ADDITIONAL CLUES THAT SOMETHING IS WRONG WITH CONVENTIONAL DATES

By Ashby L. Camp

I. Introduction[1]

    A. Previously we looked at radiometric dating. I tried to explain the methods and the assumptions inherent in those methods. I pointed out how C-14 dating supports a young creation and how helium retention in zircons and discordant isochron dates for the same geologic event suggest that the rate of nuclear decay was accelerated at some points in the past. What I want you to see is that radiometric dating does not make belief in a recent creation impossible. If, as I believe is the case, God has revealed that creation is recent, then something is wrong with one or more of the assumptions on which conventional radiometric dates are based. I've tried to show that it is not absurd to question those assumptions.

    B. Before we look at some other indicators that something is wrong with conventional dating, let me reiterate my basic approach to this subject. Consider these propositions: 1. Scripture affirms nothing contrary to fact. 2. Scripture affirms that the cosmos and the basic kinds of all living things came into being over six actual days less than 10,000 years ago. 3. The cosmos and the basic kinds of all living things did not come into being over six actual days less than 10,000 years ago. All three propositions cannot be true (in the same sense at the same time). One must reject at least one of them to be logically coherent.

    C. If you've been in the class from the beginning, you know that I accept propositions 1 and 2 (and thus reject proposition 3). That means that I'm not examining nature trying to find out whether the cosmos and the basic kinds of all living things came into being over six actual days less than 10,000 years ago. I know they did because God has told me so in his Word, and I trust what he has told me. Rather, I am examining nature trying to understand how, *given the fact it's less than 10,000 years old*, it came to have its present qualities and features. Even when I don't know how a certain quality or feature can be explained in terms of a creation that is less than 10,000 years old, I trust that it can be and that some day I'll understand it, even if not in this life.

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[1] These are notes from a class I taught at church in 2005. That is why the sources are not carefully documented.   The facts asserted can be confirmed from the articles in my online list of articles of interest to creationists at http://trueorigin.org/camplist.asp and in the following books: Steven A. Austin, ed., *Grand Canyon: Monument to a Catastrophe* (Santee, CA: Institute for Creation Research, 1994); John D. Morris, *The Young Earth* (Green Forest, AR: Master Books, 1994); Ariel A. Roth, *Origins: Linking Science and Scripture* (Hagerstown, MD: Review and Herald, 1998); Don Batten, ed., *The Revised and Expanded Answers Book* (Green Forest, AR: Master Books, 2000); Jonathan Sarfati, *Refuting Compromise* (Green Forest, AR: Master Books, 2004).

D. Now, those who reject proposition 1 and/or 2 think I am forcing the data of nature to fit a false conclusion. Whether I'm right or they're right depends on whether propositions 1 and 2 are true. I hope that in the Church of Christ we're in agreement that proposition 1 is true. So the issue for Bible believers is whether proposition 2 is true. That's why I spent so much time on that issue at the beginning of the class. If the Bible is true, and if it says that creation is less than 10,000 years old, then all contrary interpretations of nature necessarily are false.

E. Imagine you happen to be visiting a morgue when a "John Doe corpse" is brought in. An angel of the Lord appears to you and says, "this John Doe was born in 1993." He then vanishes. You hear the ME dictating into his recorder, "The John Doe just brought in is approximately 80 years old." You tell the ME, "You are mistaken about the age. An angel told me this fellow is only 12 years old." He laughs and says "I base my conclusions on science, not on superstition. As you can see, this person is almost entirely bald, with some grey hair on the sides, and has wrinkled, baggy, and spotted skin. In addition, I just ran a test and determined that he has advanced hardening of the arteries!" Now, in the face of that evidence, you can conclude that the angel was wrong, you can claim that the angel didn't really mean that this person was born in 1993 ("born" really means "turned 70"), or you can continue trusting what the angel told you and seek to understand how someone 12 years old could be in that condition.

1. As you investigate, you find anomalies, things that don't fit with the conclusion of his advanced age. Maybe his eyes are too clear for an elderly person or his joints or teeth aren't worn enough. These things reinforce your conviction, based on your trust in the angel's word, that the ME is mistaken. The ME, however, gives no weight to the angel's testimony. The only evidence in his scales is the physical evidence. And the anomalies you cite are (so far) insufficient to outweigh what he interprets as strong or heavy evidence of aging.

2. You hope that, as you continue working from your conviction that the person is in fact 12 years old, you will discover how to make sense of the seemingly disparate data. In other words, you hope you will come to understand by reason what you know by faith to be true, to understand how a 12 year old boy can be bald, wrinkled, and have advanced arteriosclerosis. Because you're asking questions others are not asking, perhaps you will discover a medical disorder, like Progeria, that produces these symptoms in children. But even if you don't, you trust that such an answer exists and that one day, in this life or the next, it will be made known.

F. What I'm doing at this stage of the class is pointing out anomalies, things that don't seem to fit with the alleged vast age of the heavens and the earth. These indicators come from the fields of astronomy, geophysics, geology, biology, and anthropology.

II. Astronomical

      A. Comets

      1. Comets are "dirty icebergs" that orbit the sun. The nucleus, which is the actual "iceberg," is made of frozen material (mainly water, carbon dioxide, methane, and ammonia) mixed with dust. Comet nuclei range in size from a couple of miles in diameter to 25 or so miles. They have very long, elliptical orbits which take many years to complete. Short-period comets have orbit periods of less than 200 years; long-period comets have orbit periods more than 200 years. There are about 100 known short-period comets and 600+ known long-period comets.

      2. Each time the nucleus passes near the sun, the increased radiation heats it. The released gas expands rapidly into an envelope around the nucleus, called a coma, which ranges from 6,000 to 60,000 miles in diameter. The Sun's radiation ionizes the gas, which, along with reflection off the dislodged dust particles, makes the coma visible. Solar wind pushes the ionized gas away from the Sun, creating an ion tail that points straight away from the Sun, and the Sun's radiation pushes the more massive dust particles outward, producing a curved dust tail.

      3. Each time the nucleus passes near the Sun, it loses 1-2% of its material. So comets can only make so many trips around the Sun before they are reduced to invisibility. According to a January 29, 2004 article posted at the European Space Agency's website:

> A comet probably has enough surplus ice for a few hundred passes of the Sun. After that, it may become so weakened by the loss of material that it shatters, or its surface may become so choked with tar-like substances, left behind when the ice evaporates, that it forms a layer, insulating the remaining ice from further exposure to the Sun.
>
> If this happens it transforms into a 'stealth' comet! It stops producing a tail and joins the army of other near-Earth asteroids (NEAs).

      4. A realistic *maximum* orbital period for a comet is about 4 million years, because if it orbits further than that from the Sun, it would too easily be captured by the gravitational attraction of other stars. Our solar system is alleged to be 4.6 gya, and comet nuclei are alleged to have come from material left over from the formation of planets (there is no other known source). If the solar system really was 4.6 gya, no comets would still be orbiting. Even at the maximum orbital period of 4 million years, they would have made more than 1200 trips around the Sun, which is far too many. They would have been destroyed or extinguished long ago. And that does not include the losses that would occur over that time from collisions with planets (e.g., Shoemaker-Levy that hit Jupiter in 1994) and ejection from the solar system via planetary interactions (changing of orbit).

5. Those convinced the solar system is 4.6 gya propose that comets are supplied from a cloud (Oort cloud) of a trillion or more nuclei orbiting in a huge, more circular path, which always keeps them further from the Sun than Pluto. Since they never get close enough to the Sun to be diminished, they can last billions of years. Every now and then some perturbation causes a nucleus to fall into the inner solar system, into one of the observed comet orbits.

6. There are several problems with this proposal:

a. There is no observational evidence that the Oort cloud exists. It simply is postulated on the basis that comets cannot have orbited for as long as the solar system is alleged to have existed. In the words of that article at the European Space Agency's site, "The fact that comets die in what, astronomically speaking, is a short period of time (around 10 000 years), suggests that there must be a great reservoir of extra comets to restock them."

b. According to evolutionary theories of the origin of the solar system, comet nuclei came from material left over from the formation of the planets. This icy material was sent out to the Oort cloud in the outer reaches of the solar system by the gravity of the newly formed planets. All of the earlier studies ignored collisions between the comet nuclei during this process. A study published in *Nature* in 2001 considered them and found that most of the comets would have been destroyed by the collisions. So, instead of having a combined mass of perhaps 40 Earths, the Oort cloud should have at most the mass of about a single Earth. It is doubtful that this is enough mass to account for the comets that we see.

7. Short-period comets are alleged to have come from an inner belt of nuclei called the Kuiper belt. It remains doubtful whether the Kuiper belt exists. Over 600 Trans-Neptunian Objects have been observed, but the Kuiper belt would need about a billion icy cores. Moreover, the observed KBOs are much larger than comet nuclei. The diameter of the nucleus of a typical comet is around 10 kilometers. However, the recently discovered KBOs are estimated to have diameters ranging from about 100 to 500 kilometers (with at least one at 1,000 kilometers). Finally, even if the Kuiper belt exists, it explains only short-period comets.

B. Young Faint-Sun Paradox

1. According to the scientific establishment, life started on Earth 3.8 gya. Given conventional thinking about when and how the Sun formed and what powers it, it is acknowledged that 3.8 gya the Sun was 25-30% less luminous (fainter, or less radiant) than it is today.[2] With today's atmosphere, a drop of only 1-2% in the Sun's brightness

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[2] In model proposed in I.-Juliana Sackmann and Arnold I. Boothroyd, "Our Sun. V. A Bright Young Sun Consistent with Helioseismology and Warm Temperatures on Ancient Earth and Mars," Astrophysical Journal, 583 (2003), pp. 1024-1039, Sun would have been only 15% less luminous 3.8 gya. It then would *dim* until about 3 gya, at which time its luminosity would match the luminosity of the standard model and increase the same way as the standard model.

would transform Earth into a giant snowball, and a 1-2% brightening would boil away the oceans and cook all life. So how was the Earth warm enough 3.8 gya for life to get started, and how did it maintain for 4 billion years the nearly constant average temperature necessary for life to evolve?

2. The claim is that the atmosphere 3.8 gya was loaded with various greenhouse gases, and thus trapped more heat. Over the eons the atmosphere supposedly lost just the right amount of greenhouse gases to compensate for the increasing brightness of the Sun, thereby keeping the temperature nearly constant. This would require an incredible fine-tuning of all the factors that govern the creation, exposure, and erosion of continental land masses (silicates exposed to atmosphere remove carbon dioxide, and silicates comprise most of Earth's crust) and all the factors that govern the burial of organisms like photosynthetic plants and various bacteria that remove greenhouse gases (if they get buried before they can decay or be eaten by other organisms, they help reduce greenhouse gases).

3. The choices are: (1) insane luck, (2) a planet designed by God to evolve over eons, or (3) the Earth/Sun system is not billions of years old. Choice (2) is unacceptable to the scientific establishment and, in my view, contradicts Scripture. Creationist astronomer Danny Faulkner says regarding choice (3), "If Earth were recently created and designed to have the kind of atmosphere that it has now and the Sun has not changed appreciably in luminosity, the young faint Sun paradox has been resolved."

III. Geophysical

A. Earth's Magnetic Field

1. The main part of the Earth's magnetic field is dipole, meaning it has only two poles, North and South. However, parts of the magnetic field are non-dipole, having four poles, eight poles, and on up in multiples of two. In 1967 and 1968, two scientists published a systematic analysis of the measurements of the strength of the field made from 1835 to 1965 revealing that during those 130 years the strength of dipole field had steadily decreased by over 8%.

2. The scientific establishment's explanation was that the magnetic field was undergoing a gradual reversal. The energy being lost in the dipole part of the field was not being dissipated as heat but was being stored in the non-dipole parts, where it would later be converted into a new dipole field with reversed polarity. (The establishment also claimed that some energy from the dipole part was going into an unobservable part of the magnetic field in the Earth's core, but subsequent data indicated this part of the Earth's magnetic field was too small to be a significant reservoir for the energy disappearing from the dipole part.)

3. Data from careful measurements over from 1970-2000 establish that during that time there has been a *net loss* of energy from all observable parts of the magnetic field of 1.41% $\pm$ 0.16. In other words, contrary to the establishment's

contention, the dipole energy loss is not matched by a comparable gain in non-dipole energy. At this rate of energy loss, the magnetic field could not be more than around 36,000 years old.

4. Under Humphreys's model for how the Earth's magnetic field is generated, reversals occur, but they *decrease* the total energy in the field rather than sustain it or add to it. Given the decreases from reversals in the past, the age of the magnetic field in Humphreys's model fits the biblical time frame.

5. There is good reason for believing that Humphreys's model is correct.

a. Under the standard dynamo theory of the magnetic field, which claims that complex processes in the Earth's core have converted heat energy into electrical energy so as to maintain the magnetic field for billions of years, reversals require something around 1,000 years to accomplish. Under Humphreys's model, reversals can occur in as short a time as two weeks.

b. In 1986 Humphreys predicted that old lava flows should be found that demonstrate a rapid reversals of the Earth's magnetic field. A lava flow made of basalt that is a couple of feet thick takes a couple of weeks to cool. Iron minerals in the flow are like little compass needles. When the rock cools, it freezes them in the position they were in at that time. If the field reversed in the short time between the cooling of the outside and inside of the flow, the "needles" would be pointing differently in the outside and inside rock. Since that prediction, several such flows have been found.

c. In 1984, Dr. Humphreys made some predictions of the field strengths of Uranus and Neptune, two giant gas planets beyond Saturn. His predictions were about 100,000 times the evolutionary dynamo predictions. The two rival models were inadvertently put to the test when the Voyager 2 spacecraft flew past these planets in 1986 and 1989. The fields for Uranus and Neptune were just as Humphreys had predicted.

B. Sodium in the Sea

1. The oceans are alleged to be some 4 gya. For decades investigators have attempted to monitor sodium input and output in the oceans. Geologist Steve Austin and physicist Russ Humphreys authored a peer-reviewed paper in 1990 in which they calculated how long it would take for current levels of sodium to accumulate in the oceans. (Sodium, Na, is best known as a component of salt, NaCl.) They looked at all the processes that input sodium and all the processes that remove sodium.

2. At *present* rates of input and output, the ocean's present sodium content would accumulate in 32 million years. Using the extreme *minimum input* and *maximum output* values in favor of an ancient ocean, the *maximum* age that results is only 62 million years. According to T. M. Church, "An underground route for the water cycle," *Nature* 380:579-580 (1996), the rate of submarine groundwater discharge to the oceans

occurs at much greater rates than previously supposed, which means that sodium enters the ocean at greater rates than previously suspected.

　　　　3. The only response I have seen to this is the claim on the Internet that Austin and Humphreys grossly underestimated one of the removal mechanisms.

　　　　　　a. Here's what a knowledgeable source said to me in an email about the claim:

I had a good talk with Steve this summer [2003] about [the critic's] alleged "albite" sink. . . . The stupendous amount of albite [the critic's] idea requires to be in seafloor rocks away from the hot vents has never been observed, despite much seafloor drilling and sampling. The reason is simply that albite is not stable in the cooler sea water away from the vents. As the water cools, the albite loses its sodium (back into the seawater) and becomes another mineral (chlorite, if I recall Steve correctly).

A great deal of that mineral is observed in seafloor rocks. If [the critic's] idea were really any good, he should submit it to a professional geochemistry journal, such as <Geochemica et Cosmochemica Acta>. Such journals would be delighted to have a valid solution to their long-standing problem of sodium imbalance in the ocean. They would lionize the inventor of such a solution. . . .

This illustrates a very important principle: technical claims need technical review. The ICC got expert peer review, much of it from unfriendly folks, for the paper Steve and [Russ] submitted. [The critic] should get similar peer review for his claims. . . .

　　　　　　b. The expert on which the critic relies was a coauthor of a progress report on ocean sources and sinks given at an NSF-sponsored workshop on the Future of Ocean Chemistry in the U.S. on Jan. 6-9, 1998 (www.ofps.ucar.edu/joss_psg/project/oce_workshop/focus/progress/paper_two.html). The authors state, "Na likely has a small sink in high temperature hydrothermal systems, due to albitization which also results in a Ca source (but the direction of the Ca flux could be reversed on the flanks)." They don't provide any numbers, but "a small sink in high temperature hydrothermal systems" certainly doesn't sound relevant given the disparity between 32 or 62 million years versus 4 billion years, and even this is considered only *likely*.

　　　C. Erosion of the continents

　　　　1. As rainwater drains into rivers, it erodes the land over which it flows. By repeatedly sampling the water at the mouths of many of the world's rivers, sedimentologists have estimated the average rate at which the donating land is being worn down. The average erosion rate (rate of lowering) for North America has been

estimated to be 61 millimeters (2.4 inches) per 1000 years. At that rate, the continent would be leveled in "a mere 10 million years." In other words, the North American continent would have been eroded away about 250 times in 2.5 billion years (the assumed minimum age of the continents).

2. Measurements have also been made of how rapidly sediment from the continents is reaching the ocean. In a dozen or so studies, calculations have varied from 8 to 58 billion *metric* tons per year.[3] The average is 24.1 billion metric tons (26.5 billion tons) per year. These measurements are probably low, because they do not take into account (or arbitrarily estimate) the amount of sediments pushed along the bottom or the accelerated rates from catastrophes. But even at that rate, the continents, which average 623 meters (2044 feet) above sea level, would be leveled in 9.6 million years. If continents have really been around for 2.5 - 3.5 gya, why have they not eroded away?

3. Those convinced the continents are billions of years old have several replies, none of which are compelling.

a. They say the erosion is being offset by uplift of the continent and mountains, kind of like a melting ice cube. But that does not explain why the sedimentary rocks on the surface, which allegedly have been exposed to erosion for eons, have not worn away. For example, the Rocky Mountains and the Colorado Plateau allegedly were uplifted about 70 mya, but they're still covered with sedimentary rock. In the words of Ariel Roth (p. 266), "Present erosion rates would quickly remove the sediments of the earth's mountain ranges as well as elsewhere, yet sediments from young to old are still well represented."

b. They say current erosion rates are faster today because of human activity, but the most liberal estimates claim that increased erosion by only 2.5 times, and then only for the most recent few thousand years.

c. They say a drier climate in the past resulted in slower erosion rates. However, the lush vegetation evident in significant portions of the fossil record indicates at least some wetter conditions in the past, and estimates of global precipitation suggest variable but average or slightly wetter conditions over the past 3 billion years.

D. Sediments in the ocean

1. Related to the rate of erosion is the rate of sediment accumulation in the oceans. Taking a high estimate of about 1,118 million billion tons of sediment in the oceans, with about 26.5 billion tons of material being deposited from the continents to the oceans each year, the existing amount would be deposited in about 42 million years.[4]

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[3] According to Roth (1998), the average rate from a dozen studies is 24,108 million *metric* tons. A metric ton is 2,204 pounds (rather than 2,000 pounds). Thus, 24,108 million metric tons is 26,567 million tons.

[4] Roth (1986) says the estimate of **435 million km³** of sediment on the ocean and continental margins by Ronov and Yaroshevsky is "generous." Nevins (1973) estimates there is 77 million cubic miles of

Other estimates would take this down to 30 million or even 17 million years. At today's deposition rate, the ocean basins would be filled completely in about 133 million years.[5]

      2. Those convinced the continents are billions of years old appeal to plate tectonics for a solution. They propose that the sediments are subducted as the sea floor slides slowly (an inch or so per year) beneath the continents. But according to Dr. David Scholl, a Stanford geophysicist, "Globally, the average volume of subducted ocean floor sediment is ~1 km^3/yr (solid volume),"[6] which translates to about 2.2 - 2.5 billion tons. That's far too little to solve the problem. So they are left to speculate about lower deposit rates.

      E. Volcanic activity

      1. At present, the earth's volcanoes together release an average of about four cubic kilometers (0.96 cubic miles) per year of lava, ash, cinders, etc. The best estimate is that the Earth has a total of 135 million cubic kilometers (32,388,222.41 cubic miles) of sediment of volcanic origin (14.4 % of the estimated total volume of the Earth's sediments).[7] At the current production rate, it would take only 33.75 million years to deposit that amount. If the current production rate were extended over 2.5 gya, there should be 74 times as much volcanic material as we now find. That would be a layer of volcanic material with a thickness more than 19 kilometers (almost 12 miles) over the entire Earth's surface.

      2. The scientific establishment assumes that we are in a much more active period of volcanic production than in the past. Subduction doesn't really work because the estimates are based on existing amounts of sediment.

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sediment on the ocean and continental margins, which translates to **320.7 million km^3**. According to Roth (1986), **1 km^3 = 2,280** million tons (13.6 km^3 = 31 million tons; so 1 km^3 = 2,280 million tons). According to Nevins (1973), **1 km^3 = 2,570** million tons (10.7 billion tons per cubic mile, which translates to 2,570 million tons per 1 km^3). Using the higher volume and mass figures (435 million km^3 x 2,570 million tons), one gets a total sediment mass of **1,118 million billion tons**. Using the lower volume and mass figures (320.7 million km^3 x 2,280 million tons), one gets a total sediment mass of **731 million billion**. It is unclear to me where Morris (1994) got his estimate of **410 million billion tons** of total sediment.

[5] Roth (1986) has the total volume of the ocean basins as **1,550 million km^3**. If, as Roth (1986) claims, 13.6 km^3 = 31 million tons, then 1 km^3 = 2,280 million tons, and 26,500 million tons per year = **11.62 km^3 per year**. If, as Nevins (1973) claims, 1 cubic mile = 10.7 billion tons, then 1 km^3 = 2,570 million tons, and 26,500 million tons per year = **10.31 km^3 per year**. Using Roth's figures, the ocean basins would be filled in 133 million years. Using Nevins's figures, they would be filled in 150 million years.

[6] http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_63531.htm

[7] These figures are based on Ronov's classic study (14% of 937.5 million km^3 = 135 million km^3). If one takes the average of the eight estimates of total sediment volume given by Pettijohn (683 million km^3), the total amount of sediment of volcanic origin (using Ronov's 14% figure) is only 95.6 km^3. Using Ronov's estimated total sediment volume (937.5 million km^3), Garrels and Mackenzie's estimated percentage of sediment that is volcanic in origin (25%), and an unrealistic value of volcanic output per year (1 km3), one can push the time back only to 234.3 million years.

F. Mountain uplift

        1. Careful measurements indicate that the major mountain ranges of the earth are rising at an average rate of around 5-10 millimeters (0.2-0.4 inches) per year. Using an average rate of 5 millimeters per year would result in mountains 500 kilometers (310 miles) high in just 100 million years. The world's tallest mountain, Mt. Everest, is only about 9 kilometers (5.5 miles) high.

        2. The uplift is not being offset by erosion, as 5 millimeters per year is more than 100 times faster as estimates of average rates of erosion before the advent of agriculture (about 0.03 millimeters per year). The scientific establishment asserts that we are in a period of unusually rapid mountain uplift.

IV. Geological

        A. Tight folds created in allegedly ancient rock

        1. The Grand Canyon cuts through an elevated plateau called the Kaibab Upwarp. The underlying metamorphic rock (Vishnu Shist) was pushed up thousands of feet, and with it the various layers of sedimentary rock lying on top of the metamorphic rock.

        2. The bottom sedimentary layer (Tapeats Sandstone) is allegedly 550 million years old. The top layer (Kaibab Limestone) is allegedly 250 million years old. The upwarp allegedly happened 70 million years ago. So at the time of the upwarp, the Tapeats Sandstone was 480 million years old and had been under vast layers of sedimentary rock for hundreds of millions of years. Since under normal conditions sediments harden into rock in a matter of years, at the most perhaps as much as a hundred years, the Tapeats Sandstone would have been hard rock for eons before the uplift.

        3. The fact the forces involved in the uplift *bent* the Tapeats Sandstone in places to almost 90 degrees shows that it was not solid rock at the time of the uplift; otherwise it would have broken instead of bent. It apparently had not been there very long.

        4. It is true that even a brittle rock can be bent under special circumstances, but in hard rock like the Tapeats Sandstone, that sort of bending always results in elongated sand grains or broken cement crystals, neither of which has been found here.

        B. Clastic dikes and pipes

        1. There are places around the world where sandstone claimed to be hundreds of millions of years old has been squeezed up through cracks in the rock layers above it. For example, the Sawatch sandstone is alleged to be 470 million years old, and yet, when the Rocky Mountains were formed by an uplift some 70 million years ago (the

Laramide Orogeny), that sandstone was still soft enough to be injected into Pike's Peak granite above it. It would not still be soft if it were really that old.

       2. Another example is in the Kodachrome Basin State Park in Utah. Here both dikes (walls) and pipes (cylinders) of sandstone were injected through upper layers of rock at a time when the sandstone allegedly was 150 million years old. Rockwall, Texas (and Rockwall County) is named after the rock "walls" that are hidden just below the surface. These in fact are clastic dikes where sandstone was injected through cracks in limestone layers alleged to be around 80 million years old.

       3. The alternative explanations are that the sandstone remained unsolidified for eons or that the cracks were filled from above, but the evidence for these is lacking.

       C. Gaps in sedimentary layers without expected evidence of erosion

       1. Sedimentary rock layers frequently lie directly on top of sedimentary layers alleged to be tens to hundreds of millions of years older. In other words, the intermediate layers are missing. For example, over an area of about 36,000 square miles in the central U.S., the Pliocene Ogallala Formation, dated to 2-5 million years, lies directly on top of the Triassic Trujillo Formation, dated to 208 million years. And yet, the contact zone between the two layers is very flat, showing almost no signs of erosion. That doesn't seem possible if the alleged ages are anywhere near correct.

       2. A given part of a continental surface is either an upland area that is being eroded or a basin into which sediments are being deposited. So how could the surface of the Trujillo Formation be flat after 200 million years when the Ogallala deposits were made on top of it?

       a. If the intermediate layers were deposited on the Trujillo Formation and then eroded away before the Trujillo Formation began receiving the Ogallala deposits, the surface of the Trujillo Formation would be very irregular. Erosion carves the land into irregular topography as water seeks the path of least resistance in its downhill journey.

       b. The same problem exists if one claims the intermediate layers were never deposited. That would mean the Trujillo Formation was eroding for the entire 200 million years. Even if any of it could be left, it certainly would not be flat.

       3. Some other gaps:

       a. Valley of the Colorado River from Dead Horse Point, Utah

       b. Grand Canyon gap

       c. Gaps in southeastern Utah

d. Great Unconformity (550 million on 1.7 billion)

e. Coconino Sandstone on Hermit Shale (Schnebly Hill Formation of up to 2,000 feet between Coconino and Hermit)

V. Biological

A. Bacterial life

1. In 2000, viable bacterial spores were extracted from salt crystals that were laid down as part of a salt layer that is dated to 250 mya. This find was published in the prestigious journal *Nature*.

2. Research on spores of various species of the same genus of bacteria reveals that at 68 degrees (F) (20 C) they have a D(10) time of 50 years. That means that 10% of the spores become nonviable every 50 years.

3. If you apply this D(10) time to the density of viable spores found in the salt layer, it dates to only 350 years. This is too recent, but a number of uncertainties could push the age up. In his article "Bacterial Life in Ancient Salt," Evert van der Heide lists some of these factors and then concludes:

> The calculated 'bacterial age' of 350 years is therefore highly uncertain and can easily vary by two, or possibly three, orders of magnitude with greater ages more probable than younger ages. This results in an estimated range of 200 to 35,000 years, corresponding to 4 log cycles of 50 years at 20 degrees C or 7 log cycles and a D(10) of 5000 years at 0 degrees C, respectively. It is difficult to imagine conditions leading to 350,000 years, but even this estimate differs by more than two orders of magnitude with the 250 Ma reported for the Salado evaporite. This gap may increase when claims of 650 million-year-old bacteria in evaporites are confirmed.

4. A young age of this evaporite is supported by the fact the DNA of these bacteria is 99% identical to the modern species *Bacillus marismortui*.

5. As you might imagine, some claim that the bacterial spores must have been from a more recent contamination of the ancient salt layer. But the author of the original study refuses to back down. This is from the February 2005 issue of the journal the *Public Library of Science*:

> [Ancient] DNA research continues to invite controversy. In 2000, a team of United States researchers claimed to have cultured a bacterium sealed inside a 250-million-year-old salt crystal. For Cooper, this is the sort of study that should require replication by an independent laboratory before publication. "When we repeated that work with the same primers, we were

pulling up halobacteria from everywhere," he says. "We took some dust from the top of the natural history museum in Oxford, extracted [DNA], used their supposedly halospecific primers and extracted a whole bunch of sequences, including some that fell within their diversity." This strongly suggests, says Cooper, that the bacterium that was cultured was a modern bacterium, rather than an ancient specimen. "I can't see any logic for having 250 million years without any evolution."

But Russell Vreeland, a microbiologist at West Chester University in Pennsylvania and first author of the salt-crystal study, is adamant that his methods were exacting. "The probability of having a contaminant in our sample was one chance in a billion," he calculates. "If you use a Band-Aid today on your skin or your children, you are 1,000 times more likely to have an infection from that Band-Aid than I am to have a contaminant." It's completely unscientific to argue that the cultured bacterium was a result of contamination simply because it resembles modern bacteria, says Vreeland. "That's throwing out the baby with the bathwater. If you can show that nothing has penetrated your sample and the DNA is inside, then the age of the DNA has to be equal to the age of that rock," he says. "I think you can make your criteria so stringent that you miss reality."

      6. In 2005, Vreeland and some other scientists published a paper in *Geology* offering new evidence strongly supporting their claim that the fluid inclusion from which the bacterial spores were extracted was not a later contamination of the salt layer.

      B. DNA from fossils

      1. In living cells, DNA is maintained by repair mechanisms, but after death DNA self-destructs at a rather rapid rate.

         a. In a 1993 review of the chemical stability of DNA published in *Nature*, Tomas Lindahl said, "deprived of the repair mechanisms provided in living cells, fully hydrated DNA is spontaneously degraded to short fragments over a time period of several thousand years at moderate temperatures." He went on to say "it seems feasible that useful DNA sequences tens of thousands of years old could be recovered, particularly if the fossil has been retained at low temperature."

         b. In November 1993, it was written in *Scientific American* (p. 92): "Certain physical limits seem inescapable. In approximately 50,000 years, water alone strips bases from the DNA and leads to the breakage of strands into pieces so small that no information can be retrieved from them. Oxygen also contributes to the destruction of DNA. Even in ideal conditions–in the absence of water and oxygen and at low temperature–background radiation must finally erase all genetic information."

c. Some years later, Svante Paabo, a world-renowned DNA researcher, opined (in personal correspondence to Pauli Ojalan, a Ph.D. student in Finland) that 50,000 years was the outside limit for the survival of DNA.

d. In 2001, Tomas Lindahl, in a review in *Nature*, put the figure at about 100,000 years.

e. In the January 2003 issue of *Geotimes*, Christina Nielsen-Marsh opined, based on lab work by Dr. Matthew Collins, that DNA held at around 0 degrees Celsius can last for an expected 100,000 to 120,000 years.

2. Yet, DNA reportedly was extracted from several dinosaur bones dated to 65 mya, several fossil leaves dated to 17-20 mya, a termite in amber dated to 25-30 mya, a leaf in amber dated to 25-40 mya, a weevil in amber dated to 120-135 mya, a bee in amber dated to 25-40 mya, and bacteria in salt crystals dated to 250 mya.

3. Regarding the bee in amber, in 1995, Dr. Raul Cano, a microbiologist at California State Polytechnic University, dissected the allegedly 25-40 mya insect and found in its gut viable bacterial spores, spores that were so well preserved they grew when placed in the right environment. In other words, they were still alive! And, interestingly enough, their DNA closely matched the DNA of modern bacteria that grow inside modern bees. Cano, *Science*, Research News, V.268, 5/19/95.

4. A 1996 paper in *Science* indicated that DNA was not recoverable in specimens that had more than a certain degree of amino-acid racemization (L-form racemized to D-form). The dinosaur fossils exceeded this, and the 17-million-year-old fossil leaves *probably* did. That is taken as proof that the DNA found in them was from contamination. However, the amino-acid racemization in insects preserved in amber *was below that threshold*. Yet, even these finds are now considered by most to be the result of contamination, despite the extreme care that was taken to guard against it. Because others were unable to extract DNA from other insects in amber and because chemistry indicates that preservation for vast ages, even in amber, is impossible, the work of the various scientists, whose claims to have extracted ancient DNA were sufficiently documented to pass peer-review, are just written off.

5. The words of Vreeland, the lead scientist in the extraction of bacteria from the allegedly 250 mya salt layer, are worth repeating:

> It's completely unscientific to argue that the cultured bacterium was a result of contamination simply because it resembles modern bacteria, says Vreeland. "That's throwing out the baby with the bathwater. If you can show that nothing has penetrated your sample and the DNA is inside, then the age of the DNA has to be equal to the age of that rock," he says. "I think you can make your criteria so stringent that you miss reality."

6. And as I said, earlier this year Vreeland and some other scientists published a paper in *Geology* offering new evidence that strongly supports their claim that the fluid inclusion from which the bacterial spores were extracted was not a later contamination of the salt layer.

C. Dinosaur soft tissue

1. Here's a 1997 report by two scientists in *Earth* magazine of an allegedly 65-million-year-old dinosaur they examined that was not completely mineralized:

> "The lab filled with murmurs of amazement, for I had focused on something inside the vessels that none of us had ever noticed before: tiny round objects, translucent red with a dark center. Then a colleague took one look at them and shouted, 'You've got red blood cells. You've got red blood cells!'. It was exactly like looking at a slice of modern bone. But, of course, I couldn't believe it. I said to the lab technician: 'The bones, after all, are 65 million years old. How could blood cells survive that long?'"

2. Further testing of these cells was done to disprove the notion that they could possibly be red blood cells. The material from these objects was injected into laboratory rats to see if they would mount an immune response. They did mount a rather specific immune response. They produced antibodies against hemoglobin. Initially Mary Schweitzer herself wrote, in *Proceedings of the National Academy of Sciences*, that this was a strong sign that the immune response really was produced by hemoglobin. But the explanation for this phenomenon given later by Dr. Horner, (Mary Schweitzer's boss - she was a Ph.D. student at the time) was that the tougher heme molecule survived with maybe three or four amino acids of the globin protein attached to it. It was felt that this was enough to give this antibody response in the lab rats. As noted by Dr. Sean Pitman, a medical doctor who did a residency in hematology:

> Certainly then, a heme group with 3 or 4 amino acids attached to it (just over 1,000da) would not seem to give rise to the relatively strong and specific immune response (specific to a certain type of hemoglobin) observed by Schweitzer et al. in rats exposed to *T. rex* bony extract.

3. In 2005 this dispute was rendered moot. In the immortal words of Yogi Berra, it was déjà vu all over again, as Dr. Mary Schweitzer, the same paleontologist involved in the other find, published a paper in the March 25 issue of *Science*. The magazine *New Scientist* reported: "Paleontologists have extracted soft, flexible structures that appear to be blood vessels from the bone of a *Tyrannosaurus rex* that died 68 million years ago. They also have found small red microstructures that resemble red blood cells."

a. Comments associated with some of the published pictures:

(C) Soft, pliable and transparent branching vessel recovered from demineralized bone.

(B) A second fragment of demineralized bone again shows vessel suspended in transparent and flexible matrix (M). An unusual red 'crust' (top right of tissue fragment) was often seen in association with the more flexible tissues in this specimen.

(C) A third vessel shows small microstructures either within or attached to the vessel wall. The structures are ovoid and possess an inner opaque core. They are completely consistent in size and shape with nucleated circulating blood cells taken from mature ostrich (D) and extant chicken (E).

> b. Schweitzer stated in the Montana State University News Service, "I am quite aware that according to conventional wisdom and models of fossilization, these structures aren't supposed to be there, but there they are. I was pretty shocked." Boswell, E., Montana State University News Service, 24 March 2005.

> c. She wrote in an email to an acquaintance of mine: "I have spent most of my career arguing that small epitopes (fragments of protein, often only a few amino acids in length, to which antibodies might bind) may be preserved in bone. Never in my wildest dreams would I have predicted what we found."

> d. Schweitzer reported in October 2005 at a meeting of the Society for Vertebrate Paleontology that she had confirmed through a series of tests that the samples taken from the T-rex (MOR 1125) were indeed soft, pliable tissue made up of matrix, red blood cells, osteocytes, and blood vessels (with clearly visible filipoda). She played a Powerpoint movie of a pair of tweezers that were manually stretching the T-rex soft tissue back and forth.

> e. Schweitzer has examined other T-rex tissue (MOR 555), supposedly 66 million years old and an unnamed Argentine theropod and both showed similar qualities to the T-rex (MOR 1125).

> f. These certainly ought to be tested for C-14 and for DNA.

> g. The response of old-agers is: What do you know? Fossilization preserves these structures and tissues longer than we imagined.

V. Anthropological - Recency of civilization

A. The scientific establishment generally dates the beginning of human civilization (defined in terms of permanent settlements, use of worked metal, and plant and animal domestication) to around 8,000 - 10,000 B.C. See, e.g., Davis A. Young, "The Antiquity and Unity of the Human Race Revisited," *Christian Scholar's Review* vol. 24:4 (May 1995), 384-87. On the other hand, they claim that humans sailed to Australia

across at least 60 miles of open between 40,000 and 60,000 years ago. As Ian Tattersall writes in *The Human Odyssey* (New York: Prentice Hall, 1993):

> "People first arrived in Australia well over 40,000 years ago and must have crossed at least sixty miles of open ocean to do so." (p. 146)

> "[E]ven when the sea level was at its lowest point (and at around 50,000 - 40,000 years ago it was up — or down — to four hundred feet below its present level), the single landmass formed by Australia and New Guinea was separated from the Asian continent by at least sixty miles of ocean, and seaworthy boats and navigational skills would have been necessary to reach it. Such things ... speak of a remarkable degree of technological sophistication among the ancestral Australians." (p. 148)

B. Some have dated the presence of humans in Australia at between 116,000 - 176,000 years ago. In March 1998 stone tools on an Indonesian island (Flores) were dated to between 800,000 and 900,000 years. That means that over 800,000 years ago those toolmakers (presumed to be Homo erectus) crossed at least 12 miles of ocean to reach the island. Some scientists argue that the toolmakers accidentally drifted as far as Flores after climbing onto thick mats of vegetation that sometimes form near the Southeast Asian coast, but others insist that only a craft propelled by its occupants could negotiate the treacherous straits separating one Indonesian island from the next. As one scientist (Bednarik) said who actually made the journey in a bamboo vessel, "Armchair archaeologists, who think that sea crossings are a piece of cake, really ought to try doing this on drifting vegetation."

C. Even if one ignores the older dates (re Australia, see "Doubts Over Spectacular Dates," Science, vol. 278 [Oct. 10, 1997], 220-222), old-agers still must explain how humans with the intelligence and technological sophistication to build seaworthy vessels and to navigate the open ocean could fail to leave any evidence of even rudimentary civilization for well over 30,000 years. I have a hard time believing mankind can go from rudimentary civilization to Mars in about 10,000 years (conventional dating) but not go from seafaring vessels to rudimentary civilization in well over 30,000 years. Something is off.