Is There a Monkey in the Family Tree?

by

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The dirt road runs westward, from a point about 25 Kilometers north of the Mexican city of Uruapán, toward the village of Los Reyes. In the vicinity of the cluster of huts called Angahuán, and on the south side of the dirt road, stands a volcano. It has a classical cinder-cone geometry, jutting hundreds of meters above the adjacent hills. This is the volcano Paricutin, which first erupted as a hissing sound in a tiny fissure in a corn field, in 1943. The farmer, who with his burro, was plowing the field, was fascinated, then frightened, by the tiny volcano, which quickly built a cone only a few centimeters high. He rushed into the village where he lived, and reported how he threw away a cigarette butt, and "set the world on fire." Over a period of twelve years, Paricutin grew until it was almost 400 meters high. During this interval it poured forth hot lava, ash and cinders, and a great deal of smoke. It buried the nearby town of San Juan Parangaricutiro, first with ash, and then with lava. For a while the residents tried in vain to sweep the ash off of their roofs. But the weight became too great, and houses began to collapse. In due time hot molten lava invaded the village. In 1950, only the church steeple -- sticking up through and above the lava -- could

be seen as a monument to the town that had been destroyed.

In its last days of activity, this volcano developed a series of strong explosions, throwing hot blocks weighing up to 100 tons each into the country-side beyond the base of the cone. When I visited the volcano, all was quiet, and mist hung low over the peak, as if nothing had ever happened there.

We now call this volcano "dormant." We do not know if it is "dead." But we have studied its life history intensively, with various geologists risking their lives, up inside the steaming field of hot, flowing lava, in order to learn more about the cycle of volcanism. The crater was born, it grew to maturity -- and a very impressive maturity, too -- and finally its activity died down to a whisper, and then ceased.

Surtsey erupted under the waters of the Atlantic Ocean, south of Iceland, in 1963, and quickly built a large cone up above sea level, forming the island of the same name. In a few years the lava and ash and cinders and smoke ceased, and the volcano now appears to be dead. It went through a life cycle, from birth to apparent death.

Krakatoa, a tree-covered mountain almost 800 meters high, between Sumatra and Java, vanished in a monstruous explosion in 1883. The sound of the main explosion was heard hours later in Australia and on the coast of India, and on an island not far from Africa, almost 5,000 kilometers

away. Barometers all over the world picked up the shock wave, and ash in the atmosphere colored the sunsets in North America and Europe for two years. About 36,500 people, living along nearby coasts, lost their lives in the giant sea wave which was set off by the explosion.

The first investigators to enter the area discovered, instead of a mountain, a giant hole: the explosion crater, extending downward for 300 meters below sea level. In two more years we will celebrate the 100th anniversary of the eruption of Krakatoa. But what has the volcano been doing during this century of quiet? It has built a new cone in the middle of the old crater, and is now showing signs of increasing activity. In the geological tomorrow, it will probably erupt violently again; it has a life cycle, very much like, but not identical with, the life cycles of other volcanoes.

Each year the Mississippi River rises in its annual spring flood, carrying tremendous quantities of water and other material, the latter including both solid load and dissolved load. Other rivers in the United States carry smaller quantities, but there are many of them. The total load carried each year into the oceans is fantastic. Since the advent of the Europeans in North America, the annual erosion rate has been several centimeters per century, varying from relatively low in the eastern part of the country to relatively high in the western part. But one

centimeter per century is 100 meters per million years, and one kilometer in ten million years. These are not fanciful numbers; the presence of fragments of old erosion surfaces, high in mountain ranges such as the Rocky Mountains, shows that erosion has removed a sheet of rock, kilometers thick, since the last major episode of mountain-building.

In the case of a single stream, such as the Mississippi River, we observe clearly an important process: sediment transport. This process has an initiation: erosion in the interior of the continent. It also has a termination: deposition in the edge of the ocean. The initiation, or erosion, shows us that the land surface is gradually being worn down to lower levels: that is, it goes through a history of some kind. And the deposition, or construction of a delta, shows us that space near the continental margin is gradually being filled up; again, a history of some kind as the delta grows from small to large, from thin to thick, from simple to complicated. The stream, however, continues to connect these two different regions; because they are changing, it must also change. Therefore, when you stand on the banks of the muddy river, in flood time, and observe the dirty brown color, you see the farms of Kentucky and the wheatfields of Kansas flowing past. You should make the obvious comment: "I am watching the development of the life cycle, not only of a river, but of the interior of a continent, and of one of its edges."

In this sense, the valley of the Colorado River, in Arizona -- known to tourists as the Grand Canyon -- is said to be in youth. It is still steep and deep and sharply incised. The valley of the Mississippi River, on the other hand, is said to be in maturity, a more advanced stage of development. All rivers pass through some such sequence. Even a stream made by placing the garden hose over a pile of sand in the sand box goes through a similar cycle.

I live in Tallahassee, Florida, specifically because it is close to a sandy coast, where wave energy levels are not too high. Along high energy coasts, natural processes operate so rapidly that they are very difficult to observe. Along very low, or zero, energy coasts, natural processes develop so slowly that one needs centuries in order to see the changes. In Tallahassee I have easy access to a coast where changes are obvious, and where I can study, in detail, the development of a shore system, as wave energy and sand are redistributed along the beach. We may speak of "youth" and "maturity" of the system, and somewhere down the line -- if nothing interferes -- we arrive at the condition where nothing much changes any more: the life cycle is over.

Glaciers can be observed to develop. They have not always been present where they are today, nor will they

always continue to be present in the same locations. The great ice sheet which covered the eastern third of Canada and the northeastern quarter of the United States, up until about 10 thousand years ago, grew from a modest beginning, to a maximum extent and thickness, before melting away, leaving thousands of foot-prints for the geologist to interpret in terms, if you will, of a life cycle.

A compass can be used to map the earth's magnetic field. That field has local peculiarities, which change from year to year. The main features of the magnetic field drift slowly westward, requiring that a new magnetic map be issued every ten years, because the old one is no longer valid. In New York City, a simple compass needle does not point due north; instead, one must make a correction to the compass reading, and that correction depends on the year when the reading was made. Even in Louisville, the simple, uncorrected compass does not give you the north direction.

Furthermore, if you come back to Louisville in 100 years, the correction that will be needed then will be markedly different from the one that is necessary today . The Earth has not always had a magnetic field. We do not know precisely at what moment the magnetic field came into existence, but it is clear that it arose after an

interval in which no such field existed. The other terrestrial planets (Mercury, Venus, Moon, Mars) do not have planet-wide magnetic fields today, but only very small local fields due to the presence of small bodies of magnetic rocks. Presumably the Earth's magnetic field will decay, in the remote future, so that a compass will then be useless on this planet also. The dynamo which is presently generating the field, deep within the Earth's core, cannot run for ever -- for various reasons -- and therefore the magnetic field must ultimately grow weaker and weaker and vanish. Meanwhile the field goes through both small and large changes, from year to year, from century to century, from millenium to millenium. It even drops to zero, from time to time, because of mechanical troubles with the core, but so far it has always been re-established in a matter of a century or so.

The earth's rotation is not fixed, and therefore the day constantly changes its value. There are slow, long-term changes, with the day getting longer and longer as the rotation rate decreases. This change, although very slow (only 2 seconds in the day, each 100,000 years) is fast enough that, way back in geological time, the day contained only a few hours. Projected into the geological future, this slow change will result in a day that is, on the average, 8766 hours long. How long is that? Using modern hours, it is one year. At that time, one side of

the planet will face the sun continually, in perpetual daylight, and the other side will look out onto the darkness of empty space. One side will be very hot, with no nighttime hours in which to cool off, and the other side will be very cold, with no daylight in which to warm up. Mercury has already reached this stage of development: one day equals one year; and Venus is close to it. The Earth is headed in the same direction, as the history of the time unit, one day, continues to unfold.

The universe is going through a very rapid expansion. At one time in the past it was much smaller than it is now; tomorrow, geologically speaking, it will be much larger. The rate of expansion is so fast that, despite the huge distances involved, the entire system appears to have been trapped in a very small volume, at the moment of creation, some 20 or 30 billion years ago. Did anything material exist before that great explosion? We have no way of knowing. But the evidence of the explosion is everywhere, and the universe has gone through a process of "growing" ever since that catastrophic event far in the dim past. Because the universe is changing from day to day -- getting more diffuse, or spread out, among other things -- there must be, ahead of us, a future that is different from the present, and hence a "life cycle" of sorts.

I have touched on only a few examples. I have not

mentioned changes in the atmosphere, changes in mean sea level, changes in mountain systems, changes in lakes, changes in caves, changes in landslides, or changes in countless other things. In fact, essentially everything is changing. The everlasting hills are not everlasting -- not by a wide margin -- and neither is anything else, much. We live in a world where change is the rule, not the exception. Some of the changes are so rapid that we do not see them, and some are so slow that we do not believe there is any change. But it should be seen as a truism for the visible, tangible world that the only thing that doesn't change is that it all does change.

In this section, up to this point, I have used a variety of words to describe what is going on: change, development, "life" cycle, redistribution, drift, expansion,history, unfolding. I have not used, up to this point, another word which would serve very well indeed. If I may adopt that word, I can say that essentially everything is evolving: volcanoes, rivers, lakes, dune fields, glaciers, landslides, caves, beaches, the planet as a whole, the solar system, the galaxy, the universe. Evolution is all about us, and I want you to understand that it is the norm.

Again, I have limited my list; everything I have treated, to this point, has been inorganic. The solid rocks are evolving, the mountains are evolving, the

continents are evolving, the oceans are evolving, the atmosphere is evolving, the planet is evolving -- and this evolution is taking place before our eyes. Only when we turn to the most mobile and plastic world of all, the world of life, do we suddenly get a loud chorus of rejection from people who cannot really see any long-term changes in the system. Everything changes, everything develops, everything unfolds, everything evolves. The organic world, the most fragile of all, evolves along with all the rest.

I am reminded of various controversies which, although clothed in religious terminology and pegged to some verse or two in the Bible, really have very little to do with the Bible. An outstanding example was the "flat Earth" debate. Presumably-intelligent people hold, today, that the planet is a flat, four-cornered plate, with sharp edges, from which we might fall if we venture too close. I suppose this stems from (1) our perception of scenery, as we gaze at it; clearly the earth is flat; and (2) the statement, in some commentaries on the Bible, about the four corners of the Earth. The visible curvature of our planet, which some of us have been privileged to observe, the repeated circumnavigations in all directions, the circular shadow cast on the moon, the vast array of data from detailed mapping, the evidence from gravity measurements: these should have settled the argument

long ago. But is turns out that no amount of evidence is persuasive for some people. For them, the earth is flat, and there is no point in talking about it. As the old saying goes, "My mind is already made up, so don't confuse me with the facts."

Another example was the geocentric system. It was argued, in the early history of this debate, that the Earth had to be the center of the universe, because God had placed mankind here. In fact, the Earth is not centered in any space at all, except the precise space occupied by the Earth itself. Our planet is an undistinguished member of an undistinguished star system, in the backwaters of a very ordinary galaxy, in a part of space having no particular claim to fame. Spiritually, this is fortunate; we certainly are not No. 1, astronomically, and therefore we have no prestige, in terms of coordinates, to boast about.

A third example is the idea of a universal flood. There is no geological evidence for such a flood; although local floods have been common in the geological record, they do not correlate with each other, and there have been thousands of them. The uninformed may find some of this evidence, and make the mistake of thinking that it represents a single world-wide catastrophe. Furthermore, the Bible does not require a universal flood. The flood of Noah, covering "all the world," was no more

universal than the census-taking of Caesar, which was described by Luke as extending to all the world. It should be quite clear that the Quechua Indians of Peru were not affected by Caesar's order, and that no Roman census-taking was carried out among the primitive peoples of Australia. "All the world," in both cases, means -- as it commonly does today -- "all the world that we are talking about." This simple observation, based on a necessary limitation in the Gospel according to Luke, solves a lot of the problems, including geological problems, which arise from a blind extrapolation of "all to the world" to a twentieth-century interpretation.

The most durable of all, however, has been the battle over evolution. It has not subsided, nor do I think it will. This debate, or whatever you want to call it, has turned up all sorts of things in lieu of evidence. As some have phrased it, "You don't really want a monkey for a grandfather, do you?" No, I don't, and I have not met any scientist who did. Furthermore, I know of no rational hypothesis which places a monkey in my family tree. The monkey actually got into the family tree, because many people have forced him there, thinking that by doing this they would somehow destroy all of the evidence. Without their help, however, there is no monkey in the family tree. But isn't "a monkey in the family tree" the essence of the idea of evolution? No, it isn't.

However, the concept of evolution is a real problem for large numbers of people, monkey or no monkey. Some of them resent the monkey idea, some of them don't understand even the words that are used, and some of them start with the point that God created man and therefore that man cannot have evolved. Any use of the word "evolution" then becomes, for many people, a manifestation of wickedness. I read recently that at least one person has said that a Christian cannot be an evolutionist, any more than he can be a murderer or a prostitute. That statement shows a vast misunderstanding, at both ends of the scale, with its implication that as soon as one becomes a Christian he rejects the small handful of cardinal sins, such as incest and torture and evolution.

The subject has been wrapped in such a thick layer of emotions that, in many circles, it is impossible to discuss it. Various people have devoted their lives (I mean that, literally) to the task of "stamping out evolution". Nevertheless, despite the fog and smoke and acrimony that surround it, it is worth our time to take a closer look.

First, I have spent a good deal of time, today, in an effort to show that evolution is the norm, and not the exception. Essentially everything changes, including the organic world.

Second, we must distinguish between "evolution" and "belief in" evolution. Evolution operates, throughout

the world around us, regardless of what we believe. If an eminent biologist states that, as a specialist, he does not "believe in" evolution, I will defend his right to say that. Most of the geologists I know would probably tell you that they do believe in evolution. That doesn't make any difference, either. I do not believe in sunshine, or the Big Dipper, or trigonometry, or waterfalls, or mockingbirds. I observe them, in one way or another, and I note that they are there. From time to time I even use some of them: gravity, for example, which dogs my every step. But I do not "believe in" gravity.

"To believe in" something means to put your faith in something. I place no part of my faith in gravity, or sunshine, or trigonometry -- or evolution. Furthermore, I consider it a misdirection of faith to base it, in any significant way, on non-spiritual matters. My faith does not hinge on my perception of time, or temperature, or wind speed, or earthquake damage, or any number of other things and processes. The evidence concerning evolution is both extensive and clear. However, I do not care whether the theory is true, or not: and, if tomorrow you show me a better device for tieing together a myriad of observational facts, I will be delighted to ditch the theory of evolution.

This is not just empty talk. It is the business of the scientist to continually test hypotheses, and to

turn them upside down when a more nearly consistent scheme has been developed. Therefore I do not wish to say either "I do believe in evolution" or "I do not believe in evolution." But I do not mind saying that, in the absence of a better explanation, I use the key idea. And I apply it to almost everything.

For the geologist, organic evolution describes the long sequence of changes which have taken place in the world of living things, since they first appeared as simple unicellular organisms in the dim recesses of Precambrian time, up to and including the appearance of hominids. The sequence is well established, and, as far as I know, without exception. A great deal of effort has been put into the drive to discredit the sequence, and I am familiar with some of the results of that program. As far as I can tell, they have all been based on misidentification of fossils, misreading of the rock record, or some other rather clear misuse of the field data. I want to recount one example in detail.

In extreme north Georgia, not far from the town of Blairsville, is a locality called Track Rock Gap. The rocks exposed, there, are Precambrian in age, and it is well known that advanced animals, such as vertebrates, did not exist in Precambrian time. Therefore the report of human footprints, within the Precambrian rock, is a matter of very great interest. If the report is correct, then

either the dating procedure is badly wrong and will have to be revised or perhaps discarded, or, on the other hand, mankind has existed on the face of the earth for billions of years. Those who hold to a very late creation (circa 6,000 years ago), will reject the second (man in the Precambrian, correctly dated), and will accept the first (the dating method must be discarded). Accordingly, I studied the rock exposures at Track Rock Gap.

There are several footprints, making up a trail. Each foot print is quite fresh, sharply outlined, and easy to study. The trail continues for a significant distance. The rock, where these tracks are found, is a metamorphic rock; this is a variety which has been subjected -- since it was first formed -- to tremendous heat and pressure, so that the characteristics of the original rock have been destroyed. I have now stated three rigorous scientific observations, which I wish to review in detail. Each of these three, by itself, eliminates the suggestion that these images represent Precambrian fossils. Nevertheless, people who wish to believe the "late creation" idea continue to cite the Track Rock Gap locality in support of their position. Let's go over the field evidence.

No. 1. The prints are quite sharp. This should be compared with tombstones in the same area, where carvings made 150 years ago have been weathered and blurred so badly that some of them can no longer be read. The same

atmosphere works in Track Rock Gap and in nearby cemeteries. From this observation we conclude that the markings (a) are not Precambrian, (b) are not as old as the local rock mass, and (c) are not even more than about 200-300 years old.

No. 2. The trail continues for a significant distance, up one side of a small hillock, and down the other. That is, the prints are on the rock, rather than in the rock. Worded differently, they are on the modern weathered surface, and do not represent any time surface of any kind, within the rock. I could get exactly the same geometrical relationship by painting them with brush and paint. But markings on the present surface of the rock do not represent fossils that were made simultaneously with the rock. Therefore we conclude that the markings (a) are not Precambrian, (b) are not as old as the local rock mass, and (c) are not very old at all, since they lie on the present weathering surface.

No. 3. The rock is a metamorphic rock. In its history of intense chemical reworking, original fossils -- if there were any -- have been destroyed. Therefore we conclude that the markings (a) are not Precambrian, (b) are not as old as the local rock mass, and (c) must be relatively young.

I have recounted this story, on various occasions, and almost invariably some one objects that maybe some

other effect about which I do not know, has operated here, and therefore these rocks prove later creation. This is total nonsense. These same people should argue, with equal conviction, that $10 + $10 does not equal $20, because perhaps some other effect, about which I do not know, operates. Each single line of evidence -- and I quoted three -- is by itself sufficient to destroy the idea that we have Precambrian human fossils at Track Rock Gap. There is no room for doubt -- unless you wish to believe that the Earth was created last Friday.

I hope you are convinced about Track Rock Gap. I hope you understand that the evidence is unassailable. If you do understand this, then I will share with you some additional information. Each of the "foot prints" is a carving, having a sharply-defined instep, equal depth at all points from toe to heel and from left side to right, and different in size from the adjacent prints in the sequence. Furthermore, simple items like the number of toes are not consistent from one print to another.

I do not know who made the images at Track Rock Gap, or precisely when they were made. I will guess for you that they were carved by Indians, for ceremonial purposes, a couple of centuries back. If they were formed in some other way -- perhaps by Boy Scouts -- I do not mind. But I will guarantee that they have nothing to do with the length of Precambrian time, the antiquity of man on the

Earth, the date of creation, or the reliability of radiometric dating procedures.

There is a vast literature in existence, based on non-data, fabrication, and distortion. It is labelled as "scientific" by its proponents, and then it is passed off on the gullible in an effort to prove a late creation. It is garbage, and poisonous garbage, at that. Even if it turns out that creation did come late -- perhaps last Friday night-- the literature to which I refer is garbage. I say this with assurance, for two reasons. First, the logic is dishonest. And second, I do not wish a package of errors introduced as evidence in favor of <u>any truth</u>, including my faith in God.

The Track Rock Gap fraud is only one of many; I run into new ones regularly. Let me mention one more. It concerns a fossilized human fetus, so I was told, having no head, arms or legs, from Cretaceous-age rocks of southern Oklahoma. If it is indeed a fossil human fetus, then either humans lived on the planet in Cretaceous time, about 100,000,000 year ago, or we have proof of late creation. There are hundreds of these fossils, and, unlike the art work at Track Rock Gap, these are genuine fossils, obtained honestly from the local sedimentary rocks. But what else must we say? Fortunately for the cause of accuracy in research, many of these fossils are unbroken. They are rather large, but no record-setting, cephalopods,

which are found in many places where Cretaceous-age rocks are exposed. Any geologist should be able to identify even the fragments correctly. There are no heads, no arms, and no legs, even on those items which have the original unbroken circular symmetry and finely-detailed external layer. Only the ignorant or the dishonest would use them as evidence of late creation.

The simple fact is that we have an unparalleled record -- much more detailed, extensive, and complete than any book -- of millions of fossils scattered through hundreds of millions of years, arranged in a systematic array from the simplest as earliest, to the most complex as latest. The gaps in this record do not spoil the argument, anymore than tearing the middle hundred pages out of a dictionary causes me to lose the definitions that remain.

I am not concerned about whether the theory of organic evolution, introduced many years ago in an effort to explain the data, is correct or not. But I do note that, in science, there is no alternate theory, much less a superior one. If you happen to have a personal, private revelation from God, explaining that it was really done in some other way, I can only say that personal private revelations carry zero weight in the rational, systematic, replicable set of operations which we call science.

Let us make sure that we know what is being said here. The array of data is unbelievably extensive, and

it documents a long slow development from simple to complex. The theory of organic evolution has been proposed to account for that development. The data are trustworthy; the theory may turn out to be wrong. But it is the only scientific theory now available, and we will continue to teach it, until a more useful scientific theory has been worked out and matched with the data. Do I believe in the theory of evolution? That is a childish question. I use it, for the organic world as well as for the inorganic world. I will gladly replace it, when a superior substitute has been verified.

Why does the religious person feel that he must have scientific support for his faith? Is it that his faith is so weak that it cannot stand by itself, but must have a crutch labelled "proof," no matter how flimsy? I look back over evidences of this problem: Christian Science, for example; it has nothing to do with science, so it must be an effort to put a respectable gloss, of some kind, on a religious variant that needs that gloss. Scientology, for example; it is no more science than is witchcraft, or astrology, or the ouija board; but it cannot appeal to the gullible without the impressive trappings provided by some form of the word "science". So-called creation science, which is not science, fits in this category.

I seek no scientific confirmation for my faith. As a Christian, I do not care how the world was made, or when

the world was made; I am concerned about why the world was made, and what role I have in answering the question within my own life. As a scientist, I observe the evidences of how and when, but see no shred of a hint as to why.

I do not need to find one of the original nails from the cross to prove that it really happened; I do not need to see Abraham's tomb, or Moses' grave-marker; I am not upset that the Shroúd of Turin was painted with studio paints; I do not accept blurred photographs of rock ledges, purporting to show the remains of Noah's Ark; and I certainly would not accept a piece of deck planking with Noah's name on it. I do not want a faith that is based on mere scientific data, because science, like everything else in this world, evolves, and I do not believe that God evolves.

God created the world, and he saw fit to place me in it. He does not shield me from falling meteorites or drops of rain; I sunburn just like the non-Christian; and germs do not respect the fact that I belong to a church. But God did place me here -- I say that as an article of faith -- and he walks with me as I try to understand, to admire, to contemplate, and to cope with the evolving world which he created.

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