, which carries instructions for the operation and perpetuation of the cellular machinery. Complex molecular processes are involved in replicating the DNA.
- (4) The nucleolus is a factory for the partial manufacture of ribosomes.

- (5) The microtubules form a complex lattice work that gives form to the cell and enables it to systematically move and change shape.
- (6) Some cells possess cilia, whiplike structures that execute a swimming stroke through the action of an internal arrangement of sliding rods.
- (7) Lysosomes contain enzymes that break down unwanted material within the cell.
- (8) The chloroplasts, found in plant cells, are complex chemical factories that carry out

- photosynthesis—the storage of solar energy in the form of sugar molecules.
- (9) The cellular membrane is equipped with many complex protein molecules that regulate the passage of molecules into and out of the cell and act as sensors informing the cell of external conditions.
- (10) The mitochondria are chemical factories that generate energy for the cell through the controlled breakdown of food molecules.

environment. They showed no signs of evolving into even slightly more complex forms, what to speak of cells. On top of all this, Fox has no reasonable suggestion as to how they could have emerged from a prebiotic chemical soup. (Getting dry amino acids heated to 280 degrees in nature requires quite a bit of imagination.) There are many other experiments like this that produce similar results and leave the same questions unanswered.

RNA. With the production of these enzymes, the A-B-A-B-A-B cycle would continue. This is called a hypercycle, and Eigen proposes that the hypercycles could gradually become more and more complex until they approached the level of living cells.

There are, however, major problems with hypercycles. First, the model requires a mechanism for producing complicated proteins (in the form of enzymes) from information coded in RNA.

Eigen has not been able to suggest a workable mechanism of this kind.

Second, given a functioning hypercycle, there is no certainty it would evolve. The prominent evolutionary biologist John Maynard Smith criticized Eigen's model, pointing out that unless the hypercycle were enclosed within a compartment resembling a cell wall, its different parts would compete

“The origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going.”

—Francis Crick

with each other. This would make it impossible for the hypercycle as a whole to evolve by mutation and natural selection. And if the need for the compartment is admitted, there remains the difficult problem of accounting for the apparatus by which it could replicate itself during reproduction. Smith says, “Clearly, these papers [of Eigen and his coworkers] raise more problems than they solve.”⁴

Finally, hypercycles are much different than cells, which have a unified genetic system and complicated molecular mechanisms. To go from a hypercycle to a cell would take *thousands* of intermediate steps. It would be like going from a wind-up

clock to an internal combustion engine by small changes. Each change would have to result in an improved and functioning mechanism—a possibility that at present defies imagination. In his appeal to natural selection, Eigen does not define the exact steps that would lead from his hypercycles to living cells, and therefore his explanation amounts to no more than an unscientific wave of a magic wand.

Thus far we have seen how cells function in a remarkably organized manner and how the leading theories that attempt to describe the development of living cells from inert chemicals lack any explanatory value. At this point, we may ask why scientists persist in their attempt to find strictly mechanistic explanations. One answer is that they feel committed to their present reductionistic strategy, which is to explain everything—from galaxies to bacteria—in terms of matter acting according to basic, simple laws of physics. Rejecting the possibility of any other approach to science, they fear that to deviate even slightly from their strategy would lead to the end of science as they know it.

Being unable to provide any suitable mechanism for the formation of the cell by simple physical laws, many scientists have turned to “chance” as the ultimate causative factor. There is, however, a fundamental problem with this approach. Strictly speaking, the term *chance* refers only to the presence of certain patterns in the statistics describing the repetitions of an event: it cannot be the “cause” of anything (see “Chance and the Origin of the Universe” on page 9). As for the mathematical probability of life arising from matter, there are some easily calculated estimates of the chance of such an event occurring over the course of 4.5 billion years, the age of the earth given by modern science.

Let's begin by looking at the basic ingredient of all living organisms—proteins,

which carry out many of the vital functions of the cell. Proteins are formed in a highly complex process that can be compared to a factory assembly line, where raw materials are organized with the help of specialized machines. The elaborate protein macromolecules contain an average of 300 amino acid molecules linked in a chain, and within even the simplest *E. coli* bacteria there are approximately 2,000 different types of proteins. (In mammals there are 800 times as many.) The formation of these different protein molecules is controlled by the cell's genetic material. According to a mechanistic model, prior to the development of a self-reproducing system capable of performing the basic functions of a cell and its genetic coding, any combining of amino acids into proteins would have necessarily been due to random interaction.

To determine the probability of random interaction resulting in the proteins required for even the simplest cell, the noted British astronomer Sir Fred Hoyle and mathematician Chandra Wickramasinghe, of University College, Cardiff, Wales, calculated as follows.⁵ As already mentioned, there are 2,000 different proteins necessary for the single-celled *E. coli* bacteria, and these proteins average 300 amino-acid units in length. The function of a particular protein depends upon the sequential order of its 300 or so amino-acid units, just as the meaning of a paragraph depends on the order of its words. Since there are 20 amino-acid types to choose from, the odds of forming any particular protein sequence is 20^{300} to 1.

Scientists have pointed out that there is some latitude for variation in the exact sequence of the 300 amino acid units without disrupting the protein's performance. Therefore Hoyle and Wickramasinghe generously adjusted the 20^{300} to 1 probability to 10^{20} to 1—a tremendous reduction in the odds. Then, since the simplest cell requires

2,000 different proteins to operate, they combined these two figures (10^{20} and 2,000) and arrived at a mathematical probability of $10^{40,000}$ to 1 that random interaction could provide the necessary molecules for constructing even the simplest self-reproducing system. These odds are so incredibly great that no one could reasonably expect such an event to occur in the relatively brief few billion years that scientists allow for the phenomenon (see “Could Life Arise by Chance?” below). So much for pure chance.

Many scientists dislike this concept of chance, but they have concluded that as far as their present mechanistic understanding is concerned, it looks as though life must have originated by a “chance event” of extremely small probability. One of these is Nobel laureate Francis Crick, codiscoverer of the DNA structure, who stated, “An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going.”⁶ These scientists have of course hoped to explain the origin of life on the basis of natural laws. But as we have seen, they have been unable to do so. Thus stymied, some of these scientists have turned to extremely radical hypotheses (but of course not so radical as the concept of a designer).

For example, Crick himself has proposed that the genetic code may have been carried to earth by intelligent life from another planetary system. This concept could account for life on earth, but we are then left to explain how life developed elsewhere.

So although vast numbers of people believe that science has substantial evidence “proving” the idea that the first living entities were produced from the random interaction of chemicals in the earth's distant past, it is clear that there exists no viable

theory of the chemical origin of life. Furthermore, the mathematical theory of probability does not allow us to use the convenient explanation “It happened by chance.”

Therefore, because there is nothing even approaching a mechanistic explanation for the high information content of living systems, we propose that living organisms can't be explained in mechanistic terms. In

It is clear that there is no viable theory of the chemical origin of life.

“The Mystery of Consciousness,” we discussed an irreducible, nonmechanistic aspect of reality, namely consciousness. Now we have another irreducible aspect of reality that cannot be accounted for by mechanistic science—namely, the complex forms of living organisms. We propose that a superconscious intelligence is responsible for both of these phenomena. It is the original source of the conscious entities within physical organisms and provides the information for the arrangement of matter into the biological structures that serve as vehicles for those conscious entities. The nature of this higher intelligence will be more elaborately discussed in the final article in this magazine, “Higher Dimensional Science.”

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COULD LIFE ARISE BY CHANCE?



HANS OLSSON

To give some idea of what exactly is involved in supposing that life could have emerged by random combination of chemicals in a primordial soup, let us imagine that this soup covered the entire surface of the earth to a depth of one mile. We shall divide this volume into tiny cubes measuring one angstrom unit on each side. (An angstrom unit is about the size of a single hydrogen atom.) Let's also assume that the soup is extremely concentrated, so that reactions are taking place within each of the cubes within the soup.

Now, in the expectation of obtaining the simplest possible self-reproducing organism, let the reactions take place a billion times per second in each cube. And let's further assume that the reactions have been going on for 4.5 billion years, the estimated age of the earth.

As we have seen in the accompanying ar-

ticle, scientists Fred Hoyle and Chandra Wickramasinghe have estimated that the chance of obtaining the simplest self-reproducing system by random combination of molecules is at best somewhere in the neighborhood of 1 in $10^{40,000}$ attempts. But if out of extreme generosity we reduce the required number of proteins from 2,000 to only 100, then the probability is still 1 in $10^{2,000}$.

Now, if you add up all the possible attempted billion-per-second combinations in our hypothetical primordial soup, you wind up with only 10^{24} throws of the chemical dice. That means the odds of getting the required self-reproducing system out of our soup would be 1 in $10^{1,926}$. We wouldn't expect that to happen in the entire course of the earth's history!

Of course, a diehard gambler might say it's highly unlikely but it *just could happen*

by chance. But this is a completely meaningless use of the word *chance*. In order for a statement about an event with a nonzero probability of happening to be meaningful, we would have to observe enough repetitions of the event to establish a statistical pattern. Only this would allow us to say, “This event has probability *p* of happening.”

For example, we say that when we toss a coin there is one chance in two that it will turn up heads. This probability is established by examining the behavior of the coin over several hundred trials. Now, if you have an event with a probability of one in a million, it would take hundreds of millions of trials to establish this. And if the event has an estimated probability of 1 in $10^{2,000}$, you would need many times that number of trials. The basic point is this: What is meant by a probability of 1 out of $10^{2,000}$ is that a certain statistical pattern corresponding to

this figure will be observed over the required vast number of trials. If there is no possibility of performing these trials (as is certainly the case here), then there is no meaning to saying an event happens with that very small probability.

On this planet, as we have seen, you can only have a maximum of 10^{24} trials. Now, we can be extremely generous and grant the chemical evolutionists that the trials can be taking place in primordial soups on as many planets as there are atoms in the entire universe—about 10^{80} . Then you get a grand total of 10^{104} trials—still an infinitesimal number compared to $10^{2,000}$. The conclusion is simple. It's meaningless to talk about the origin of life in terms of chance. To say it happened by chance is just the same as saying it happened, and we already know that. In that case, all we can say is that life is a unique event.

A NEW LOOK AT EVOLUTION

Will something more than physical principles be needed to account for the origin of species?

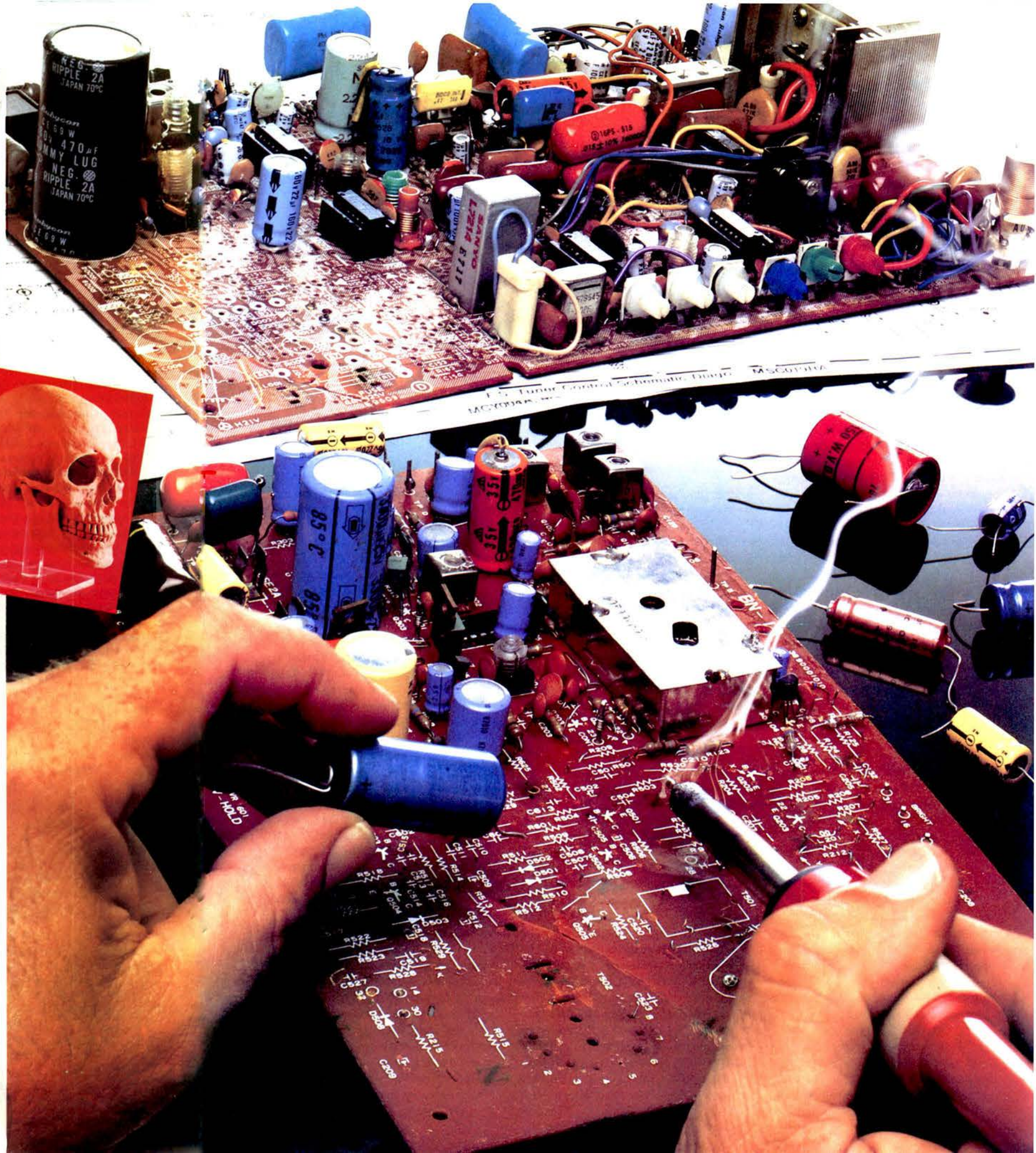


Today a great many people accept without question the idea that man arose from lower species by the process of evolution. If one suggests otherwise, he runs the risk of being labeled hopelessly ignorant of the realities of life on earth.

Darwin is credited with first proposing a plausible physical mechanism that would explain the variety of life forms we observe in the world around us. Evolution, as he explained it, is based on the twin principles of variation and natural selection. When members of a species reproduce, he reasoned, there is variation among individual representatives of the species. Some of these are better equipped to survive in their particular environment, and therefore their qualities are selected and passed on to their descendants. Over the passage of time, these changes in organisms are sufficient, according to evolutionary theory, to result in changes of species.

Since Darwin's time, the concept of variation has undergone some changes. Modern evolutionists believe that mutations in genes produce the variations that natural forces select for survival. (Darwin did not know about genetics.) Evolutionists have considered a number of types of genetic variations—point

The bodies of organisms are complex systems of interacting parts. To change one species into another is not just a simple matter of gradual remodeling, as a sculptor might remodel these clay skulls. Rather, it is likely to involve many distinct, coordinated steps, as we see when confronted with the task of changing one electrical circuit into another. This creates doubts about the possibility of evolution by gradual transformation.



mutation, genetic recombination, and random genetic drift, for example—but these all fall under the broad heading of random variation. And to this day the only principle accepted as giving direction to the evolutionary process is natural selection. So Darwin's basic principles of random variation and natural selection are still the foundations of evolutionary thought.

Today's evolutionists would still agree

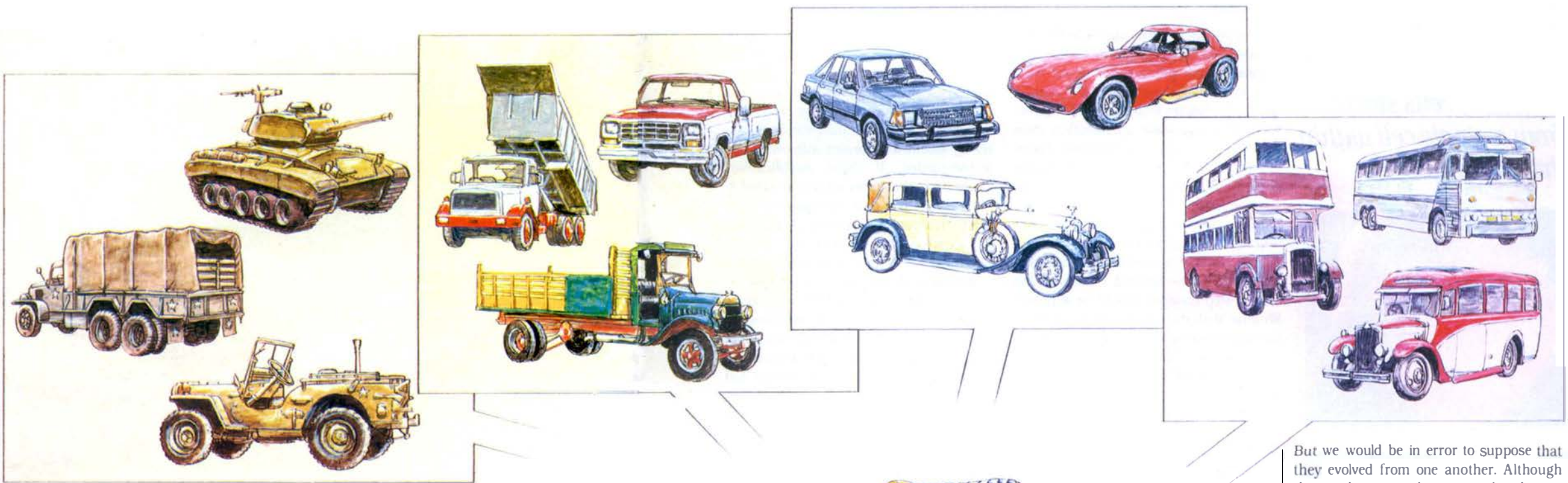
There are no valid grounds for insisting that evolution is the only explanation for the variety of living forms.

with the following statements of Darwin: "I can see no difficulty in a race of bears being rendered, by natural selection, more and more aquatic in their habits, with larger and larger mouths, till a creature was produced as monstrous as a whale."¹ And, "... what special difficulty is there in believing that it might profit the modified descendants of the penguin, first to become enabled to flap along the surface of the sea like the logger-headed duck, and ultimately to rise from its surface and glide through the air?"²

This may sound reasonable to some—that over millions of years bears turn into whales. But is that what actually happened? And even more important, is there any real scientific reason to suppose that it could happen that way at all, even in theory? An objective review of the facts suggests to some observers that the answer to both questions is definitely no. At this time, as we shall show, there are no valid grounds for insisting that evolution is the only possible explanation for the variety of living forms we see today.

Many people think that the only alternative to Darwinian evolution would be some form of Biblical creationism. There are, however, many alternatives, including concepts of a universal designing intelligence other than the one advocated by fundamentalist Christians and concepts of evolution other than the one advocated by Darwin.

Yet the great majority of scientists stand ready to defend evolution against any alternative concept. They widely propagate the slogan "evolution is a not a theory but a fact." This statement implies they have gone beyond the level of theory, when in fact they have hardly reached the level of genuine theory in their discussion of evolution.



Indeed, the theory of evolution as it now stands does not actually explain—in the rigorous scientific sense of the word *explanation*—how one species transforms into another.

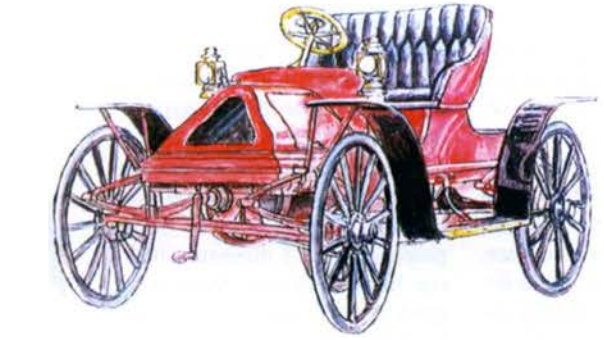
When scientists speak of evolution, they mean that all the species we see around us today have descended generation by generation from a primordial single-celled organism. All the variations in different life forms are supposed to have come about by evolutionary processes governed by the laws of physics as they apply in biology and chemistry. Darwinian evolution thus relies upon the all-encompassing basic strategy of modern science: material reductionism. In this case, life is reduced to chemistry, and chemistry is in turn reduced to physics. These natural laws are deemed sufficient to explain evolution, and all available evidence is said to confirm that evolution did in fact occur as described above. This of course excludes intelligent design in any form.

In their presentations to the public, evolutionists are quick to wrap themselves in the mantle of scientific objectivity and reason. They claim to be just examining the facts as they present themselves, and if the facts indicate conclusions different from the ones they currently hold, they profess to be quite prepared to change their theories. But they decline to do so because they see "overwhelming" evidence in their favor. As paleontologist Niles Eldredge, a major spokesman of evolutionary thought, says, "Evolution is a fact as much as the idea that the earth is shaped like a ball."³ But let's see

if the evidence really is so overwhelming that evolution is a fact in the same way that the earth is round is a fact.

In this day and age it is fair to say that a great many people who are well off financially are in a position to obtain direct evidence of the fact that the earth is round. You can go to your local travel agent, purchase a round-the-world airline ticket, and see what happens. Say you start out in Los Angeles and fly west across the Pacific, continuing on across Asia and Europe. Eventually you'll arrive at the eastern coast of North America, and in five or six hours you arrive back in Los Angeles. With that experience, it is not unreasonable for you to conclude that the earth is a globe. Also, armed with your idea that the earth is a globe, you can explain quite a number of things—why the sun rises at different times at different longitudes, the progression of the seasons, and so forth. These predictions are not vague. You can calculate the exact time for sunrises and sunsets at different points on the globe for months and years in advance.

Such direct verification does not exist in the case of evolution. Of course, if you had some sort of time machine by which you could go back hundreds of millions of years and then photograph a certain kind of reptile called therapsids and then with time-lapse photography follow them around as they gradually changed into mammals, primates, and finally man, then that would be pretty solid evidence of evolution. Or else if you could look at an animal today and predict what it would be likely to evolve to in a million years, and then go ahead into the fu-



The hypothesis of evolution by physical processes predicts that species can be classified in a hierarchy of forms, but such hierarchies may also arise through the action of intelligence.

ture in your time machine and track the development of the species to see if it matches up with evolutionary predictions, that would be some substantial evidence. Of course, after seeing so many full-color paintings of evolution in textbooks, many people might think the scientists do have such time machines. Actually the physical evidence of the past is quite fragmentary, and therefore the scientists rely mainly upon theoretical speculation. Thus in absence of solid confirmation we should remain open to examining a number of different theories. At this point evolution does not have an exclusive claim to being the sole explanation of the variety of species.

Not only is there a startling lack of observational evidence confirming the theory of evolution, but the theory itself is not

soundly formulated enough to warrant any attempt at confirmation. A major feature of a valid scientific theory is that it offers accurate predictions: so from the theoretical basis of evolution one should be able to deduce certain things about the observable world. What do the evolutionists predict? The prominent evolutionist Niles Eldredge, in attempting to answer this challenge, came up with two predictions: there should be a hierarchy of biological forms and a sequence of fossils arranged in an ascending order of development in the strata of the earth.⁴

It's understandable evolutionists would like their theory to predict hierarchies of forms, because we all know they exist. But a hypothesis involving design would predict the same thing. For example, in creating an essay, an author often begins by writing an outline of ideas arranged in hierarchical order. Hierarchies are a natural product of the mind. In vehicles designed by engineers we can also see a hierarchy of mechanical forms: automobiles of various sorts, trucks, tanks, boats, submarines, airplanes, etc.

But we would be in error to suppose that they evolved from one another. Although the machines can be arranged in hierarchies, they are all separately designed and manufactured. So hierarchies of form are not proof that one form evolved from another by physical reproductive processes. They could just as well be accepted as proof of a designing intelligence.

Evolutionists also predict a sequence of fossils. But does their theory really predict (in advance) the actual sequence, or does it merely come after the fact? Imagine a hypothetical evolutionist from another planet arriving on earth during the Precambrian epoch, a time when it is supposed only some primeval algae and bacteria existed. Could he have predicted in advance that variation and natural selection would go on to produce spiders and oysters? Why not just more and better algae and bacteria? Evolutionary theory can offer no reason why if life started with a single cell we now have elephants and mosquitos. Scientists can only point to the species now existing and claim "they evolved." They cannot predict any specific organism or class of organisms. They might say that their theory does support a broad trend from simple organisms to ones more complex, but this claim is excessively vague and does not exclude other possible explanations.

Nevertheless, in all their writings and speeches evolutionists insist that evolution did take place and that it did so solely by natural physical laws. They feel to admit other causes—such as a designing intelligence—is unscientific. But the explanations they propose in terms of natural laws are themselves unscientific because no one has yet constructed models showing

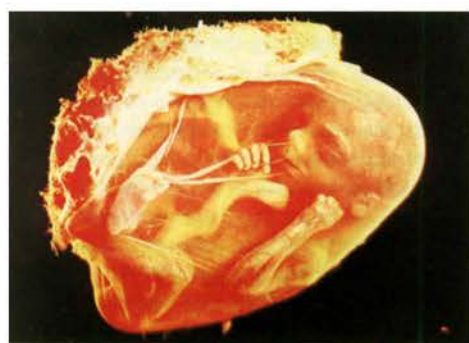
A human body containing hundreds of billions of cells starts from a single cell within the womb.



C. EDELLMAN / BLACK STAR PUB CO.



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If we could understand in detail how genetic instructions guide embryonic development, then we might be able to say what genetic changes would be needed to change one species into another. But in the absence of this knowledge we can only speculate.

even approximately the stages in the progressive evolution of organisms. They have discovered that physical bodies are complex molecular machines and maintain that these complex molecular machines develop by progressive modification from other complex molecular machines. Therefore they should be able to provide models showing how the transformations take place, in detail.

In what way, for example, did certain eels develop the capacity for delivering powerful electric shocks? A mere wave of the hand will not suffice—detailed models of the step-by-step changes should be supplied. Without such models the theory of evolution remains a vague idea outside the realm of true science. If evolutionists say that this is too great a task, then they should give up their claim that they know and have proved that organisms descend from other organisms by modification. They should simply say that they don't yet know or understand why we have the types of living beings now existing.

A scientific evolutionary model should take genetics into account by showing in a systematic step-by-step way how genes determine physical forms of organisms. For example, a human body containing hundreds of billions of cells organized into such complex structures as the brain starts from a single cell in the womb. How, therefore, does the genetic information within the fertilized human egg guide this complex development? At present there are ongoing, but unsuccessful, attempts to come up with mathematical models to explain the process, which remains one of the most significant unsolved problems of modern science.

If a satisfactory model is ever developed, it might then be possible to develop rigorous scientific explanations for the transformation of one species into another. For example, scientists say that by genetic mutations, prehistoric fish transformed into amphibians. But if they don't even know how you get the form of the fish from its own genetic material, anything they say about the fish form changing into an amphibian form is bound to be highly speculative—practically speaking, an imagination.

To put the theory of evolution on firm ground, mathematical models of how genes translate into physical form are absolutely essential. Without such models there are only vague handwaving stories about evolution. These stories can't provide any firm, testable predictions, and when they are applied after the fact to observations, they are so flexible that they can be adapted to any set of data imaginable. In contrast, a mathematical model gives definite predic-

tions that can be compared with evidence and thus be proved or disproved.

If such models did exist, it might be possible to use sufficiently powerful computers to determine what might happen when a specific set of genetic information is randomly modified in concert with certain selective rules. If these modifications predicted in the model actually resulted in physical changes that corresponded to observed relationships among species, then we could say that evolution had actually been raised to the level of a science.

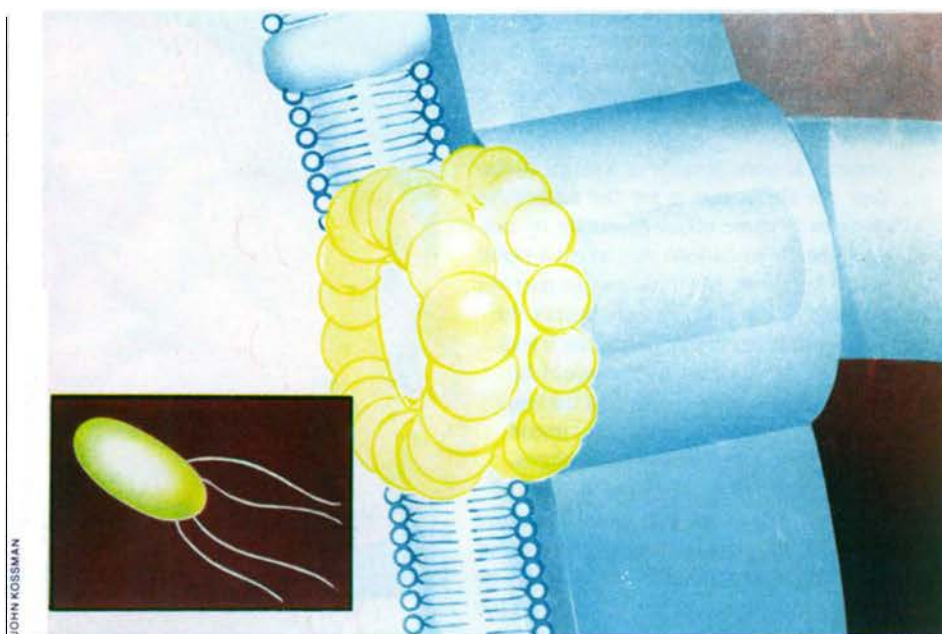
But this is not the case. As of yet there exist no models making definite predictions about evolution. In fact, the evolutionists are not at all certain about what they would like to predict. Contradictions abound. On one hand the student of evolution can find statements that the outcome of the process of evolution is completely a matter of chance. And on the other hand, there are statements saying the outcome is quite determined by physical processes involving natural selection. In human evolution, some authorities assert that the evolution of manlike beings is highly probable and would be likely to happen on any suitable planet in the universe. For instance, Dale Russell and Ron Sequin of Canada's National Museum of Natural Science have proposed that if dinosaurs had not become extinct, there is a good chance that they would have evolved into humanoid reptilian forms by now.⁵

Then there are those who assert that the appearance of human beings on earth is a chance occurrence. According to this view, at the beginning of the evolutionary process there would be no certainty that humanlike creatures would develop. Theodosius Dobzhansky, a leading evolutionary theorist, poses this question: imagine a highly competent biologist living 50–60 million years ago in the geological epoch called the Eocene. Could he have predicted that man would evolve from the primitive primates then in existence? Not very likely according to Dobzhansky, who says, "Man has at least 100,000 genes, and perhaps half of them (or more) have changed at least once since the Eocene. The probability is, to all intents and purposes, zero that the same 50,000 genes will change in the same ways and will be selected again in the same sequence as they were in man's

evolutionary history."⁶

So here we have two completely contradictory viewpoints about evolution. They both cannot be right. One says evolution is determined; the other says it proceeds in a way that can never be duplicated. Therefore it would seem that evolutionary theory does not provide a very consistent framework for deciding even the most basic questions.

Another example of how the theory of evolution fails to predict specific results is found in the writings of prominent Neo-Darwinian evolutionary theorist John Maynard Smith. "Suppose," he writes, "that at a time 200 million years ago, during the age of reptiles, some event had occurred which doubled the rate of gene mutation in all existing organisms; we must suppose that for some reason the rates did not fall back to their original levels. What would have been the consequences? Would the extinction of the dinosaurs, the origin of mammals, of



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monkeys, and of man have taken place sooner, so that roughly the present state was reached in only 100 million years? Or would the rate of evolution have stayed much the same? Might it even have been slower? The short answer is that we do not know."⁷

To appreciate the significance of the above statement, let's consider the science of ballistics. If on the basis of ballistics an artillery officer could not tell his commanders what would happen if he doubled the amount of explosive used to fire the shells, then we would have to conclude that that sort of ballistics doesn't deserve to be called a science. By the same logic, the cur-

Some scientists predict that if dinosaurs hadn't become extinct, some might have evolved into a humanoid like this one. Others say that beings of the human type have always had a nearly zero probability of evolving.

The propulsive motor of the *E. coli* bacterium is built of several interacting components. Starting with a motorless ancestral cell, how can the motor be built up by gradual steps, each of benefit to the organism?

rent theories of evolution definitely have their shortcomings, as theories go. In fact, we would have to say it is not so much a question of whether or not a particular theory of evolution is correct, but whether there exists a theory at all.

A Cellular Motor

The difficulties facing a theory of evolution can be more clearly seen when we consider a concrete example such as the cellular motors in the *E. coli* bacterium.⁸ This one-celled creature possesses flagella (corkscrew-shaped fibers) powered by rotary motors built into its cell wall. The turning of the flagella propels the *E. coli* through the water just like a ship's propeller, and by operating these motors in forward and reverse direction the bacterium can guide itself to its desired destination.

Now suppose we imagine a bacterium without this apparatus. The question is this: by what evolutionary steps could we arrive at a bacterium with the cellular motors? What is the sequence of intermediate stages? The requirement is that each stage would have to confer some definite advantage to the bacterium over the previous stage. Otherwise, the changes cannot be attributed to natural selection, which is said to govern the process of evolution.

It has been determined that 20 genes govern the structure of the motors. That means the development could not take



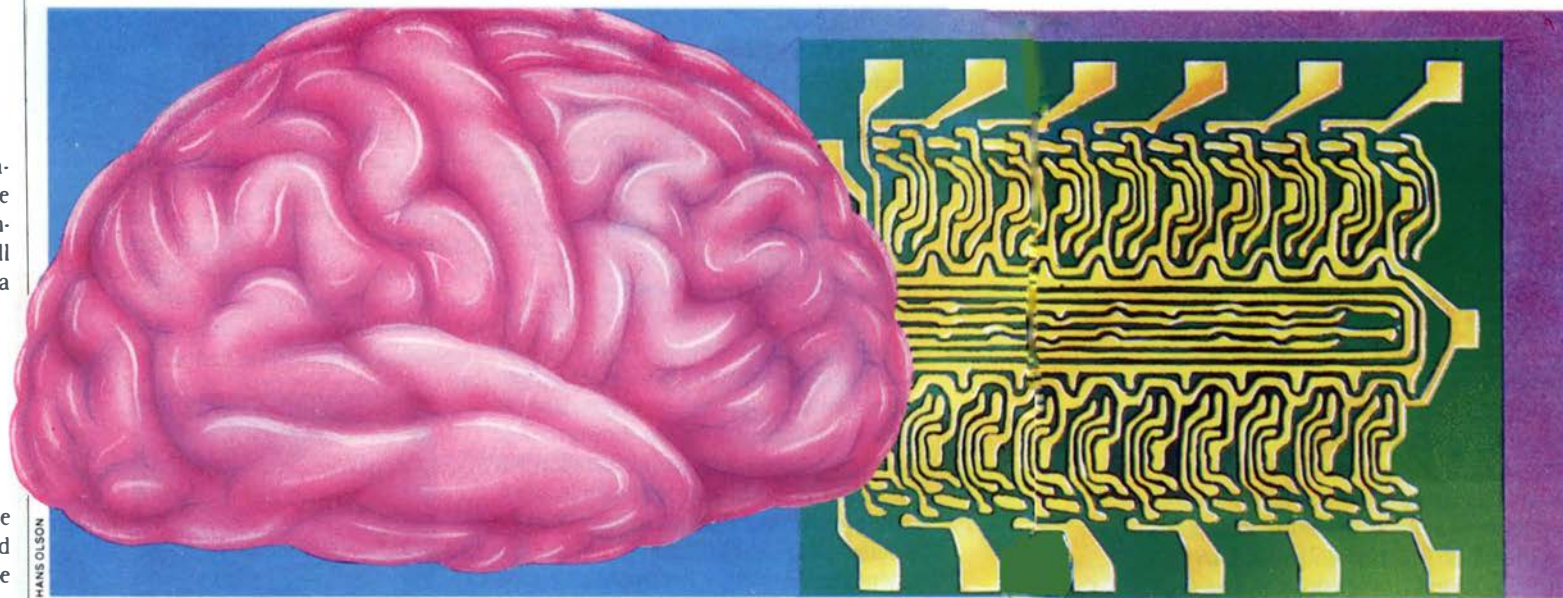
Some evolutionists have suggested that prolongation of growth will suffice to convert an ape brain into a human brain. But this overlooks the complex changes in neural interconnections that are almost certainly required.

place all at once because of a single mutation. An alternative is for the successive changes to come about gradually by random genetic mutations that affect a small number of genes. But if you just get part of a motor, how can that possibly benefit the organism? It would probably make it less likely to survive because it would be wasting its energy to produce a useless structure. Natural selection would therefore tend to prevent such changes.

Suppose then that one cell finally did somehow get a workable motor structure but didn't have the sensory system needed to control the motor. Then it wouldn't be able to properly use the motor, and thus the motor would be of no value. On the other hand, the sensory apparatus would be useless without the motor. What this means is that the sensory apparatus and the motors should develop simultaneously, which complicates the whole matter greatly.

In essence, the problem is this: the motor clearly involves a great number of interacting components, and for the entire motor to work, all the components have to be present together and assembled in the right way. It is very hard to imagine how you could produce such a complex mechanism unless you were suddenly able to bring together all of the components. Modern evolutionary

The working of the shrimp's statocyst (organ of balance) depends on a tiny weight that the shrimp inserts with its claws. By what gradual steps, each beneficial to the organism, did this arrangement evolve?



theorists have no adequate explanation. But an intelligent designer would be able to do this, because the mind can go from an idea to a working design by a process of reasoning in which the intermediate stages do not have to survive in some natural environment. If a designer wanted to build a molecular motor, he could think about it and come up with a plan, slowly or quickly. It is possible to envision that, but it is difficult to imagine it could happen by a blind natural process.

The *E. coli* motor example is by no means unique. There are innumerable other instances of complex form ranging from sophisticated molecular machinery in cells (as described in the previous article) to remarkably developed organ systems in higher species of life. The problem of the origin of such structures is universal and re-

mains unsolved by evolutionary theorists. In fact, since most of the structures in higher organisms are far more complex than the simple example from *E. coli* we have just considered, we anticipate that an honest attempt to explain their origin will involve correspondingly greater difficulties.

The recently developed science of molecular biology has made the task of the evolutionary theorist much more difficult. Followers of classical Darwinian theory customarily think of evolution in terms of what we might call plastic deformation. They tend to envision an organism as a plastic model and, for example, imagine one could gradually deform the plastic shape of a monkey until it by stages came to take on the appearance of a man. Most people still see evolution in this simplistic way.

But organisms are not plastic models. Physical bodies are extremely complex molecular machines, the workings of which are far more complicated than any machine of human manufacture. So it is practically impossible to see how you can change one machine into another type of machine by a process of plastic deformation. You can do body work on a car and change its shape somewhat, but if you want to rearrange the insides, that is an entirely different story. A

The human brain may be bigger than the ape's, but the real difference is the more complicated programming it is able to run.

new kind of engine, for example, is likely to require a whole new set of parts with a whole new set of interrelationships, and these cannot be produced by gradual continuous deformation of the parts of the original motor. If you start pulling wires and stretching metal in the motor and driveshaft, the machine is likely to break down entirely.

Some evolutionists have suggested that the characteristics that distinguish human beings from apes can be accounted for simply by an increase in brain size. This is another case of plastic deformation in operation—it sounds so simple, just like blowing up a balloon. But neurological studies of the brain have shown that it is not

just a lump of flexible gray matter—it is composed of billions of neurons linked together in complex circuits.

So to go from an ape brain to a human brain is not as easy as blowing up a balloon. It would mean increasing the number of neurons and rewiring them so as to enable the brain to generate such complex human functions as speech. A human child, at a very early age, is able to spontaneously assimilate the symbolic structures and communication processes of a spoken language. Apes can't do this. This has led experts in linguistics, such as Naom Chomsky, to posit that the brain has a kind of grammatical software programmed into it.

Carrying the computer analogy a little bit further, we can understand that doubling the size of a computer memory and giving it a 16-bit processor instead of an 8-bit processor is not enough to increase its usefulness to the user. What's really required is new and more advanced software, programs that will let the user take advantage of the extra capacity. The same is true of the human brain—it may be bigger than the ape's, but the real difference is the more complicated programming it is able to run. The big question is how the new programs come into being. One thing is certain: it is difficult to add radically new capacities to a program by gradually modifying it in the hope that by gradual small changes it will improve. It is more reasonable and logical to suppose that a process of designing and engineering a completely new system of software is what's really involved.

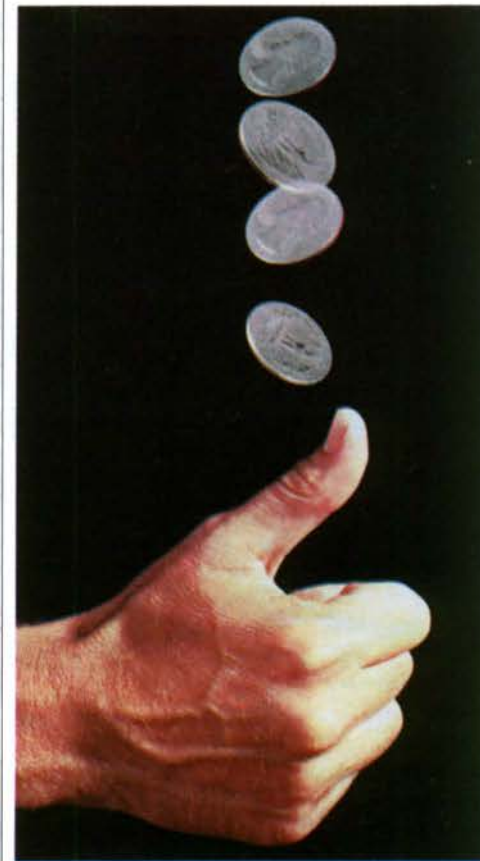
Another example of the difficulties facing evolutionary theory may be found in the statocyst of a certain species of shrimp.⁹ The statocyst is a small, hollow, fluid-filled organ that helps the shrimp balance itself. Amazingly, its function depends upon the shrimp inserting a grain of sand into it through a tiny opening. By means of the pressure the grain exerts upon the sensitive hairs lining the inner walls of the statocyst, the shrimp can tell up from down. It is extremely difficult to imagine any series of gradual intermediate steps that might have led to the statocyst and the behavior associated with it.

At this point, when it becomes clear that a physical explanation of the origin of complex structures is out of reach, some scientists try to save the theory of evolution by appealing to blind chance. Although we have discussed this topic before in this magazine, the appeal to chance is so common in science that we feel it important to again dispel some of the misconceptions associ-

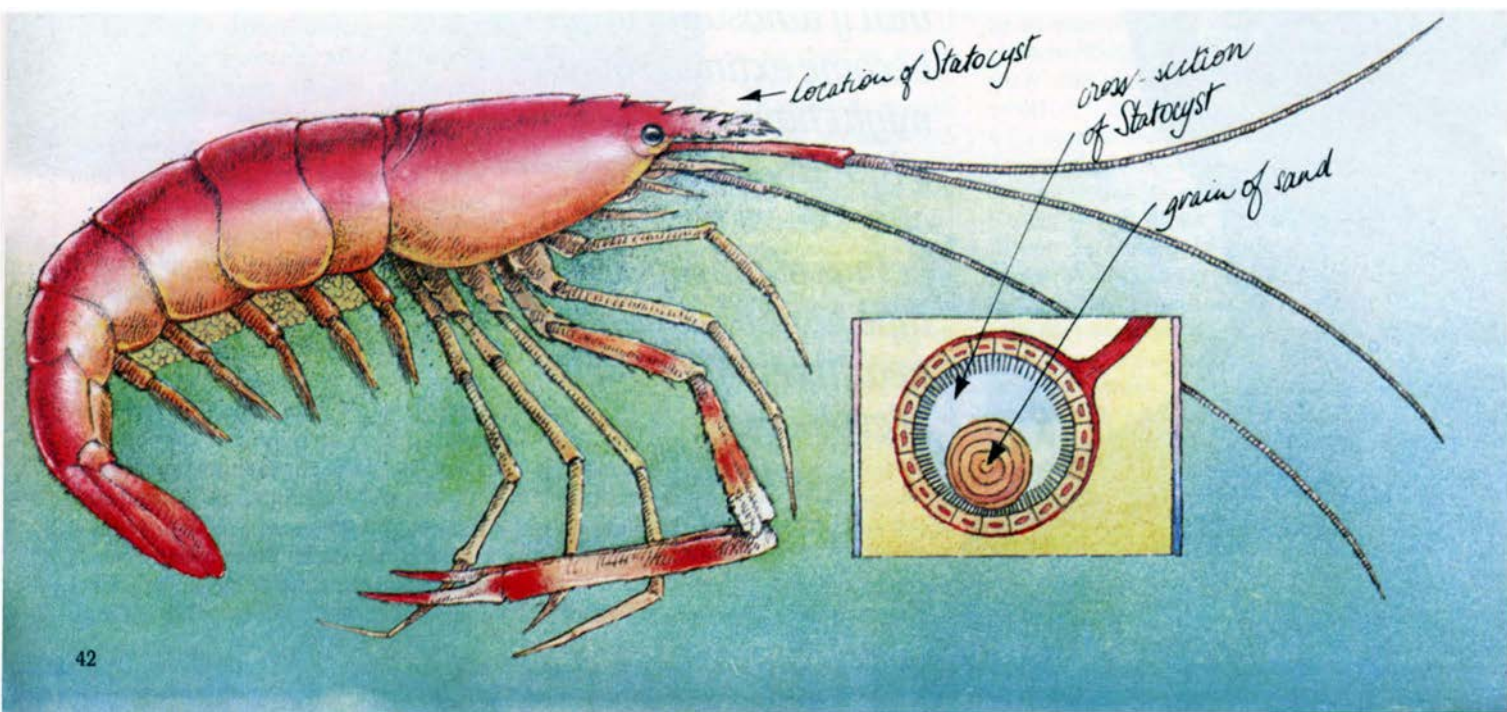
ated with it. Scientists making this appeal propose that somehow or other, everything comes together in just the right way by chance. But this involves a serious misconception. Chance is only meaningful when you can repeat an event and observe statistical patterns in the results.

For example, imagine you were the first person to ever flip a coin. If you could flip it only once, you really couldn't draw any conclusions about the chances of heads coming up rather than tails. Even if you flipped it five times, a pattern might not emerge—it might come up heads all five times. But if you flip it several hundred times, you are justified in making probability statements about the event.

Now how does all this relate to evolution? It is clear that the origin of a species is not something that can be repeatedly observed. Yet, as we have previously noted, the evolutionary theorist Theodosius Dobzhansky has stated that there is almost zero chance of human evolution being repeated. In general, when evolutionary theorists evoke chance they are talking about probabilities so small that you would not



We can apply the idea of chance to tosses of a coin since large numbers of tosses are possible. But when applied to unrepeatable events such as the origin of man, the word "chance" loses all meaning.



expect events with such probabilities to occur even once in the course of a span of time billions of times longer than the accepted age of the universe. (See "Could Life Arise by Chance?", p. 34.)

So in considering evolutionary events that are likely to occur only once in hundreds of billions (or even trillions) of attempts, it becomes useless to speak of them in terms of chance. It would be meaningful if you could repeat the events many hundreds of billions of times, but we are dealing with events that historically are supposed to have occurred but once. Therefore, if scientists can offer no acceptable physical explanation of the origin of the complex physical structures of an organism, then these structures become simply "unique events." We cannot say anything certain about their origin. All we can say is that they exist.

Some evolutionists have already been forced to draw similar conclusions. George Gaylord Simpson, one of the deans of modern evolutionary theory, says in his book *This View of Life*: "The factors that have determined the appearance of man have been so extremely special, so very long continued, so incredibly intricate that I have been able hardly to hint at them here. Indeed,

they are far from all being known, and everything we learn seems to make them even more appallingly unique."¹⁰

Does Evidence Support Design Model?

At this point, it is safe to say that the laws of physics do not fully account for evolution as it is currently being put forward. Yet the idea of evolution is so thoroughly embedded in people's minds that it is difficult for them to objectively consider alternative explanations. Oftentimes, it's a case of the theory determining how evidence is seen rather than vice versa.

Here are some common examples of evidence that people uncritically assume support the idea of evolution: the fact that creatures of different species have similar bodily parts; the fact that creatures of similar structure have similar genetic content; the fact that some creatures have what appear to be vestiges of organs or structures that were more fully developed or useful in their presumed ancestors; the fact that plant and animal breeders have been able to modify species to some extent; and the fact that the observed features of organisms sometimes appear to contradict what would be expected of an intelligent creator. But the lines of reasoning leading from

The embryonic teeth of the baleen whale are sometimes cited as a fatal objection to the hypothesis of design. Yet an economical design, generating many species from a common plan, might be expected to possess such features.

these evidences to the exclusive conclusion of evolution are weak, and it's quite possible that other explanations may better fit the facts.

Similar body parts in different species might suggest to some a common ancestry, but an intelligent creator might also use similar parts in constructing unique physical forms. In fact, that would be more efficient than designing completely new parts for each species. When human engineers build a new model of jet aircraft, they make use of structures already designed and tested in previous aircraft. So why should a superintelligent designer of organisms work in a less efficient way?

In recent years, geneticists have discovered that in species of similar form the DNA and other proteins have similar molecular structures. So just as evolutionists have deduced ancestral relationships among species from similarities in physical form, some of them now deduce such relationships from the genetic similarities. It is not, however, very surprising that similar species would have similar genetic materials. But the main point is that such similarities show nothing definite about how the organisms originated and cannot be used as proof of Darwinian-style evolution. If an intelligent designer had produced varieties of organisms with certain structural similarities, we would also expect to see parallel molecular relationships. In one of his recent books, prominent astrophysicist Sir Fred Hoyle reproduced a chart purporting to show evolutionary relationships among

species based upon molecular studies. He observed, "One should not be deceived, however, by the elegance of this result into thinking that [the chart] proves the existence of an evolutionary tree. What it shows is that if a tree existed, then it was like this."¹¹

It can be reasonably argued that vestigial organs may be the result of design rather than evolution. The embryo of the baleen whale, for example, is said to possess what appear to be vestigial teeth. In the process of embryonic development, these are reabsorbed and replaced in the adult form by baleen (long, fringed structures in the mouth of the whale used to strain tiny organisms from seawater for food). Evolutionists take the vestigial teeth as evidence that the baleen whale evolved from a whale species that had teeth.

But there is another possible explanation. Let us suppose that an intelligent creator wanted to design a large number of whalelike forms in the most efficient way. He might start with genetic coding for a basic body plan that included teeth. When he arrived at the plan for the body of the baleen whale, he could alter the genes to suppress the growth of teeth and add genetic information to cause the growth of the baleen strainers. In this version, you would also expect to see embryonic teeth. Altogether the design hypothesis is as reasonable as the evolutionary hypothesis, and perhaps even more so, because the evolutionists have no step-by-step explanation for the origin of baleen. They can only assert that it happened by a kind of evolutionary magic. Despite all this they reject outright any argument in favor of design, a possibility they refuse to consider because it violates their unproven belief that everything in the universe can be explained by unaided physical laws and processes.

Ever since the time of Darwin, the changes resulting from breeding have been put forward as evidence for evolution. If man can produce limited changes in plants and animals over a few generations, then just imagine the possibilities of change over the course of millions of years. So goes the reasoning.

But evolution by natural selection and inducing changes in plants and animals by breeding are not at all comparable. In breeding there is a deliberate intent to obtain specific results—a bigger apple, a cow that produces more milk—but in the pro-

cess of natural selection there is no intelligent directing plan. And in the absence of such a plan how do you get the results? How do we know for sure that natural selection will actually channel a process of evolution in a direction of progressive change toward more highly developed species? It could just as well tend to simplify bodily plans as

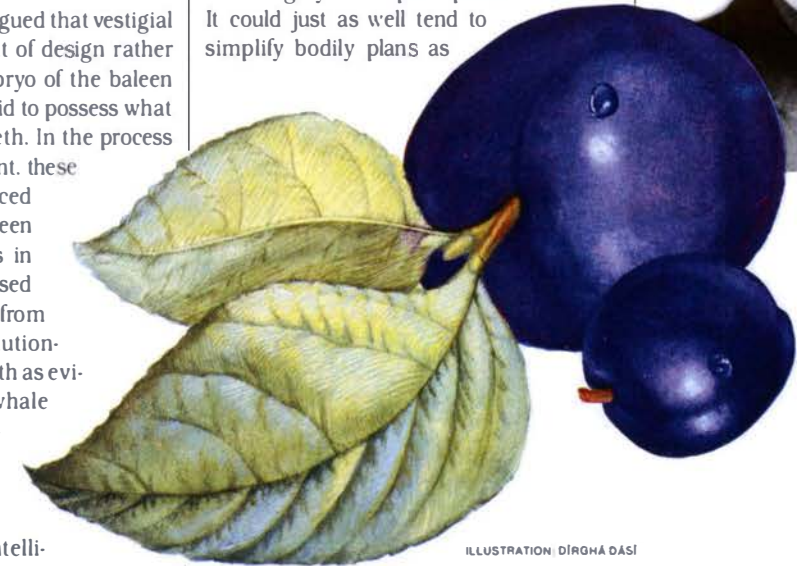


ILLUSTRATION: DIRGHA DASI



The plant breeder Luther Burbank pointed out that there are natural limits to the degree that an organism can be modified by breeding. This casts doubt on the standard view that the kind of changes achieved by breeding can, in nature, produce all species.

much as possible, because that would be more economical and thus of greater benefit to the organism. At present, however, we have no way of knowing which direction natural selection will favor—other than assertions by evolutionists. Everything they say about natural selection comes after the fact. Why do elephants have such big ears? Because it gave them a selective advantage, they say. What's the next step for the elephants? They can't even give a hint.

It may be admitted that natural selection will eliminate individuals of a species that are unfit to survive, but there is no proof that the dying off of the unfit will result in the whole species gradually changing into another one. And even if species did transform, how do we know that natural selection would not inevitably lead to species that are energy efficient—slow and low to the ground with big, thick shells like turtles? Natural selection is supposed to select traits that are the best for survival, but can any evolutionist specify just what is advantageous for survival? Why hasn't radio evolved in amphibious descendants of electric eels? They certainly would have the basic equipment for it, and it seems like it would confer a lot of advantages.

Also, all available evidence shows that there are limits to the changes that can be brought about by breeding. The noted American botanist Luther Burbank stated, "I know from experience that I can develop a plum half an inch long or one two-and-a-half inches long, with every possible length

in between, but I am willing to admit that it is hopeless to try to get a plum the size of a small pea, or one as big as a grapefruit. I have roses that bloom pretty steadily for six months of the year, but I have none that will bloom twelve, and I will not have. In short, there are limits to the development possible."¹² This hard fact about breeding doesn't bode any good for evolution, because if there are built in limits to how far you can change a species there is no possibility that you could get evolution of new species.

The process of breeding is something like stretching a rubber band. It stretches only so far—and then it either breaks or snaps back. For example, during the nineteenth century, domesticated rabbits were brought into Australia, where there were no native rabbits. When some of these domesticated rabbits escaped, they bred freely among themselves, and very quickly their descendants reverted to the original, wild type.¹³

Ernst Mayr of Harvard, one of the most prominent advocates of evolution, met with the same problem in his own experiments with fruit flies. He tried to decrease and increase the bristles on the bodies of the flies. The average is 36, and he got them up to 56, but at that point the flies began to die out. He also bred them down to 25 bristles, but after he allowed them to return to unselective breeding they were back to average within five years.¹⁴ These results reveal a major antievolutionary characteristic of



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“To suppose that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light . . . could have been formed by natural selection, seems, I freely confess, absurd in the highest degree.”

—Charles Darwin

designer. Yet many evolutionists feel that the particular way organisms are structured rules out such an intelligent designer. Harvard paleontologist Stephen J. Gould writes, “Odd arrangements and funny solutions are the proof of evolution—paths that a sensible God would never tread.”¹⁷ As an example, he cites the Panda’s thumb. The Panda bear has a thumb it can use to grasp the bamboo shoots that form the mainstay of its diet. This thumb, however, is not one of the five fingers of the normal mammalian paw. Rather this extra digit is constructed from a modified wrist bone, with appropriate rearrangement of the musculature.

In essence Gould claims, “God would not have done it that way. Therefore it must have happened by evolution.” But this negative theological reasoning is invalid on many counts. The first point is that it is inappropriate for the evolutionists to introduce in their favor a concept they have completely excluded from their account of reality—namely God. Secondly, we might ask from where they have obtained such explicit information about how God would or would not create things if He existed? How do they know He might not produce new features in organisms by modifying existing ones?

In the case of the Panda’s thumb, we note that although Gould rejects design by God as an explanation, he fails to provide an adequate explanation by evolutionary processes. He simply states that a single change in a regulatory gene, which controls the action of many structural genes, was responsible for the whole complex development of bone and muscle. But he does not specify which regulatory gene changed, nor does he explain how a change in the regulatory gene would orchestrate this remarkable transformation. He offers nothing more than the traditional vague magic-wand explanation.

The evolutionists have not conclusively shown that an evolutionary process, guided only by the laws of physics, actually occurs. They have no real theory, only vague speculations backed up by imperfect arguments. When faced with design as a factor in ac-

counting for the origin of complex organisms, they often set up stereotyped simplistic concepts of God as a straw man to knock down. To admit any cause other than physical ones would be to admit the failure of modern science’s basic strategy for comprehending reality, a strategy that has resulted in a radical narrowing of intellectual options. Nevertheless, there is sufficient evidence to suggest that the idea of an intelligent designer of complex organisms should not be rejected. This suggests a whole new strategy for approaching scientific questions. If an intelligent designer exists, then it might be possible to obtain from this source accurate information about the actual origin of species. This possibility will be further examined in the final article of this magazine, “Higher-Dimensional Science.”

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species: when changes are pushed beyond a certain limit members of a species will become sterile and die out or else revert to their standard form.

The French zoologist Pierre-P. Grasse points out in his book *Evolution of Living Organisms*. “The changes brought about in the genetic stock [by breeding] affect appearances much more than fundamental structures and functions. In spite of the intense pressure applied by artificial selection (eliminating any parent not answering the criterion of choice) over whole millenia, no new species are born. . . . Ten thousands years of mutations, crossbreeding, and selection have mixed the inheritance of the canine species in innumerable ways

without its losing its chemical and cytological [cellular] unity. The same is observed of all domestic animals: the ox (at least 4,000 years old), the fowl (4,000), the sheep (6,000), etc.”¹⁵

In short, it may be possible to induce changes in the existing form by breeding (making the creature smaller or bigger, for example), but it does not appear possible to generate entirely new complex structures in the organism in this way. If this cannot happen by man’s conscious efforts, why should we assume it could happen by blind natural processes?

Darwin himself admitted the difficulty of accounting for complex form in *The Origin of Species*. “To suppose that the eye

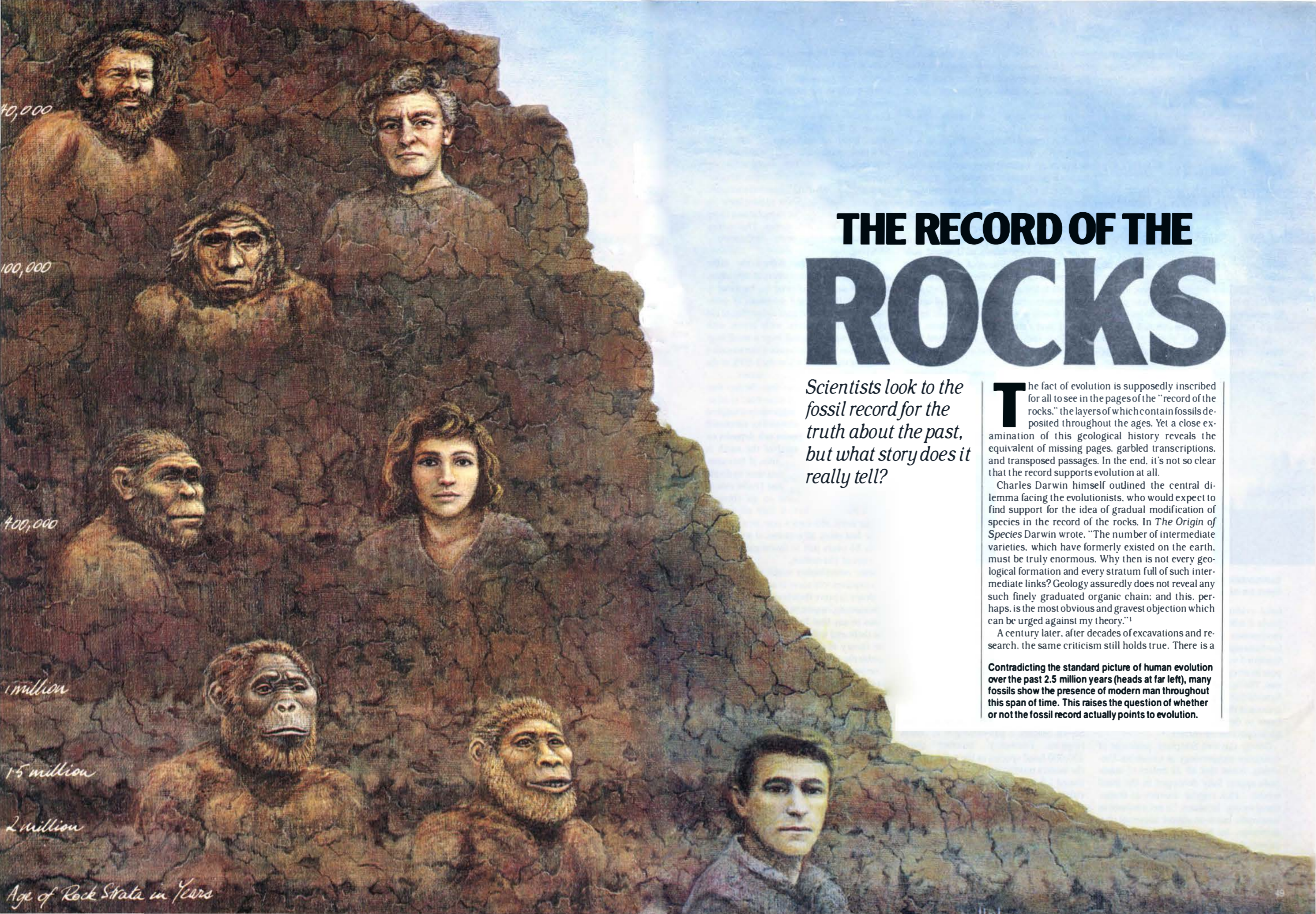
with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest degree.”¹⁶

Darwin then goes on to suggest in an extremely sketchy way that you can have a sequence of gradual changes taking you from a light-sensitive spot in some primitive creature to a mammalian eye. But this sort of magic-wand waving will not do. True science would demand detailed descriptions of exactly how each transitional stage would be formed. To put the matter in proper perspective, it would be like going

To scientifically explain the origin of the eye by evolution, it would be necessary to show the explicit sequence of stages leading to its many intricate mechanisms. Darwin and his successors have never squarely confronted this challenge.

from a slide projector to a color television merely by successive modifications of design. If someone were to claim this were possible, he should be able to provide us with schematic drawings and working models. Yet nothing approaching this has been offered in support of claims of evolution of complex forms in living organisms.

As we have many times suggested, this leaves open the possibility of an intelligent



THE RECORD OF THE ROCKS

Scientists look to the fossil record for the truth about the past, but what story does it really tell?

The fact of evolution is supposedly inscribed for all to see in the pages of the "record of the rocks," the layers of which contain fossils deposited throughout the ages. Yet a close examination of this geological history reveals the equivalent of missing pages, garbled transcriptions, and transposed passages. In the end, it's not so clear that the record supports evolution at all.

Charles Darwin himself outlined the central dilemma facing the evolutionists, who would expect to find support for the idea of gradual modification of species in the record of the rocks. In *The Origin of Species* Darwin wrote, "The number of intermediate varieties, which have formerly existed on the earth, must be truly enormous. Why then is not every geological formation and every stratum full of such intermediate links? Geology assuredly does not reveal any such finely graduated organic chain; and this, perhaps, is the most obvious and gravest objection which can be urged against my theory."¹

A century later, after decades of excavations and research, the same criticism still holds true. There is a

Contradicting the standard picture of human evolution over the past 2.5 million years (heads at far left), many fossils show the presence of modern man throughout this span of time. This raises the question of whether or not the fossil record actually points to evolution.

striking absence of transitional forms in the fossil record. Professor N. Heribert-Nilsson of Lund University in Sweden writes. "It is not even possible to make a caricature of evolution out of paleobiological facts. The fossil material is now so complete that the lack of transitional series cannot be explained by the scarcity of material. The

Of the estimated 1 billion species that have ever lived, more than 99.9% did not leave fossils.

deficiencies are real, they will never be filled."²

The plant and animal kingdoms are divided into broad divisions known as phyla. Yet each phylum appears with no clue to its origin in the fossil record. Noted French evolutionary zoologist Pierre-P. Grasse states. "From the almost total absence of

Stephen J. Gould and Niles Eldredge, felt compelled to come up with a new evolutionary theory to account for the gaps. They propose "punctuated equilibrium" as an explanation.

The punctuated equilibrium theory makes evolution invisible in the fossil record. A supposed change from species A to species B would take place in a small population in an isolated geographic location within a geological microsecond—a period too short to allow for fossils of intermediate forms to be deposited. Then the new species B would move from its isolated place of origin and expand throughout the entire range of the old species A. On a scale of millions of years the fossils of B would suddenly replace the fossils of A, giving the impression that B had emerged without intermediate forms. According to punctuated equilibrium advocates, this lack of transitional fossils is exactly what would be expected, and therefore they can claim that any given species has in fact evolved from an ancestral form without offering any

One reason for evolutionists to be cautious is that because of erosion and other factors large parts of the sedimentary rock layers in which the record is embedded are themselves missing. Geologist Tjeerd H. van Andel studied early Cretaceous sandstones in Wyoming that span 6 million years. When he compared the amount of rock that was actually there to the amount that should have been deposited according to accepted rates of sedimentation, he came up with an astounding figure—the amount was only 2% of what it should have been. Instead of 6 million years worth of stone, there was only 100,000 years worth. That means a lot of sediment that should be there (fully 98%) is gone.

Van Andel discovered that the same study can be repeated almost anywhere with the same result.⁶ What happens is this—over the course of millions of years there is a process of continual erosion of old layers and deposition of new layers, with the end result being that only a small fragment of the total is left over in the so-called record of the rocks. At least 90–99% of the sedimentary layers are gone forever.

Even more remarkable than the fact that the greater part of the rock record is missing is the fact that we have barely scratched the surface of what's there. The estimated volume of sedimentary rock deposits on the continental surfaces of the earth is about 134 million cubic miles. If, for example, 100,000 paleontologists were to divide up the task of examining just 1 cubic mile of rock, each would have to go through 1,472,000 cubic feet. If they all worked 8-hour days, 365 days a year, at a rate of 1 cubic foot every 10 minutes, it would take them 84 years just to investigate 1 cubic mile out of 134 million.

Some evolutionists might claim that all this explains why there is not enough fossil evidence to prove their theory, but this kind of reasoning cannot be accepted. It is ludicrous to say that because the evidence is not there and will probably never be found, the theory is right. Indeed there are undoubtedly many missing fossils, but there is no reason to suppose in advance that they would support the theory of evolution.

Anomalous Evidence

Even among the fossils already discovered are a great many anomalies that contradict the currently held theory of evolution. And how scientists have treated this anomalous evidence leads to the conclusion that perhaps they are not being quite as objective and impartial in the search for the truth as they would like us to believe.

For example, some researchers have reported finding pollen of higher plants in strata shown by standard dating methods to be extremely old. These findings call into question the whole conventional account of

the evolution of plants. In one instance, parties of scientists in Venezuela reported finding pollen of flowering plants in Precambrian rock formations judged to be 1.7–2.0 billion years old.⁷ This posed a serious problem, because according to current theory the flowering plants evolved fairly recently, only 100 million years ago.

To resolve the difficulty, one group of scientists decided that although the dates of the rock were correct the pollen must have been a recent intrusion, even though entry of the pollen into those layers defies simple explanation. The second group held that the pollen had been there since the rock had formed, but concluded that the dating was wrong and the rock was of recent origin. The two groups thus contradicted each other in their interpretations of the evidence. The real significance of this treatment is that both groups felt compelled to look for ways to avoid contradicting the standard story of evolution, to which they were strongly committed.

This is not the only case in which fossil pollen of higher plants has been found in strata belonging to an age in which such plants, according to current evolutionary theory, could not yet have evolved. For example, paleontologist S. Le Clercq of the

Even among the fossils already discovered there are a great many anomalies that contradict the currently held theory of evolution.

University of Liège, Belgium, has written a review article citing a number of cases of evidence of this kind.⁸

How do scientists deal with this evidence? It is of course possible for them to revise their theory of evolution so as to accommodate this material, but that would be somewhat embarrassing and time-consuming, since every textbook would have to be rewritten. It also would be possible for them to simply present their accepted theory and honestly and objectively point out the existence of contradictory evidence and interpretations. One can find accounts of such evidence and interpretation in widely scattered technical articles, but in standard textbooks and popular presentations this contrary evidence is simply not mentioned at all. Thus a person reading these accounts would not have the faintest idea that such evidence ever existed.

Anomalous evidence concerning human remains raises major questions about

HANS OLSON

evolutionary theory. According to the conventional view, hominids, or manlike creatures, began to evolve from apelike ancestors in Africa about 4 million years ago. The early hominids from this period (4–2 million years ago) are known as *australopithecines*, beings with manlike bodies and apelike heads. There is a further development of *australopithecus* to *homo habilis*, which appeared about 2 million years ago. *Homo erectus* evolved from *homo habilis* about 1.5 million years ago and migrated to Europe and Asia.

About 200,000–300,000 years ago, the very first representatives of *homo sapiens*

appear, but these are not quite like modern human beings. From this species, about 100,000 years ago, Neanderthal man develops and spreads throughout Europe, Africa, and the Middle East. About 40,000 years ago fully modern man is thought to have evolved in the Near East or Asia. Called *homo sapiens sapiens*, the new species then enters Europe and replaces Neanderthal man, who disappears from the scene. The rudiments of modern civilization begin 10,000 years ago. According to the standard accounts, this whole development took place in the Old World. The only humans ever to have existed in the New World are



As a result of erosion, 90-99% of the fossil record is irrevocably destroyed.



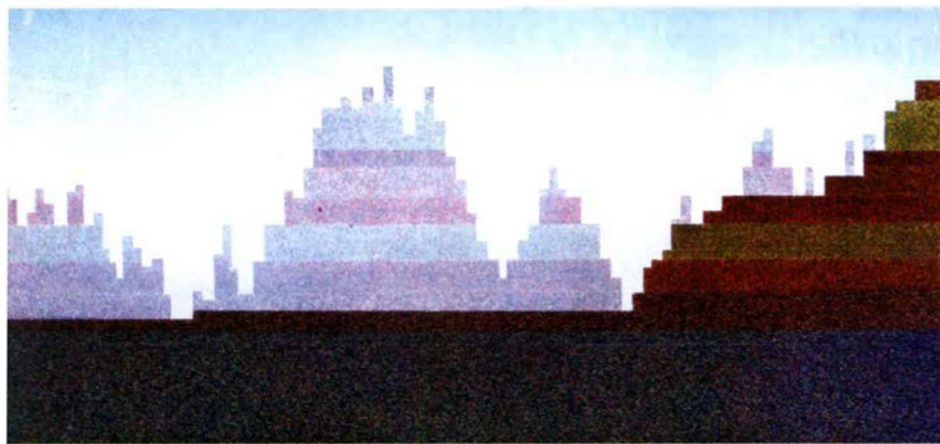
Only a tiny fraction of the surviving sedimentary rock has been observed.



Fossil evidence that doesn't conform to current theory tends to be sifted out.



The remaining fragmentary and biased sample is what scientists use to explain the past.



Sedimentation and erosion leave an extremely incomplete rock record. (The lighter colored layers are missing from the current strata.)

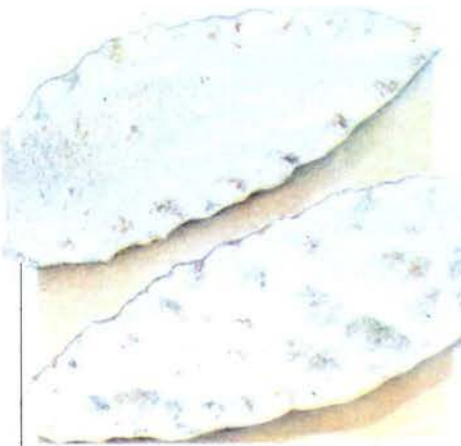
fossil evidence relative to the origin of phyla, it follows that any explanation of the mechanism in the creative evolution of the fundamental structural plans is heavily burdened with hypothesis. This should appear as an epigraph to every book on evolution. The lack of direct evidence leads to the formulation of pure conjectures as to the genesis of the phyla: we do not even have a basis to determine the extent to which these opinions are correct."³

George Gaylord Simpson, professor of vertebrate paleontology at Columbia University, noted that all 32 orders of mammals appear fully developed in the fossil record. "This regular absence of transitional forms," he states, "is not confined to mammals, but is an almost universal phenomenon, as has long been noted by paleontologists."⁴

The problem is so difficult to overcome that one school of evolutionists, headed by

proof from the fossil record. But a theory that allows no proving or disproving on the basis of physical evidence hardly qualifies as an adequate scientific explanation.

A major difficulty for those seeking support for evolution in the rock record is that the record is extremely incomplete. Only a fraction of the species thought to have ever existed are represented. David M. Raup, curator of Chicago's Field Museum, and Steven Stanley, a paleontologist at Johns Hopkins University, number about 130,000 fossil species in the collections of the world's museums, compared to an estimated 1.5 million living species. They calculate that 1 billion species have lived since the Cambrian, and of these more than 99.9% did not leave fossils.⁵ It is thus difficult to see how evolutionists can dare speak with such certainty about the supposed relationships of descent among species over billions of years.



Projectile points of a kind associated with modern man in Europe were found at Valsequillo, Mexico, and dated 250,000 years old.

fully modern men who migrated there from Asia no earlier than 30,000 years ago.

This is the standard scenario, yet much evidence has turned up that challenges it. We shall now review some of this evidence and examine how scientists have responded to it, beginning with that calling for the least amount of change in current views.

At Border Cave in South Africa paleontologists have made fossil discoveries that push back the date and change the locale for the origin of modern man. They concluded that "anatomically modern *homo sapiens* [*homo sapiens sapiens*] originated at some as yet uncertain time prior to about 110 thousand years before the present."⁹ This differs substantially from the standard version, with its date of 40,000 years ago for the origin of modern man in Asia or the Near East.

Moving to the New World, we come to the archaeological site at Valsequillo in southern Mexico. There, in 1962, archaeologist Cynthia Irwin-Williams excavated stone artifacts, including spearpoints, representative of a technology usually associated with fully modern (Cro-Magnon) man in Europe. In 1972 and 1973 a team of dating experts, including geologists from the U.S. Geological Survey, using several independent dating techniques, found that the layers in which the artifacts were found were about 250,000 years old.

The Valsequillo artifacts thus present a far greater challenge to the accepted view of human evolution than the Border Cave finds. The date is twice as old and it places anomalously ancient men on the wrong continent.

At the very least the find would mean some drastic rethinking of the history of man in the New World. The authors of the dating study said in their report that they were "painfully aware that so great an age poses an archaeological dilemma."¹⁰ The authors knew what they meant when they used the word *painfully*, for they had met with an extremely hostile reception from archaeologists nationwide, one of whom accused the team of ruining Dr. Irwin-Williams' career.¹¹ There is indeed a

dilemma here, because man is generally thought to have arrived in the New World no earlier than 12,000 years ago, although some extend the date to 30,000 years. The mainstream scientists' resolution of this dilemma is typical—the Valsequillo find is simply not mentioned in standard textbooks and popular accounts of human evolution. There are numerous other controversial finds of ancient man in the New World that are conspicuous by their absence from the standard accounts. Recent examples include the Calico Hills, California, early man site (500,000 years old), the Flagstaff, Arizona find (100,000–170,000 years old), and the Mission Valley find in San Diego, California (100,000 years old).¹²

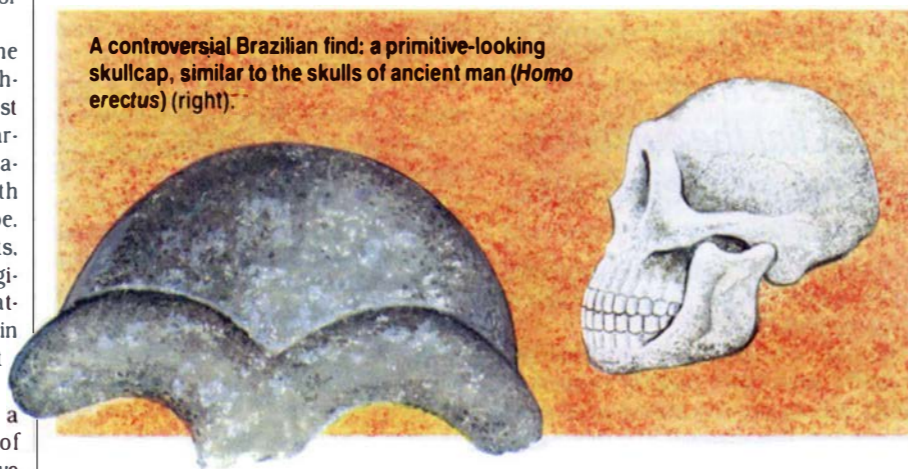
The kind of suppression of evidence that one can encounter in promoting unorthodox archaeological views is illustrated by the excavations at Sheguiandah. At this site near Lake Huron in Canada, Dr. Thomas Lee, the director of the National Museum of Canada, uncovered stone tools that geologists dated at 150,000 years old. On the advice of an expert, Dr. Ernst Antevs of Arizona, Lee reported a lesser date of

tional Museum (Lee), who had proposed having a monograph on the site published, was himself fired and driven into exile. . . . Sheguiandah would have forced embarrassing admissions that the Brahmins did not know everything. It would have forced the rewriting of almost every book in the business. It had to be killed. It was killed."¹³

Ancient Men in America?

In the New World, not only is there evidence indicating the presence of fully modern man at dates unacceptable by the standard archaeological views, but there is also evidence of primitive man of the *homo erectus* category. For example, Canadian anthropologist Alan Lyle Bryan, editor of the book *Early Man in America*, discovered in Lagoa Santa, Brazil, a skullcap with a low, receding forehead, thick walls, and exceptionally massive browridges. These features make it practically indistinguishable from skulls of the *homo erectus* type. Shown photographs of the Lagoa Santa skull, several American physical anthropologists found it impossible to believe it could have come from America. Nonetheless, Bryan supported his claim by citing other published works containing descriptions of similar fossil finds in the same area of Brazil. Challenging accepted opinion, he argued that anatomically primitive forms of man spread all over the world in very

A controversial Brazilian find: a primitive-looking skullcap, similar to the skulls of ancient man (*Homo erectus*) (right).



30,000 years. But even this was too much for the traditionalists, who adhered strongly to their own date of 12,000 years as the maximum limit for human presence in North America. Lee wrote in the *Anthropological Journal of Canada*, "The site's discoverer was hounded from his Civil Service position into prolonged unemployment; publication outlets were cut off; the evidence was misrepresented by several prominent authors among the Brahmins [scientific establishment]; the tons of artifacts vanished into storage bins of the National Museum of Canada; for refusing to fire the discoverer, the Director of the Na-

ancient times, evolving independently on different continents into anatomically modern man. The skull was placed in a Brazilian museum but later mysteriously disappeared.¹⁴

The anomalies we have been discussing thus far tend to indicate first of all that modern man is both more ancient and more widespread in ancient times than current archaeological opinion would allow. Second, various races of primitive man appear to have been much more widespread than is generally accepted. Now we will cite some evidence that indicates the presence of fully modern humans at far earlier dates and the

presence of anatomically primitive humans at much later dates.

Reck's Controversial Find

Regarding evidence for the extreme antiquity of modern man, it should be noted that the extent to which it challenges the standard views is matched by the degree of vehemence with which the evolutionary establishment tends to reject it. One example of such controversy is provided by a find made in 1913 by Dr. Hans Reck in East Africa's famous Olduvai Gorge.

Dr. Reck discovered a skeleton of fully modern man in strata that made it contemporary with Peking Man and Java Man, supposedly distant ancestors of *homo sapiens*. This find inspired much controversy, but when the famous Louis Leakey visited the site in 1931 with Reck, he concluded the skeleton was at least a half million years old.¹⁵

Opponents continued to argue that it was an intrusive burial, that it was a man of recent origin buried in the ancient strata of rock. But Reck insisted that he had taken adequate care to rule out this interpreta-

The skull was placed in a Brazilian museum but later mysteriously disappeared.

tion. The strata above the skeleton had been undisturbed, he claimed. Yet other investigators charged they had found material from higher strata in the rock matrix in which the skeleton was embedded. In the face of the conflicting testimony, Reck and Leakey withdrew their claims.

In 1973, Dr. Reiner Protsch of the department of biology and anthropology of the J. W. Goethe University in Frankfurt, West Germany, made a report on radiocarbon dating of Reck's skeleton. Since the skull was considered too valuable to destroy for radiocarbon dating, Protsch wanted to use other bones. Unfortunately all of the skeleton except the skull had mysteriously disappeared from the Munich museum in which it had been kept! Some fragmentary portions of ribs, long bones, and vertebrae were later produced and were thought to have come from the originally complete skeleton. As a precaution, both the skull and the fragments were tested for nitrogen content to see if they were actually from the same skeleton. The results of the test were similar enough to not rule out the possibility that this may have been the case. The subsequent radiocarbon dating gave an age of 17,000 years for these bones, which according to Protsch means that the skeleton

was buried by digging down from a land surface in the middle of bed 5 at Olduvai Gorge.¹⁶ This has been taken as final proof that Reck's skeleton is an intrusive burial and is much younger than originally thought.

Yet the British scientist A. Tindell Hopwood observed on the site a hard layer of calccrete (limestone) between the base of bed 5 and the lower bed 2 in which the skeleton was found. If the skeleton had indeed been buried from a land surface in the middle of bed 5, the hole would have had to go through the calccrete layer. Regarding the hardness of calccrete, Hopwood noted that African diggers "working at their own speed with heavy crowbars, failed to dig a hole two feet square and three feet deep through similar material, although they were two days on the job."¹⁷

The whole question remains problematic. We have Reck's original testimony that it was not an intrusive burial, along with attempts to prove it was. But upon close examination it appears the refutations are less than airtight, leaving open the possibility that Reck's original observations about the placement of the skeleton and its extreme age were correct. It is remarkable indeed that the picture of the nature and origin of man that we have derived from modern science is largely based on evidence and lines of reasoning as questionable and slipshod as these.

Louis Leakey was involved in other finds indicating the presence of *homo sapiens* in very early strata. One example is his discovery of the Kanam jaw in the lowest level (bed 1) of Olduvai Gorge. This jaw was initially accepted as belonging to *homo sapiens* by a committee of twenty-seven experts, who agreed it derived from the Lower Pleistocene period.¹⁸ This would give it an age of about 2 million years, contemporaneous with *homo habilis* and *australopithecus robustus*.

Unfortunately, when one Professor Boswell, who was also involved in the controversy over Reck's skeleton, challenged Leakey's claims, Leakey was unable to relocate the exact site where the find had been made. As a result the find was discredited in the eyes of archaeologists although Leakey insisted that his original report was correct.¹⁹

In considering the treatment of Reck's skeleton and the Kanam jaw, it is interesting to note that the standards imposed for the acceptance of evidence that contradicts current views seem to be stricter than the standards for acceptance of evidence that agrees with current views. Consider for example, the Petralona skull, which was



found in Greece. This skull seems to be nearly intermediate in form between the *homo erectus* type of skull and the *homo sapiens* type. It is given a date of about 200,000–300,000 years and is accepted as evidence of human evolution by archaeological authorities such as John Gowlett, head of the radiocarbon dating laboratory at Oxford.

Yet how solid are the facts indicating the age of this skull? John Gowlett gives the following information: "The finds were first uncovered not by archaeologists, but by local people who kept no records. Some accounts speak of a skeleton as well as the skull, but no evidence of this has ever been produced. Even the exact stratigraphic position of the skull has been debated."²⁰ If the Petralona skull had to conform to the same standards applied to Leakey's Kanam jaw or Reck's skeleton, it is highly doubtful that it would ever have been accepted as evidence for human evolution.

Modern Man in Ancient Strata

There is evidence for the existence of modern man in even older periods than those represented by Reck's skeleton and the Kanam jaw. The Castenedolo skull provides one example. It was discovered in 1860 in Castenedolo, Italy, by Professor Ragazzoni, an expert geologist, in strata dated as Pliocene. This means the remains, if actually deposited in this strata, were 2–7 million years of age. Later on, in 1880, the remains of two children and a woman were



Anthropologist Myra Shackley cites evidence for the existence in Central Asia of a hominid, locally known as the Almas (shown below in an 18th-century Tibetan drawing), which she regards as a survival of the Neanderthal man.

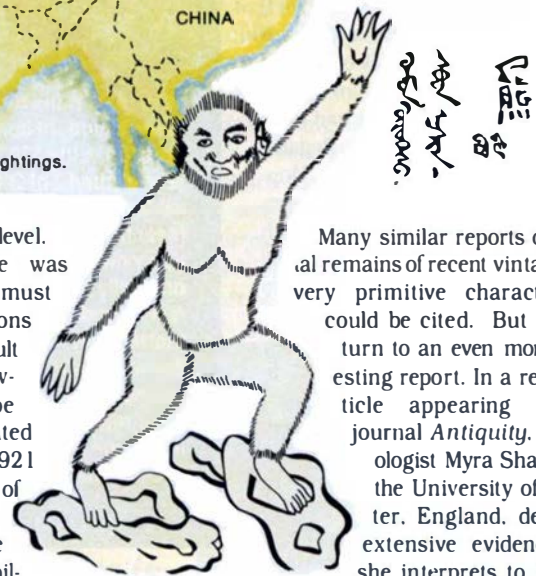
found nearby at the same level.

Inevitably the charge was made that the skeletons must have reached their positions in Pliocene strata as a result of intrusive burial. However, Professor Giuseppe Sergi, who investigated these finds, wrote in 1921 that the incompleteness of the skeletons and the dispersal of their bones in the strata ruled out the possibility of burial. Also there was no admixture of materials from higher levels, as one would expect if a pit had been dug from above. Yet after a brief period of initial controversy, the Castenedolo finds were ignored by scientists writing on human evolution.

The eminent British evolutionist Sir Arthur Keith wrote in connection with Castenedolo and finds of a similar nature, "Were such discoveries in accordance with our expectations, if they were in harmony with the theories we have formed regarding the date of man's evolution, no one would ever dream of doubting them, much less of rejecting them."²¹

At this point, let us shift our attention from the antiquity of modern man to the recency of primitive man. According to standard views of paleoanthropologists, the Neanderthal man became extinct some 35,000 years ago, and since that time only fully modern man has existed throughout the entire world. Furthermore, it is widely accepted that the more primitive *homo erectus* forms ceased to exist some 200,000 to 300,000 years ago.

Yet in the respected journal *Nature* we find the following interesting report. A European scientist, Mr. K. Stolyhwo, gave an account of a Neanderthal skull found as part of a skeleton in a tomb in which there was also a suit of chain armor together with iron spearheads. He said the skull was very similar to the Spy Neanderthal skull, a classical example of the type.²²



Many similar reports of skeletal remains of recent vintage with very primitive characteristics could be cited. But now we turn to an even more interesting report. In a recent article appearing in the journal *Antiquity*, archaeologist Myra Shackley of the University of Leicester, England, described extensive evidence that she interprets to indicate the survival of Neanderthal man up to the present time.

Her evidence consists mainly of accounts of sightings and captures, as well as footprints and other traces, of a kind of subhuman but manlike being. Called the Almas, its existence has been repeatedly reported for many centuries throughout a broad area in Central Asia stretching from the Altai Mountains in Outer Mongolia to the Caucasus of southern Russia. These reports include many accounts made by reputable scientists, by officers in the Soviet military forces, and by local people. The following eyewitness account of a captured Almas is given by V. H. Khaklov, a Russian zoologist of the early twentieth century. "They are of medium height, with hair all over the body, absence of a forehead but prominent browridges and heavy lower jaw and no chin, long arms and short legs, feet broad with big toe shorter than other toes."²³

Although Dr. Shackley interprets the many reports of the Almas as evidence for the survival of Neanderthal man, these reports actually indicate that the Almas, if it exists, has a much lower level of culture than is customarily attributed by scientific authorities to the Neanderthals. Indeed since the Almas are described by local people as being without language and without knowledge of fire, they seem to be more primitive even than *homo erectus* as he is commonly presented by scientists.

The evidence cited by Myra Shackley illustrates the problematic nature of the em-

pirical method: we automatically tend to reject this evidence since it conflicts with everything we believe. Yet, considered by itself, her study is as substantial as much of the evidence accepted as confirmation for conventional scientific views. Without committing ourselves to any final conclusion about any of the evidence presented here, either controversial or not controversial, let us try to objectively consider what empirical picture it conveys.

Did Evolution Really Occur?

If we combine the evidence for the existence in modern times of very primitive human or subhuman forms with the evidence for the existence over 2 million years ago of modern man, there comes into focus a picture of the human fossil evidence very different from the standard evolutionary scenario. The simplest interpretation of this evidence would seem to be that human beings as we know them have coexisted with various quasi-human forms for millions of years and that there is no real indication of any evolutionary transformation from one form to another.

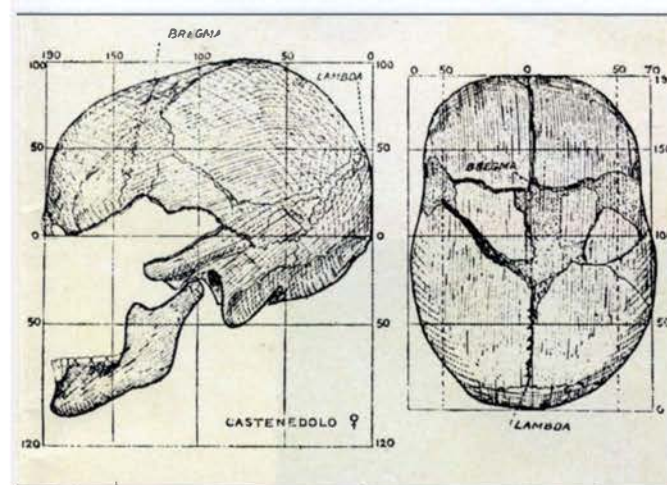
Thus far we have been considering various bits and pieces of evidence that have been ignored or rejected by the scientific es-

“Were such discoveries . . . in harmony with the theories we have formed regarding the date of man's evolution, no one would ever dream of doubting them.”

—Sir Arthur Keith

tablishment but that nonetheless were initially reported in scientific journals. In addition to this relatively staid and respectable anomalous evidence, we should in all honesty briefly note the existence of a broad category of evidence that more severely violates the theoretical systems of modern science. This evidence includes reports of human remains and artifacts found in coal mines and, more generally, in strata far antedating the purported appearance of man. Such evidence used to be reported frequently in scientific periodicals such as *Nature* and *Scientific American*. Here we will give one example from the many available in the literature.

In June 1852 *Scientific American* carried a short article about a metallic vessel that had been blasted out of "an immense



This skull and other skeletal remains of modern man were found at Castenedolo, Italy, in Pliocene deposits over 2 million years old.

mass of rock" in Dorchester, Massachusetts. The report went on to say, "The chasing, carving and inlaying are exquisitely done by the art of some cunning workmen. This curious and unknown vessel was blown out of solid pudding rock, fifteen feet below the surface."²⁴ According to geological surveys, the "pudding stone" at Dorchester is Precambrian (at least 600 million years old). This would date the decorated vase to a period before the supposed origin of vertebrates, what to speak of human beings.

Taken at face value this extremely anomalous evidence suggests that human beings or comparable intelligent agencies may have left their traces in the record of the rocks, even in ancient strata associated in modern scientific thinking with evolution's earliest stages. We cannot claim that this evidence constitutes decisive proof of this, for indeed facts do not speak for

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themselves—they are accepted or rejected within a system of ideas established by human society. The problem is that in human society established systems of ideas tend to determine what can be accepted as evidence. We have shown that scientists wedded to the theory of evolution tend to reject outright any evidence that contradicts the theory.

Our discussion of paleontological evidence thus has perhaps greater bearing on the general shortcomings of the empirical process than upon any specific evolutionary theory. First of all, we are dealing with a subject in which the basic data, the record of the rocks itself, is extremely fragmentary. Therefore if one is going to draw an empirical conclusion, one is forced to speculate extensively to fill the

gaps. Secondly, as we have mentioned, the basic facts in the record of the rocks do not speak for themselves but must be interpreted, and this interpretation depends very strongly on the nature of the existing views. This encourages researchers to try to establish a final picture based on fragmentary evidence and then "hold the line" against all opposing views.

This in turn leads to a double standard. Evidence favoring the established view is accepted even though shaky, and evidence opposing the established view tends to be rejected even though this is done on shaky grounds. All of these factors make it difficult to establish the truth about the origin and ancient history of man by the empirical process of paleontology. If anything at all, however, can be deduced from the evidence presently available, it is that, contrary to the picture presented in all standard textbooks and popular accounts, it is completely misleading to present the current evolutionary scenario as established fact.

Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL AND OTHER IMPROVEMENTS.
VOLUME VII.] NEW-YORK, JUNE 5, 1852. [NUMBER 38.]

A Relic of a By-Gone Age.

A few days ago a powerful blast was made in the rock at Meeting House Hill, in Dorchester, a few rods south of Rev. Mr. Hall's meeting house. The blast threw out an immense mass of rock, some of the pieces weighing several tons and scattered small fragments in all directions. Among them was picked up a metallic vessel in two parts, rent assunder by the explosion. On putting the two parts together it formed a bell-shaped vessel, 4½ inches high, 6½ inches at the base, 2½ inches at the top, and about an eighth of an inch

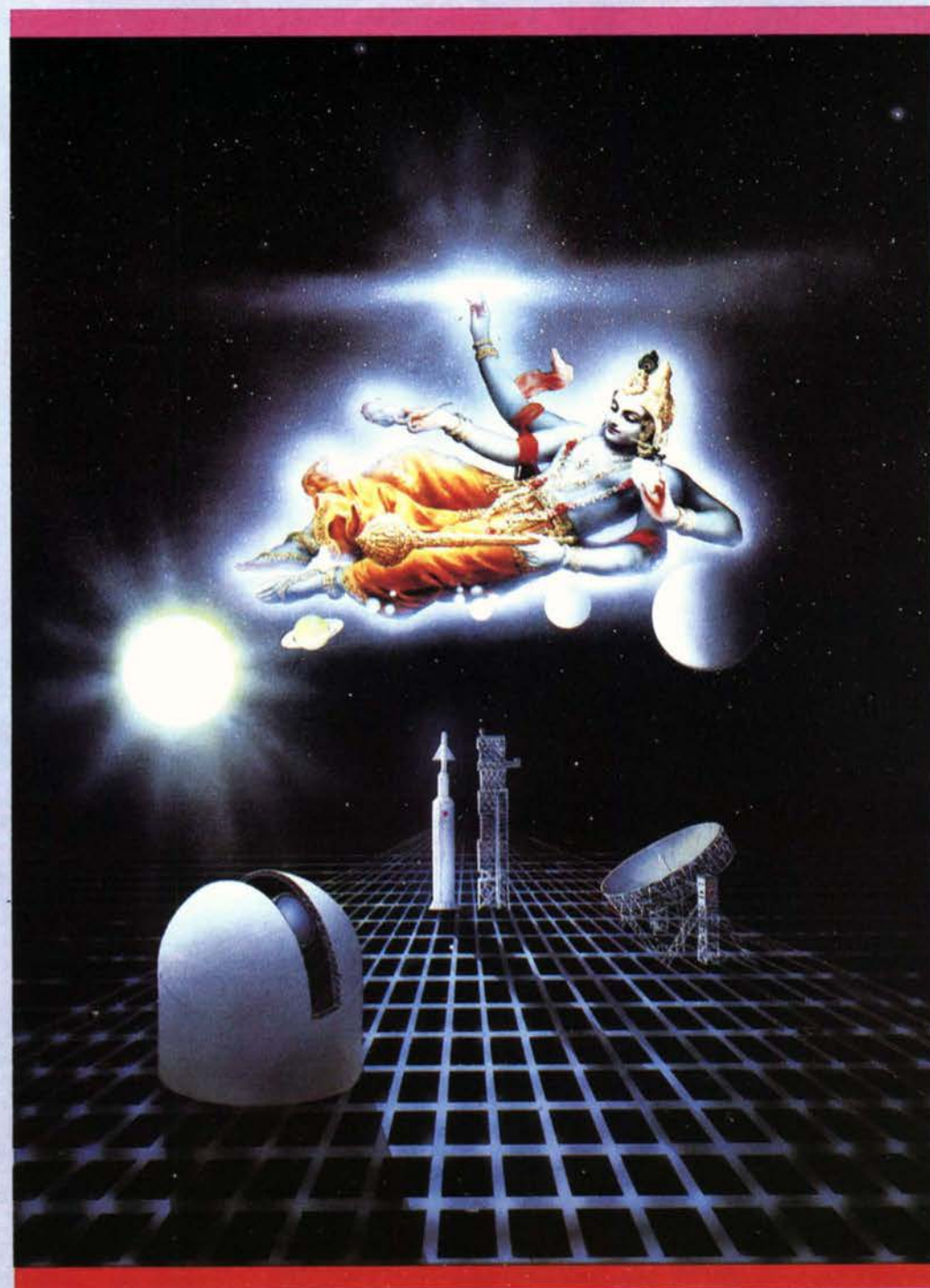
in thickness. The body of this vessel resembles zinc in color, or a composition metal, in which there is a considerable portion of silver. On the sides there are six figures of a flower, or bouquet, beautifully inlaid with pure silver, and around the lower part of the vessel a vine, or wreath, inlaid also with silver. The chasing, carving, and inlaying are exquisitely done by the art of some cunning workman. This curious and unknown vessel was blown out of the solid pudding stone, fifteen feet below the surface. It is now in the possession of Mr. John

Kettell. Dr. J. V. C. Smith, who has recently travelled in the East, and examined hundreds of curious domestic utensils, and has drawings of them, has never seen anything resembling this. He has taken a drawing and accurate dimensions of it, to be submitted to the scientific. There is no doubt but that this curiosity was blown out of the rock, as above stated; but will Professor Agassiz, or some other scientific man please to tell us how it came there? The matter is worthy of investigation, as there is no deception in the case.

This is one of many reports of finds that strongly conflict with current evolutionary theories.

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A discussion of realms of experience and strategies of investigation transcending the limits of mechanistic science.

To perceive the primordial personality lying behind the impersonal play of cosmic forces, we must go beyond the instruments and reductionistic strategies of present-day science.

HIGHER DIMENSIONAL SCIENCE

James D. Watson, codiscoverer of DNA, recently said of the mystery of life, "It is very complex, but it can be explained by the laws of chemistry, by random thermal motion. It's complicated: there are many variables, but there's no doubt it's that."¹

He recalled that this conviction had strongly motivated both himself and Francis Crick during their pioneering research into the structure of DNA. "We wouldn't have been doing it if we hadn't believed that chemistry would explain it. Up to then people felt that chemistry wasn't ever going to be enough, that you needed religion to explain life. But even when I was in college I was influenced by Linus Pauling's insistence that you can explain life on the basis of chemistry."²

His attitude toward religion is further illuminated in the following statement: "When I wrote the first edition of my text [*The Molecular Biology of the Gene*], I thought, *I am rewriting the Bible—actually going back and finding out what's up* [our italics]."³

All in all, Watson's statements represent the general drift of scientific thought over the past several centuries—faith in explaining complex phenomena (such as life, the origin of species, the origin and structure of the universe, etc.) by simple, mathematically expressed natural laws. Some scientists and religionists have attempted to preserve some last role for God as the guarantor of the laws of physics, but this gives

the laws of physics a status superior to that of God in the universe. With this compromise the substance of the original concept of the omnipotent God is completely eliminated, and one is left with a meaningless empty shell. Religions that have accepted this compromise should reevaluate their position.

For his part, Watson maintains an unshakable faith that physical explanation is always possible. "On the level of DNA it [the physical explanation of life] goes very well. On a more complicated level, we're still trying to figure it out. Embryology is much harder. And in neurobiology there are very few insights. But some [scientists] will have a moment when the light will come on . . . The problem of explaining consciousness in biological terms is a tougher one, but I'm sure it will fall out."⁴

Here the major shortcoming of modern science is brought into clear focus. Watson admits that fundamental aspects of living organisms have not been completely explained by physical laws; yet he insists that they can be and will be so explained, ruling out in advance any nonmaterial, nonmechanistic explanation.

But is this really true? Could it be that Watson's faith is ill-founded? All available evidence points clearly to the possibility that the complex forms of living organisms *may never be explained* by simple physical laws. One could perhaps say that Shakespeare's plays can be explained by the

The Vedas, written thousands of years before Darwin's time, contain the world's oldest account of evolution.

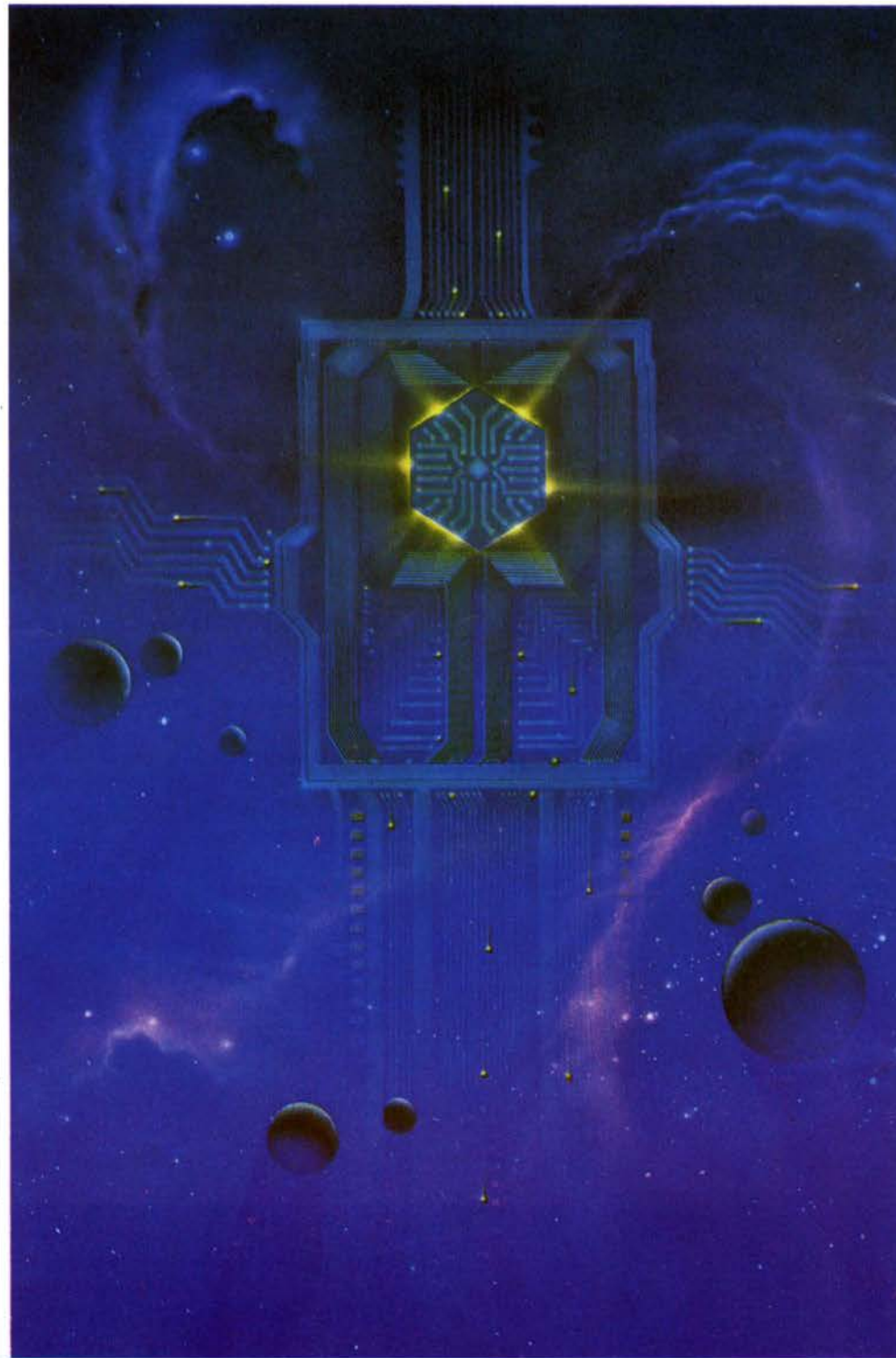
26 letters of the alphabet, but there is certainly more involved than that. In the same way, scientists may say that life can be explained by a genetic code embedded in certain molecules, but as of yet this approach has failed to account for the complexity of even the simplest life forms. Just as no one has found any simple set of laws that could allow a computer to transform the 26 letters of the alphabet into a *Hamlet* or *Macbeth*, so no scientist has shown how any set of simple natural laws could transform a few basic molecular building blocks of life into a single self-reproducing cell.

So perhaps just as the fundamental laws of physics cannot be reduced any further, the material complexity we observe in living organisms cannot be reduced any further. A few freethinking scientists with the courage to challenge current preconceptions have taken this bold step. Reviewing the conclusions of his own investigations, prominent biologist Walter M. Elsasser states that the complex biochemical forms of living organisms are "of a primary and irreducible type of natural order, on the same level as the more conventional laws of nature."⁵

Absolute Complex Form

Having failed to reduce complex things to simple principles, the scientist now has two choices. First, he can simply stop, saying these things exist but we can say nothing more about them. Second, he can go forward by searching for principles suitably complex to have generated the irreducible complexity he observes. In other words, he must consider the existence of an absolute complex form. He might then inquire about the nature of this form and by what route information is transmitted from this source to produce the forms and structures we see in the universe, such as living organisms. We need not have any preconceptions about the nature of this absolute complex form. From the standpoint of logic, there are many possibilities that can be considered.

For example, let us consider some alternative possibilities for an absolute irreducible complex form containing information capable of generating sequences of complex living organisms. Imagine that in the ocean of the primordial earth an early amoeba was situated in a certain fixed posi-



The universe contains many complex systems, including life on earth. A primordial form-generating computer is an intriguing, if not fully satisfactory, idea of how complex information may be built into the very fabric of the universe.

tion and orientation. Imagine also that in outer space a particular precisely defined pattern of cosmic rays was hurtling earthward. By the natural course of events our hypothetical cosmic rays would pass through the earth's atmosphere and zap the genes of the amoeba in a particular way, thus giving rise to a new and higher kind of organism (like a trilobite).

In this scenario the particular pattern of cosmic rays and the particular situation of the amoeba represent a kind of absolute complex form containing information for the eventual production of a higher organism. Here we have deliberately chosen an unsatisfying example of what such an absolute complex form could be like. Once we have traced the origin of the higher form of

organism back to the particular initial configuration of cosmic rays, we can go no further. We simply encounter a frustrating intellectual dead end. Therefore let us consider another possibility.

Imagine a more complete information source that originates simultaneously with the universe—a "cosmic computer" with a read-only memory (ROM) containing data for all the complex forms that are to be manifested. This proposal may seem outlandish, but if physicists can ask us to accept the hypothesis that the entire universe pops out from the quantum vacuum, why can't a universal computer pop out along with it? Astronomers Sir Fred Hoyle and Chandra Wickramasinghe have proposed something like this in their book *Evolution from Space*. "So what if our progenitor were an extremely complex silicon chip? One thing looks right about this idea. It would not be possible for an intelligence, however great, to generate carbonaceous life [life based on carbon compounds] without performing an immense amount of calculation."⁶

Actually, the idea of a cosmic computer is simply a graphic way of breaking down the deeply ingrained conception that fundamental principles must be reduced to simple natural laws. Most scientists are obsessed with the idea of seeing natural phenomena as a progression from simple to complex, whereas in reality it appears the opposite is true—anything complex derives from something equally or more complex. Therefore we could imagine that the cosmic computer, using the information contained in its memory, might build spaceships that would journey to different planets, implant life forms in suitable environments, then return periodically to genetically alter them. In this way, varieties of organisms could be sequentially produced.

We have proposed that even the structure of a simple cell is of irreducible complexity. So we could account for this complexity by having suitable programs in our hypothetical cosmic computer. But in contrast to our cosmic-ray example, these programs could be more than mere arbitrary repositories of information. If we envisage organisms as being computerlike automatons, with some, such as humans, displaying a higher-order behavior we call intelligent, could it not be that the original cosmic computer might also possess the function of intelligent behavior and decision making? Here we begin to see how an original absolute information source might have interesting features that would make us want to study it in its own right.

Consciousness and Superintelligence

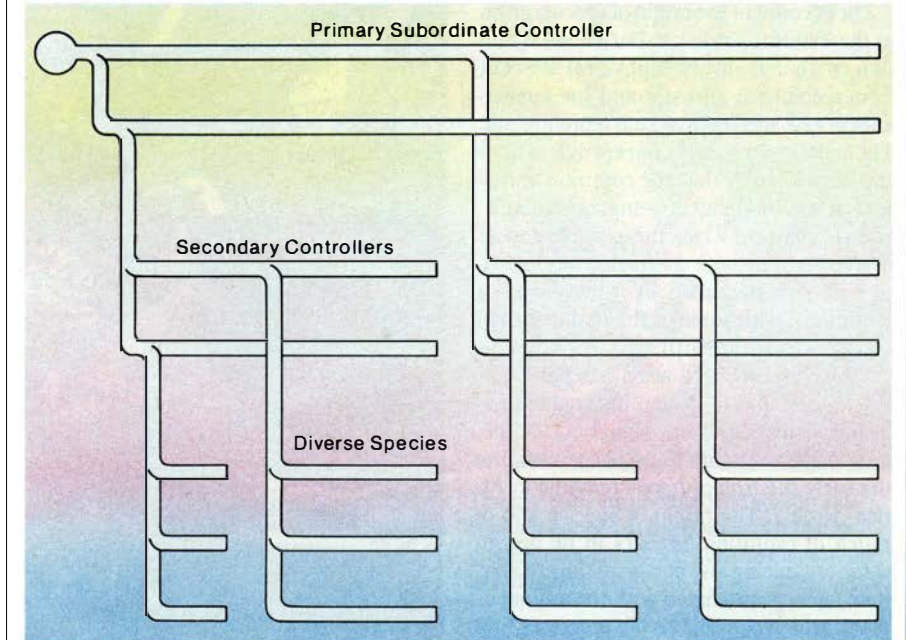
Now we come to another feature of reality. We observe in ourselves a variety of thoughts, feelings, emotions, and perceptions that go beyond the simple ability of a

machine to respond to external stimuli by some sort of data processing. In other words, our ability to function in an intelligent way is also accompanied by the phenomenon of consciousness. Consciousness is real—we all have experience of it. Yet although the behavior associated with consciousness is quantifiable, consciousness itself remains unexplained by quantitative methods. It cannot be accounted for by physical laws. So what is it and where does it come from?

We have been considering a cosmic computer exhibiting a higher order of intelli-

ing, then the strategy of assuming that this is so and seeking a process for coming in contact with such a being may prove successful.

The obvious practical question is this: can we find explicit examples in which information has been communicated to human beings from an absolute intelligent source, with the communicated information containing ways and means of showing that it is bona fide? We propose that the Vedic literatures of ancient India provide one striking example of an internally verifiable body of knowledge of this kind. The Vedic



According to the Vedic idea of inverse evolution, all living organisms descend from a single highly intelligent ancestor through the systematic unfolding of inbuilt information.

gence as the original source of certain complex features of the observable universe. This suggests a beguiling idea—that this cosmic intelligence could be something more than a lifeless machine. It could possibly be a conscious superintelligent being from which originates not only the information that determines the forms of organisms but also the consciousnesses that animate them.

This conception opens up some interesting possibilities. If there were such an intelligent being, it would be capable of communicating exact information through means of its own choosing to those curious about ultimate questions such as the origin of living beings. And if it were benevolent it might be willing to do so.

This provides us with another possible strategy for obtaining answers to ultimate questions. The standard scientific strategy of assuming that ultimate causes are simple and then seeking such simple causes will certainly fail if the ultimate cause is irreducibly complex. But if the ultimate cause is a benevolent superconscious be-

literatures contain a general account of epistemology, the systematic analysis of the procedures for acquiring knowledge, and they also provide a thorough discussion of the nature and origin of the universe and of the living organisms that inhabit it. At this point we shall briefly discuss some important features of the Vedic world view.

Inverse Evolution

The Vedas elaborately describe a complex process of evolution proceeding from subtle designs to the physical manifestation of these designs in matter. According to this account, the universal controller directly generates a primary subordinate controller who generates secondary controllers by an asexual process. These secondary controllers have the capacity for sexual reproduction, not only to generate their own kind but also to generate other species. They contain within their bodies design information for varieties of organisms. This information, which exists in seedlike subtle forms, originates in the intelligence of the universal controller, who

transmits it to the subordinate controllers (demigods). Finally the lesser controllers manifest this design information in the forms of varieties of species, which go on to reproduce themselves. The Vedas, written thousands of years before Darwin's time, thus contain the world's oldest account of evolution. However, this Vedic process reflects the original meaning of the word evolution, which refers to an unfolding of something existing in an undeveloped form rather than the random production of something entirely new by physical processes.

The account of the origin of species given in the Vedas is similar to Darwinian evolution in that it involves physical descent from a common ancestor and the appearance of new species by sexual reproduction. The Vedic evolutionary concept differs from the Darwinian in that the common ancestor is a superintelligent being, not a single-celled creature. Also, the progression of descent is from more complex forms to simpler ones. It may thus be called "inverse evolution," with some of the first steps occurring beyond the earth.

Even some modern scientists have considered the idea of design information being transmitted from a higher source. Robert Broom, who discovered some of the the early *australopithecus* remains in Africa, wrote, "The origin of species and of much of evolution appears to be due to some organising and partly intelligent spiritual agency associated with the animal or plant, which controls its life processes and tends to keep the being more or less adapted to its environment. But in addition to this there seem to be other spiritual agencies of a much higher type which have been responsible for what may be called greater evolution. . . . These spiritual agencies appear to have worked by directing from time to time the inferior agencies which are associated with the animals and plants."⁷ Broom's idea, although not exactly parallel to the Vedic concept, shares with it the notion of higher directing intelligences.

Similar thoughts have been expressed by Alfred Russell Wallace, who along with Darwin is credited with the formulation of the theory of evolution by natural selection. He wrote in *The World of Life*, "If there is such an Infinite Being, and if . . . his will and purpose is the increase of conscious beings, then we can hardly be the first result of this purpose. We conclude, therefore, that there are now in the universe infinite grades of power, infinite grades of knowledge and wisdom, infinite grades of

The Vedic literatures describe another process of evolution, whereby conscious entities transmigrate through successively higher bodily forms and evolve successively higher levels of consciousness.



The conscious selves in different bodies manifest different abilities, although they are all essentially identical.

influence of higher beings upon lower. Holding this opinion, I have suggested that this vast and wonderful universe, with its almost infinite variety of forms, motions, and reactions of parts upon part, from suns and systems up to plant-life, animal-life, and the human living soul, has ever required and still requires the continuous coordinated agency of myriads of such intelligences."⁸

Unlike the majority of scientists, Wallace is prepared to accept that there is such a thing as purpose in the universe. But his statement about "the human living soul" shows he is adhering to the standard Western conception that only human beings have souls. The Vedas, however, teach that all living organisms have souls and that in addition to the evolution of physical forms, there is a second evolutionary process involving the transmigration of souls.

The soul is understood to be a unique indestructible unit of consciousness emanating from the universal conscious entity. These individual units of consciousness can be seen as identical in substance with the universal consciousness but much smaller in relative size and power.

The units of consciousness within the bodies of all species are thus qualitatively identical with each other, yet display a certain range of powers and abilities based upon the particular characteristics of the physical forms they inhabit. To understand this principle we can consider how a human driver can manifest different abilities according to the type of vehicle he is riding in. On a bicycle, a human can achieve a certain speed, but in a high-powered sports car, the speed and power increase. In an airplane, the human can fly and in a boat can cruise over water. In the same way, the conscious selves inhabiting different bodies manifest different powers and abilities, although they are all essentially identical.

Transmigration and Karma

Transmigration requires procedures to regulate the passage of the conscious self from one body to another. According to the Vedas, this process is carried out under

The Flatland story can illustrate the transcendental nature of the self. Living bodies are represented by plane figures and conscious selves by hypercubes, which can transmigrate locally or by moving to a "higher plane."

higher laws of nature known collectively as the law of karma. The conscious selves within lower forms such as plants and animals automatically progress until they reach the human form. The progression from lower to higher forms corresponds to development from lower to higher states of awareness.

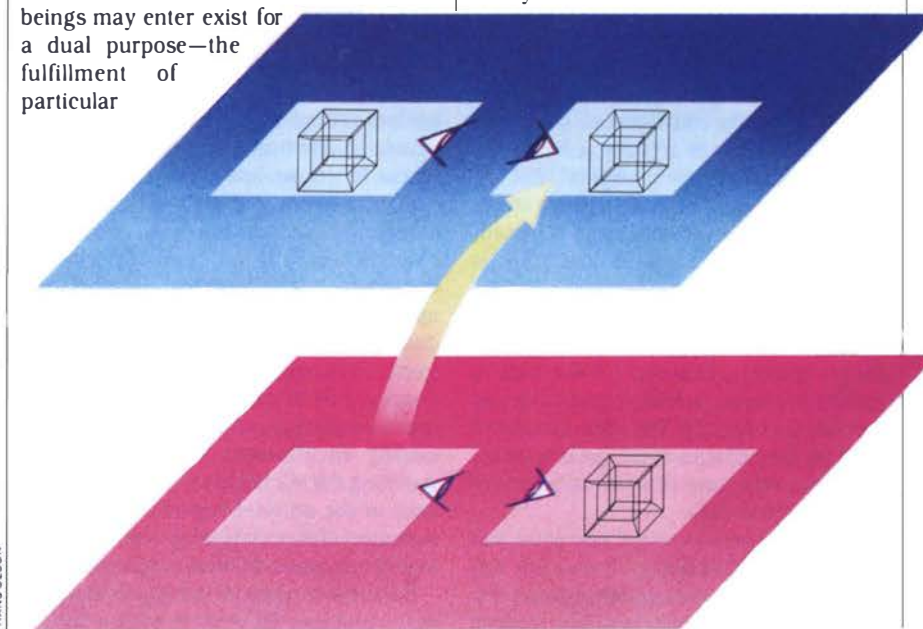
At this point, one might ask why a supreme intelligent being would put a conscious entity, or soul, through the experience of enduring birth and death in different kinds of bodies. The answer depends upon appreciating a fundamental aspect of the conscious self—its freedom to desire as it pleases. The constitutional position of every self is to knowingly and freely act in harmony with the desires of the Supreme. If a conscious entity misuses its free will to act independently of the Supreme, then He accommodates this desire by giving the entity a field of action in the material universe.

There it must endeavor for survival in an environment of competition and conflict among millions of other beings motivated by material desires like its own. These interactions among conscious beings are governed by a principle of universal justice called karma, under which their successes and failures, and happiness and distress, are awarded according to their actions in past lives. Every conscious being is thus personally responsible for its destiny.

The varieties of bodies the conscious beings may enter exist for a dual purpose—the fulfillment of particular

The self remains unchanged through molecular changes of the body and transmigrates into another body on the basis of the law of karma.

desires to experience material sensation, and gradual reformation of desire from material to spiritual. To the degree that a being misuses its freedom and acts in such a way as to harm itself or others, it must endure correspondingly greater restrictions in its ability to act.



The desire of God is that the soul return to the spiritual level of existence. But by its own choice the soul may remain in the material world. In life forms with consciousness less than human, the living entity is fully controlled by material laws. In the human form consciousness is evolved to the point where one can see how the material energy is being directed by the universal controller.

This is the key to freedom, because at this level one is able to make conscious choices affecting his status. The law of karma strongly influences the situation in which a person finds himself, but it does not strictly determine his future—there is latitude for free choice. The conscious being can choose to disregard the will and purpose of the universal controller and continue taking birth again and again in the material world, perhaps regressing to less-than-human forms. Or he can desire to act in harmony with this will and purpose and thus become liberated from the cycle of birth and death and engage in spiritual sensory activities.

Spiritual sensory activities are possible because sense perception is an inherent function of the conscious self. A physical sense structure such as the eye or ear is merely a mechanism for channeling a certain type of sense data to the perceiving self, known in Vedic writings as the *jīvātmā*. The brain is an information-processing device that is part of this sensory apparatus.

The senses and brain may therefore be considered an interface between the outside world and the conscious self (*jīvātmā*). But this interface is actually a limitation upon the original sensory capability of the *jīvātmā*, because the material sense structures are designed to register only certain material phenomena. This limitation is necessary if the soul is to function in forgetfulness of its spiritual nature and independently of its connection with God. It is always possible, however, for the soul to awaken its original sensory capabilities and perceive God directly. The Vedic literatures describe the histories of the great devotees and sages who have achieved this state of superconsciousness.

There are various levels of awareness and activity possible within the limits of the material senses. A person on the ordinary human level of consciousness will be aware of



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If there is a supreme intelligent designer of the universe, He must exist in a dimension beyond the material time and space He generates and controls.

only the familiar material phenomena known to all of us. But beings with higher levels of awareness, including those such as *devas*, or administrative demigods, have access to deeper and more extensive aspects of material reality. For example an ordinary person looking at a television program sees only the forms of people on the screen. But an electrical engineer may understand exactly how the images are produced and have direct access to the electronic equipment that generates these images. Just as the engineer working at a television station operates in a more sophisticated environment than the person watching the television at home, there may exist in the universe higher and lower dimensions of material reality corresponding to different levels of material perception.

If there is a supreme intelligent designer of the universe, He must exist in a dimen-

sion beyond the material time and space that He generates and controls. The individual soul, being completely spiritual, may also enter this dimension. At this highest level of consciousness the senses of the *jīvātmā* become unimpeded in their operation, and one can directly perceive the cause of all causes.

Scientists have been engaged for centuries in a philosophical quest for an ultimate unity underlying the variegated universe. Today this takes the shape of the physicists' search for a grand unified field theory to explain everything from subatomic particles to galactic clusters. Such endeavors to find a unifying material principle have, however, not been successful.

It might therefore be fruitful to consider the unifying aspect of a supreme conscious entity. To understand this unifying aspect we can draw a parallel between the supreme conscious entity and the qualitatively similar individual conscious beings such as ourselves. Even as you are reading this your consciousness is unifying different aspects of reality—the maga-

zine, your self, the environment, your thoughts—into an single integrated impression. Similarly, the one universal conscious entity, sometimes known as the Supersoul, is the integrating principle that ties the universe into a complete whole. All-pervasive consciousness is the distinct characteristic of the Supersoul, in contrast with the infinitesimal living beings, whose consciousness is extremely limited in scope.

In the *Brahma-saṁhitā*, a collection of hymns from the Vedic literatures of ancient India, the author describes how the universal conscious entity ties together all aspects of reality. "He is an undifferentiated entity. . . . All the universes exist in Him and He is present in His fullness in every one of the atoms that are scattered throughout the universe, at one and the same time. Such is the primeval Lord whom I adore." Everything, right down to the atom, is the energy of the transcendental controlling intelligence, and is thus unified. Most concepts of unity put forward the idea of a oneness that underlies all phenomena and is devoid of qualities. But we are suggesting that the ultimate oneness is full of qualities, personality, and variegated form.

Although our own intelligence can be

applied to the forms and patterns of matter and thus lead us to certain conclusions about the existence of the universal controller, detailed knowledge about this supreme being and His transcendental actions must be obtained through another process. According to the Vedic account, the ultimate source of absolute information is providing information for the design of organisms. He is also providing information for the functional intelligence of living beings, enabling them to perform complex activities. In addition, this original being can provide information about Himself.

The *Vedas* give an elaborate description of how this absolute information is disseminated. Essentially this knowledge is communicated via sound vibration. The information is communicated to the first living being in the universe, Brahmā. And then it is passed down from one spiritual teacher (guru) to another in a chain of disciplic succession. The Vedic sounds are qualitatively different from material sounds in that they embody rather than simply represent knowledge.

His Divine Grace A. C. Bhaktivedanta Swami Prabhupāda, the world's most renowned Vedic scholar and himself one of the great spiritual masters in the disciplic chain descending from Brahmā, states, "Before the creation the Lord was there, and therefore the words spoken by the Lord are vibrations of transcendental sound. There is a gulf of difference between the two qualities of sound, namely *prākṛta* and *aprākṛta*. The physicist can deal only with the *prākṛta* sound, or sound vibrated in the material sky, and therefore we must know that the Vedic sounds recorded in symbolic expressions cannot be understood by anyone within the universe unless and until one is inspired by the vibration of supernatural (*aprākṛta*) sound, which descends in the chain of disciplic succession."⁹ A material sound is different from the object it represents. For example, the word *water* is different from the substance water, but Vedic sounds are nondifferent from the spiritual realities they represent. By receiving the Vedic sounds from the proper channel, the spiritual realities embodied in them are directly communicated to the receptive listener. The requirement is that one receive



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The science of bhakti-yoga has practical methods for elevating sensory perception so that one can actually perceive the Supreme Being.

the knowledge as heard and pass it on without change. In this way the information remains perfect. At a certain point in history the Vedic sound vibrations were set into writing by the great sage Vyāsadeva. These writings form a standard body of knowledge, and the teachings of spiritual masters can thus be examined to see if they conform to the Vedic texts such as *Bhagavad-gītā*.

The ultimate goal of knowledge is restoring the conscious self to its original position free of matter. In the conditioned state, the conscious self attempts to exercise its faculties apart from the Supreme, but in the liberated state the self is able to reciprocate on a direct personal level with the supreme person. *Bhakti*, or the science of devotional service, is the means for cultivating this transcendental relationship.

The means for awakening this relationship vary throughout history. In the present

age the *Vedas* recommend the chanting of mantras composed of the names of God, particularly the Hare Kṛṣṇa mantra. The basic principle is that God is present in the sound of His name. When consciousness is covered by material conceptions, it cannot properly perceive the self or the Supreme. But the spiritual energies contained within the transcendental sound vibrations of the Hare Kṛṣṇa mantra have the power to remove the material coverings of the self, thus awakening its original spiritual consciousness and freeing it from the karmic reactions that entangle it in the cycle of reincarnation.

Scientists have long criticized religion for proposing explanations that one can believe or not believe but which cannot be reliably tested. But the science of *bhakti-yoga* does have practical methods for elevating sensory perception so that one can actually perceive everything that we are discussing—the soul, the Supreme Being, and the higher spiritual dimension.

At this point some might claim that such experiences

are available only to special individuals and are therefore not really acceptable as scientific. This charge can more accurately be leveled at material science. Particle physicists with access to high-energy particle accelerators may be able to confirm the existence of certain subatomic particles, but the average person is not equipped to do so. On the other hand, everyone has the potential to experience the spiritual knowledge that can be gained through the science of *bhakti-yoga*. No special equipment is necessary.

The reason that not everyone is able to immediately obtain direct perception of nonmaterial phenomena is that there are necessary conditions for the elevation of consciousness to work. This is also true in science. For instance there was an experiment performed by the renowned English physicist Henry Cavendish (1731–1810), for determining the gravitational constant. In this experiment, a dumbbell is suspended by a thin wire. Iron balls of a certain mass are placed opposite each end of the dumbbell, and by their influence the dumbbell moves slightly. When the iron balls are reversed, the dumbbell is moved in the opposite direction. By calculation one can determine the gravitational constant.

But if there is outside interference from traffic, for example, there is no possibility of getting an accurate reading. Extraneous influences must therefore be carefully excluded from the system. In spiritual science also, certain factors must be excluded in order to get the desired results. There are certain activities detrimental to higher consciousness. These disturbing influences, which according to the Vedas keep consciousness on the material platform, are gambling, meat-eating, illicit sex, and

“Yet there is another unmanifest nature, which is eternal and is transcendental to this manifested and unmanifested matter.”

—Bhagavad-gītā

intoxication. A practitioner of *bhakti-yoga* therefore carefully avoids them. So-called yoga societies that allow their members to continue the above-mentioned habits cannot deliver real spiritual realization.

The ultimate stage of *bhakti-yoga* is understanding the activities of the supreme consciousness in the spiritual dimension. The most confidential sections of the Vedic literatures describe some of these activities. We have already spoken of the idea of higher dimensions of existence, and we have indicated they become accessible by the attainment of higher levels of consciousness. The Vedic literatures reveal the existence of a spiritual realm that is quite distinct from this material universe and that in fact constitutes the major portion of the total reality. The *Bhagavad-gītā* states, “Yet there is another unmanifest nature, which is eternal and is transcendental to this manifested and unmanifested matter. It is supreme and is never annihilated. When all this world is annihilated, that part remains as it is. That which the Vedantists describe as unmanifest and infallible, that which is known as the supreme destination, that place from which, having attained it, one never returns—that is My supreme abode.”

God does not create just the material universe. He has His own transcendental variegated realm in which He engages in pastimes for His own satisfaction. God is the supreme enjoyer, and innumerable spirit souls on the highest platform of consciousness live with Him and directly associate with Him. They serve the Lord constantly without selfish interests. The Lord reciprocates with them by serving



PARIKSIT DASA

The constitutional nature of the soul is to reciprocate in a relationship of loving service with the Supreme Person, who eternally exists in His transcendental form of Kṛṣṇa.

them in turn, and thus both the Lord and His devotees experience varieties of spiritual pleasure that far surpass any material pleasure. The nature of these exchanges constitutes a science in itself.

In this magazine we have briefly presented an alternative to the mechanistic concept of the universe, a science based upon consciousness and personality rather than atoms and the void. W. Heitler, a theoretical physicist at the University of Zurich, says in his book *Man and Science*: “Belief in a mechanistic universe is a modern superstition. As probably happens in most cases of superstition, the belief is based on a more or less extensive series of correct facts, facts which are subsequently generalized without warrant, and finally so distorted that they become grotesque. . . . The ‘witch superstition’ cost innumerable innocent women their lives, in the cruelest fashion. The mechanistic superstition is more

dangerous. It leads to a general spiritual and moral drying-up, which can easily lead to physical destruction. When once we have got to the stage of seeing in man merely a complex machine, what does it matter if we destroy him?”¹⁰

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Alien Identities *Ancient Insights into Modern UFO Phenomena*

by Richard L. Thompson (Sadaputa Dasa)

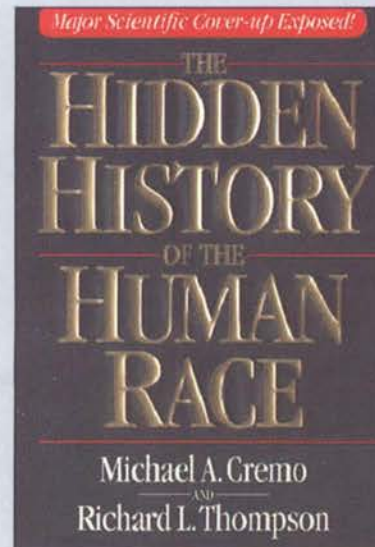
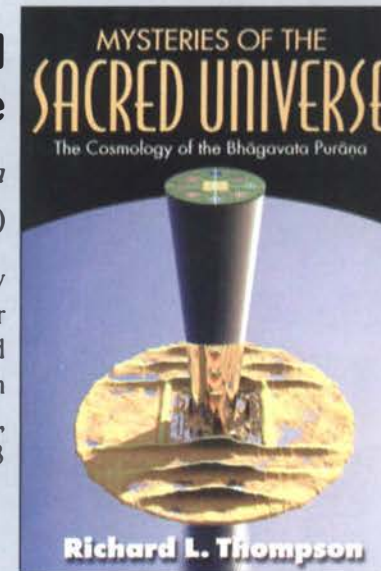
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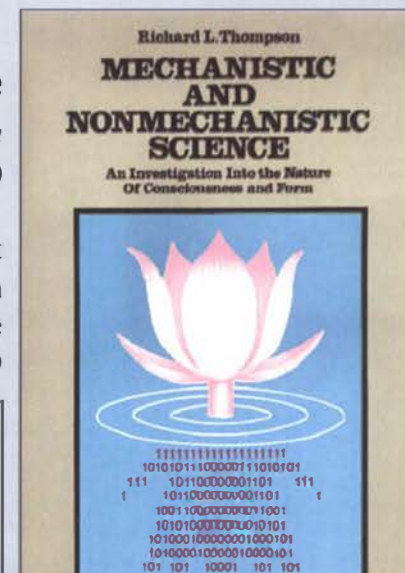
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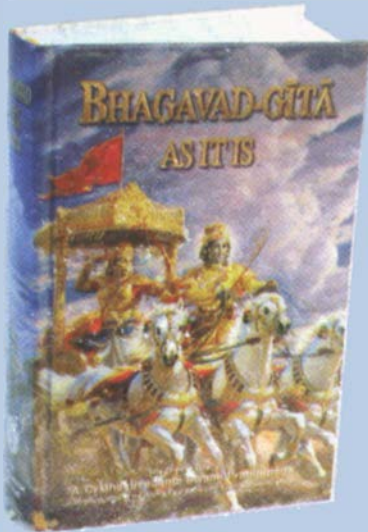
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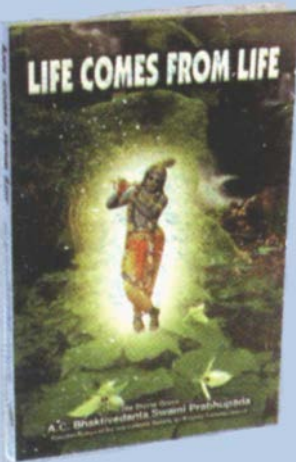
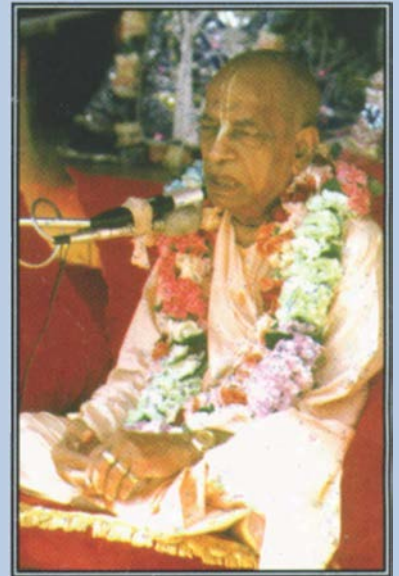




Bhagavad Gita As It Is

by His Divine Grace A.C. Bhaktivedanta Swami Prabhupada (right)

The Bhagavad Gita presents a scientific knowledge of the individual living entity—the soul, the Supreme Being, and their relationship. Modern science's attempts to understand consciousness have met with very little success till now. Bhagavad Gita, being the essence of the Vedic wisdom presents an alternate epistemology (method of acquiring knowledge) to understand consciousness and God. This epistemology is not just theoretical but contains practical techniques that have worked with many seekers from time immemorial. After all science is about explaining all our experiences, so if science cannot explain consciousness, through which we “experience” all our experiences, can science be said to be complete?



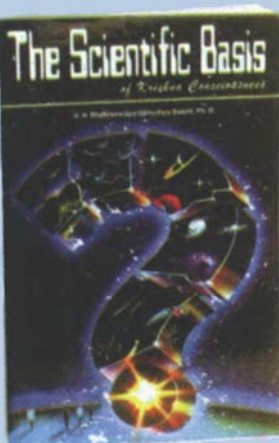
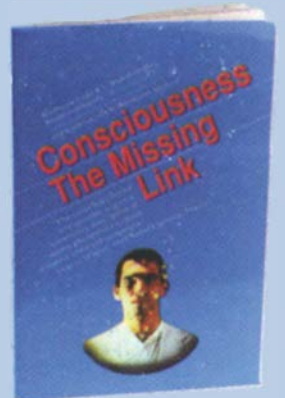
Life Comes From Life

Life Comes From Life is an impromptu but brilliant critique of some of the dominant policies, theories and presuppositions of modern science and scientists by one to the greatest philosophers and scholars of the century, His Divine Grace A.C. Bhaktivedanta Swami Prabhupada. It will be an eye-opener, especially for those who accept every pronouncement of modern scientists as gospel truth. Srila Prabhupada's vivid analysis uncovers the hidden and blatantly unfounded assumptions that underlie currently fashionable doctrines concerning the origins and purpose of life.

Consciousness—The Missing Link

What is Consciousness? What is that “IT” that makes a living person different from a dead body? These questions have intrigued man since the dawn of creation, and it is not surprising that scientists of our times too have attempted to find the answers to these questions.

In this book Srila Prabhupada explains the soul from a scientific point of view to an eminent physicist. Also contains essays by scientists of the Bhaktivedanta Institute.



The Scientific Basis of Krishna Consciousness

In this book the author systematically unravels the wonders of the physical world as discovered through the physical and life sciences. Then as a spiritualist, he explains God's role as the Supreme Scientist in bringing about this manifested reality. The author, His Holiness B.S. Damodara Swami combines a rigorous academic background (a Ph.D. in Analytical Chemistry from the University of California, Irvine, U.S.A.) with more than thirty years of spiritual experience as a renounced monk. This book is a must for those seeking an introduction to the relationship between science and religion.