GREATER AND LESSER UNCONFORMITIES

By Michael Ventura

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Ever hear of the Great Unconformity? It has much to teach, but it teaches by absence – or by the absence it signifies. There are only two places in North America where the Great Unconformity is visible: Frenchman's Mountain, overlooking Las Vegas, and the Grand Canyon. At Frenchman's Mountain, it's just a seam on a rock face. Hold your thumb sideways and place it on that seam and you touch something that represents 1.2 billion years of unrecorded time. According to Wikipedia, "the rock jumps from 500 million years old to 1.7 billion years old… missing… about 25% of the earth's history." The Lunar and Planetary Institute (www.lpi.usra.edu) notes that the Great Unconformity is found "nearly everywhere across the globe"; "it divides rocks with familiar fossils from those with no fossils or only fossil bacteria" – that is, there is little or no fossil record of the early development and evolution of complex organisms. The record stops 1.7 billion years ago and resumes 500 million years ago, by which time life on earth had gotten pretty complex, with all sorts of flora and critters.

The Great Unconformity represents a defined limit to human knowledge. The sciences of geology, zoology, biology, evolution, oceanography, meteorology, etc., can never be complete because 25% of the physical evidence has gone missing. No one knows why. Probably no one ever will. Difficult to investigate what's not there.

I was reminded of the Great Unconformity during a conversation about the Big Bang. A learned friend was discoursing on how the Big Bang was the beginning of the universe and I said, "Hold on. No, it wasn't." He was shocked. What was I, a creationist? "No, but – *what* blew up, exactly, and how did it get there, and what kind of 'there' was *there*, and what caused the stuff to go bang?" "Those questions," my friend sniffed, "are metaphysical."

Then he had somewhere else to be, but our conversation went on in my head.

Those questions are not metaphysical, they're practical, scientific. We don't know what began our universe until we can answer those questions. Just because the answers lie beyond our reach doesn't make the questions any less scientific. What is metaphysical is to take as given that the material that exploded into the Big Bang existed without cause. That something might exist without cause goes against the very basis of scientific thought.

Science is in trouble in this country for many reasons, especially religious fanaticism and a shamefully shoddy educational system. You know society is having a nervous breakdown when, for instance, the Kansas Board of Education not only approves the teaching of creationism but institutes a "redefinition of science itself, so that it would not be explicitly limited to natural explanations" (*The New York Times,* Nov. 9, 2005, p.14). Science didn't give them the answers they want, so phooey on science – while these same folks are utterly dependent on machines, products and a system of production impossible without science. A societal schizophrenia in Kansas and elsewhere. A dangerous, malignant institutionalization of ignorance.

But is this situation helped by the general refusal of science – or, more exactly, its popularizers – to admit what it doesn't know? Stacks of evidence testify to the evolution of complex organisms over the past 500 million years; but complex organisms evolved earlier, during a time for which there is virtually no fossil record, and that too is a fact. Writer-scientists like Stephen Hawking arbitrarily pick the Big Bang as our universe's origin, though, scientifically speaking, that which blew up must also have an origin and a cause. Richard Dawkins leaps to social conclusions about genes as though we know all there is to know about genes; to put it mildly, we don't.

Science is an endeavor, an investigation, a body of knowledge, but it is also a *behavior*. The behavior of science is a constant play or dialogue between the known and the unknown – and the one can change into the other very quickly. In fact, this happens constantly.

The New York Times, Feb. 5, p.F1: Dr. J. Craig Venter declared, "My view is that we know less than 1 percent of what's out there in the biological universe." The deep mid-ocean was thought "impoverished" in terms of biological organisms. But Venter and his team, "prospecting" there, "discovered six million new genes… unlike any yet seen in any of the mammals, reptiles, worms, fish, insects, fungi, microbes or narcissists [Dawkins?] that have been genetically analyzed so far." Venter's discovery "doubled the number of all genes characterized to date."

Something's always turning up to flip accepted theory topsy-turvy. In 2005 we aimed a rocket full of instruments at a passing comet and got a big surprise. "Although comets form at the frigid edges of the solar system, they appear somehow to contain minerals that form only in the presence of liquid water and at much warmer temperatures" (*New York Times,* Sept. 7, 2005, p.16). Said Carey M. Lisse, of the Applied Physics Laboratory at Johns Hopkins, "Nobody expected this."

We know what gravity is, right? Wrong. "Familiar as it may seem, gravity remains a mystery to modern physics. Despite several decades of trying, scientists have failed to fit Einstein's general theory of relativity, which describes how gravity holds big objects together, with the quantum mechanics he pioneered… Many physicists are therefore entertaining the idea that Einstein's ideas about gravity must be wrong or incomplete" (*The Economist*, Jan. 27, 2007, p.79).

This interplay of known and unknown, and the shift between them, is constant in all fields. As in: "Squash Seeds Show Andean Cultivation Is 10,000 Years Old, Twice as Old as Thought" (*New York Times,* June 29, 2007, p.8). Or: "Swiss researchers have discovered 100,000-year-old remains of a previously unknown giant camel species in Syria" (*New York Times,* Oct. 8, 2006, p.13). Before this discovery they thought camels had existed in the Middle East for 10,000 years – the "new" bones necessitated a 90,000 year correction. Near the camels were 100,000-year-old human remains that were homo sapiens, except for a Neanderthal tooth. Professor Jean-Marie Le Tensorer: "We don't know what it is yet exactly." Or: "Two genes involved in determining the size of the human brain have undergone substantial evolution in the last 60,000 years, researchers say… It had been widely assumed until recently that human evolution more or less stopped 50,000 years ago" (*New York Times,* Sept. 9, 2005, p.14).

And then there's "dark matter." "The exact nature of this matter is unknown, but it *seems* [my italics] to make up a quarter of the contents of the universe" (*The Economist,* Jan. 12, p.72). And there's "superstring theory" which posits "a multitude of possible universes, each with its own physics… the number of conceivable universes… is measurable not in the millions or billions" but in numbers mindboggingly more vast (*New York Times*, Oct. 8, 2006, p.WK3). There's just one problem. Though string theorists are "courted and recruited like star quarterbacks by universities… string theorists [admit] that after 20 years they still [do] not know how to test string theory" (Dec. 7. 2004, p.F1)." Since testing is what makes science science, that really is a problem.

Writers who make science sound so very definite rob it of its greatness, which is that science constantly confronts the unknown and constantly changes its givens and parameters. Science is not a fixed center of certainty. Certainty is unscientific, fundamentalist. Science is motivated and extended by uncertainty, by questions. Science is a shifting set of co-ordinates in which the known is always in doubt. It is the brave and manic effort of an anxious species on a dust-mote of the universe to figure it *all* out – wonderful precisely because it's impossible, not to mention fraught with the danger of error. Physicist Lawrence Krauss: "There may be fundamentally important things that determine the universe that we can't see. You can have right physics, but the evidence at hand could lead to wrong conclusions" (*New York Times,* June 4, 2007, p.F2).

Said the great quantum physicist Niels Bohr, "The opposite of a correct statement is a false statement. But the opposite of a profound truth may be another profound truth." Which didn't worry Einstein. When asked about the odd way he dressed he replied, "Once you can accept the

universe as matter expanding into nothing that is something, wearing stripes with plaid comes easy."