

## Cosmology and Religion

There is an ongoing battle in the United States between Young Earth Creationists and the scientific community over the teaching of evolutionary biology. In Kansas this dispute spilled over into cosmology (see the article by James Glanz on the front page of the 10 Oct 1999 New York Times). In this article a minor part of my remarks to Glanz are quoted, regarding a misguided attempt to use General Relativity to explain the discrepancy between the 13.7 billion year age of the Universe and the Young Earth Creationists' 6000 year age for the Earth. This huge clock rate gradient defines a huge gravitational field that would create a huge gravitational blueshift in all astronomical observations, but no such effect is seen.

But any discussion of cosmology and religion should remember these general principles:

### False dichotomy between Science and Creationism

There are NOT just two sides in this issue that deserve equal time. Young Earth Creationism is a belief held by a small minority [~6%] of Christians, and Christianity is followed by a minority [albeit a large one: 33%] of all people on the world. For example, Catholics outnumber Young Earth Creationists by a large factor, and the Catholic Church has no objection to either Big Bang cosmology or evolutionary biology, which they regard as the mechanisms used by God to create the Universe and the living things within it. (See the text of a talk by Dr. George Coyne, SJ). Hindus outnumber Young Earth Creationists by a large factor, and believe in an infinitely old Universe evolving in cycles - a belief more in accord with Hoyle's Steady State Cosmology than the Big Bang, but directly contradicting the Young Earth Creationists.

And many scientists are believers who feel that God made the Universe but that evidence we find in Nature gives us the true history of the Universe: the Big Bang cosmology and biological evolution of the species. Hugh Ross is a prominent Christian believer with scientific training, who made this statement about the Kansas School Board decision on the Big Bang:

Ironically, members on both sides of the debate do agree about one thing: big bang cosmology puts their position in jeopardy. The big bang poses a problem for young-earth creationists because it makes the universe billions of years old rather than thousands. Such an assertion undercuts their system at its foundation. Big bang cosmology also presents a problem for atheistic scientists because it points directly to the existence of a transcendent Creator - a fact they dare not concede.

It is true that scientists do not know what came before or caused the Big Bang, but that is neither a necessary nor a sufficient condition for invoking the Deity.

The evangelical Protestant denominations from which most Young Earth Creationists come have much deeper and more heartfelt disputes with other Christian denominations than with science. In particular they dispute the nature of the ultimate authority: the Catholics accept the Pope as the authority, while Protestants take the Bible as their authority. But:

### The Bible is not a Science Book

"The Bible was written to show us how to go to heaven, not how the heavens go." - Cardinal Baronius (1598), a quote cited by Galileo.

The Bible has many self-contradictions and factual errors. Its original authors were polytheistic pagans who thought the Earth was flat and the Sun, planets and stars revolved around it. The later editing by monotheistic priests was incomplete, leaving a number of self-contradictions. Translations from the original languages have introduced further errors, but most Young Earth Creationists in the United

States would take the King James version of the Bible as being the true word of God. But the King James version makes very effective use of literary devices such as "the four corners of the Earth", an easily understandable figure of speech. But if taken literally it implies the Earth is a tetrahedron, or a flat square. Hence apologists for Biblical literalism have made detailed justifications based on the original language for the phrase that just serve to weaken the idea that the Bible, whether in the original or especially in translation, should be taken literally.

Some people claim that Biblical prophecies prove the Holy nature of the Bible. But such claims can be made about Moby Dick as well. Many people preach that current events are foretold by the Bible, but nobody has a consistent ability to predict future events. If the Bible did contain an unambiguous and successful collection of prophecies there would be no question about the existence of God. In the book Contact, by Carl Sagan, Ellie Arroway, after traveling to Vega and back in the machine, puts a computer to work calculating the digits of  $\pi = 3.14159\dots$  which is the ratio of the circumference to the diameter of a circle, and finds "hiding in the alternating patterns of digits, deep inside the transcendental number, was a perfect circle, its form traced out by unities in a field of noughts." That would be an unambiguous message from the Creator of the Universe, but Contact is science fiction, not fact.

But the authority taken by science is:

Science is Based on Experience

Karl Popper, in The Logic of Scientific Discovery, wrote:

But I shall admit a system as an empirical or scientific theory only if it is capable of being tested by experience. These considerations suggest that not the verifiability but the falsifiability of a system is to be taken as the criterion of demarcation. In other words: I shall not require of a scientific system that it shall be capable of being singled out, once and for all, in a positive sense; but I shall require that its logical form shall be such that it can be singled out, by means of empirical tests, in a negative sense: it must be possible for an empirical scientific system to be refuted by experience.

A scientific theory must pass every test. It can be falsified but never verified, because the next datum might disagree. So Newton's Theory of Gravity was confirmed many times over two hundred years, but the excess precession of the perihelion of Mercury's orbit falsified it. By correctly fitting all of the previous 200 years of data, and also correctly explaining the motion of Mercury and the bending of light by the Sun, Einstein's General Relativity became the new and still reigning Theory of Gravity.

Are religious theories falsifiable by experience? Some are: for example, the theory of Biblical Inerrancy could be falsified by self-contradictions in the Bible - and it is! But almost all Young Earth Creationists swear by biblical inerrancy nonetheless. How is this possible? Most religious beliefs are matters of faith: a belief held in the absence of evidence or even despite contrary evidence. Such faith-based beliefs are not falsifiable by experience, and are thus not part of any scientific theory.

The Big Bang is not just a theory

Popular usage equates theory with an untested hypothesis. But scientific theories are hypotheses that have passed many empirical tests. However, even a very well-tested theory can be falsified, as shown by Newtonian gravity. Falsifying a well-tested theory is the biggest achievement that a scientist can make, and thus many scientists are drawn to testing and retesting the best established theories. But these scientists recognize that the probability of falsifying a well-tested theory is low, and thus their

work may come to naught. One can encourage the testing of well-established theories by proposing alternative theories that explain all known facts but make different predictions for new experiments. In the 1950's the Big Bang was not well-tested, and the Steady State model was a very useful alternative that encouraged many observations. Now the Big Bang picture is well established, but the inflationary scenario added on before events in the classic Big Bang is not well-tested. Many alternative versions of inflation have been suggested. But do not think that these alternatives represent weaknesses of the Big Bang.

Science matters to our future

The years prior to World War II were marked in Germany by a campaign against "Jewish science" which included relativity. As a result Einstein, Fermi, Teller, Bethe and Szilard all left Europe. Because of Hitler's injection of religious prejudice into science, the Allies and not the Axis were first to the atomic bomb. The next big technology will probably be biotechnology, and a failure to teach modern biology could lead to our downfall. We must teach our children both the methods of science and the latest well-tested theories of biology and physics to guarantee our future.

What About Intelligent Design?

Intelligent design (ID) is a new movement fighting to suppress or supplant the teaching of evolution in public schools. Its leaders are Phillip Johnson, Michael Behe, and William Dembski. The fundamental idea of ID is that some aspects of living systems are too complex to have been formed by natural processes. IDers then postulate a supernatural process, an intelligent designer, that they say must have directed the generation of these systems. This philosophical approach has several problems:

ID proponents typically refuse to specify the nature of their "designer". But usually in the US they mean the God of Protestant Christianity. One could just as well say that Allah is the designer.

A supernatural explanation can explain anything, so ID is not falsifiable. Thus ID does not belong in a science class, except perhaps as a bad example.

Many examples put forward by IDers as too complex ("irreducibly complex") are in fact explainable by naturalistic evolution. So the chain of ID reasoning which goes:

I am not intelligent enough to see how evolution could have made this system.

Therefore no-one is intelligent enough to see how evolution could have made this system.

Therefore this system could not have evolved naturally.

in many cases breaks down at the second step. Instead, the proponents of ID are just shown to be not as intelligent as they thought. One such case is the mousetrap. If God is invoked only to explain what science has not yet been able to explain, then as science advances, God must retreat. This approach to justifying religion is called "the God of the gaps" and it is bad theology.

The arguments for ID are in fact rather old, going back to William Paley and his example of a pocket watch that required a watchmaker. Paley believed that the nature of God could be learned by studying the natural world.

One would be better served to say that the evidence for design in the Universe is not what science cannot explain, but rather what it can explain. Albert Einstein wrote:

The most incomprehensible thing about the world is that it is at all comprehensible.

There are many more ways for the Universe to be chaotic and disorganized than for it to follow simple universal laws, so the regularities observed by scientists could be taken as evidence for design.

One could argue that the anthropic principle, which notes that in many ways apparently arbitrary parameters in the Universe have values conducive to the existence of intelligent life, is not just a selection effect but rather a choice by a Creator. But as usual with anthropic arguments this is impossible to test, so it is not a falsifiable scientific theory.

But the intelligent design movement of Behe, Dembski and Johnson is in practice just a stealthy way for a minority of Christians to deny the beautiful regularities found in biology and cosmology. ID is both bad science and bad theology, and should not be foisted on our public schools. See the AAPT Statement on the Teaching of Evolution and Cosmology.

There is much better evidence for stupid design.

Resources:

The talk.origins archive has a special section discussing intelligent design.

H. Allen Roe wrote an article: Devolution- Why Intelligent Design Isn't in the 30 May 2005 issue of the New Yorker.

The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design by Richard Dawkins.

The 1 July 2007 NY Times Book Review has an review of Behe's latest book, The Edge of Evolution by Richard Dawkins. The review is titled Inferior Design.

The World is not Magic

Scientists have never observed a miracle or true instances of magic. This does not say that no miracles have ever occurred but invoking a miracle or claiming that something happened by magic is not a scientific approach to understanding the world.

Can Science and Religion Coexist?

Yes! Yes! Yes!

To allow a vocal minority that disagrees to take over our public schools is bad science, bad religion, bad public policy, and unconstitutional.