

Owen Gingerich : God's Universe

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Alison Morgan Feb 09

Gingerich is professor of astronomy and history of science at Harvard, specialising in Copernicus. Also a devout Mennonite. Book is lecture series.

Notes and quotes (not comprehensive).

'Science works within a constrained framework in creating its brilliant picture of nature. But reality goes much deeper than this. Scientists work with *physics*, but (perhaps unwittingly) they also have a broader system of beliefs, *metaphysics*, a term that literally means "beyond physics".' 6

'I contend that the current political movement popularly known as Intelligent Design is misguided when presented as an alternative to the naturalistic explanations offered by science, which do not explicitly require the hand of God. This does not mean that the universe is actually godless, just that science within its own framework has no other way of working.' 7

'Martin Luther would translate the Bible into German, and in 1514 he had had the audacity to print the Psalms without the traditional marginal references to the interpretations of the Church Fathers. "Scripture alone!" became the slogan, and even Rome was driven to a defensive scriptural literalism.' 10. Ps 104, 'The Lord God laid the foundation of the earth, that it not be moved forever' – surely this ruled out Copernican cosmology?

Aristotle had postulated a Final Cause (why) and an Efficient Cause (how). Why is the water in the kettle boiling? Well, because we want some tea (final cause) but also because the heated molecules escape from the water and become a gas (efficient cause). [illus from Polkinghorne]. 'One aspect of the scientific revolution of the seventeenth century was that it turned away from the final causes so central to the Aristotelian worldview and concentrated on efficient causes, the how of the phenomena'. 12

There are about 200b stars in the Milky Way galaxy – more than 30 apiece for every man, woman and child on our planet; and more than 100b galaxies beyond the Milky Way. The estimated no of stars in the universe vastly exceeds the no of grains of sand on all the beaches of the world; but the no of synaptic interconnections in a single human brain vastly exceeds the no of stars in the Milky Way – 10^{15} synapses vs c. 10^{11} stars.

Harvard anthropologist David Pilbeam has remarked that if we could have observed Neanderthals over the millennia, we could hardly have extrapolated to the complex human civilization that eventually rose on earth. In the 200,000 years of their existence, the Neanderthals' some tools remained without improvement.. In contrast, *Homo sapiens sapiens* ... began, gradually, to improve his tools. Perhaps this was due to the Neanderthals' lack of language? It does suggest the evolution of intelligence was not inevitable.

Gallup poll in 2004 asked people to choose between statements that God guided process of development of humans from less advanced forms of life over millions of years; that God had no part in this same process; that God created human beings at one time within the last 10,000 years or so. 45% chose the third...

Liebniz: 'I hold that when God works miracles, he does not do it in order to supply the wants of nature, but those of grace'.

The Allende meteorite exploded over a Mexican village in 1969. Analysis of radioactive elements contained within it allowed it to be dated quite precisely at 4.6 billion years of age. It's the oldest known macroscopic object on earth. We've got nearly a ton of fragments of it, and they date back to the birth of the solar system itself. The universe is 3x older than that – the Big Bang is dated to 13.7b years ago. The sun's age, 5b years, is calculated from the rate at which it fuses hydrogen into helium; the age of stars is also calculated from computer modelling of how they consume their nuclear fuel.

Big Bang – the entire visible universe was squeezed into a dense dot of pure energy, a tiny ball of pure energy that could pass through the eye of a needle. The balance between the outward energy of expansion and the gravitational forces pulling everything back together is incredible – accurate to about one part in 10^{59} . Astronomer Royal Sir Martin Rees has written a book called *Just Six Numbers*, in which he describes 6 physical numbers that, if changed slightly, would produce a cosmos in which life could not exist.

But stellar evolution is child's play by comparison with the complexity of DNA. Agnostic Hoyle wrote 'a common sense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature'. Lecomte de Nouy: 'events which, even when we admit very numerous experiments, reactions, or shakings per second, need an infinitely longer time than the estimated duration of the earth in order to have one chance, on an average, to manifest themselves can, it would seem, be considered as impossible in the human sense.. To study the most interesting phenomena, namely Life and eventually Man, we are, therefore, forced to call on anti-chance, as Eddington called it; a 'cheater' who systematically violates the laws of large numbers, the statistical laws which deny any individuality to the particles considered'. 60.

The anthropologist Irvan DeVore likes to compare the prospect of producing favorable mutations with trying to tune your MG by standing fifty paces away and firing at it with a shotgun. One pellet might accidentally hit the valve just right to adjust the engine, but it is far more likely that the car will be destroyed before that can happen... 64

ID theorists ask 'whether random mutations can generate the incredible amount of information content required to produce even the simplest of cells, and whether even the great antiquity of the universe could make this possible. Here science, dealing with extremely low probabilities balanced against vast numbers of opportunities, is frankly on very shaky turf.' 66

Gingerich believes in intelligent design – ie without the design features of the universe we would not be here. He has a problem with Intelligent Design, which is being sold as an alternative to Darwinian evolution. 'evolution today is an unfinished theory. There are many questions about details it does not answer, but those are not grounds for dismissing it'. 'Can mutations be inspired? Here is the ideological watershed, the division between atheistic evolution and theistic evolution; and frankly, it lies beyond the capability of science to prove the matter one way or the other'. 69 'Is the universe designed?' is not a scientific question. It is a metaphysical question. Science will not collapse if some practitioners are convinced that there has occasionally been creative input into the long chain of being. Are mutations blind chance, or is God's miraculous hand continually at work? Or we could be more subtle, and ask whether God designed the universe in the first place to make possible the catalysts and unknown pathways that enable the formation of life. Lecomte de Nouy pointed out the incredible odds against the chance formation of a protein molecule. Given that protein molecules do exist, we have mostly ignored him...

To teach ID alongside evolution is a category error. The scientific quest takes place in the realm of efficient cause. ID is great on final causes, but falls short in supplying any mechanisms to serve as the efficient causes. It does not explain the temporal or geographical distribution of spp. It's an interesting philosophical idea, but does not replace the scientific explanations that evolution offers.

When Newton published his *Principia*, Leibniz complained he had not really explained gravity, and that for the moon to be pulled toward the earth by invisible means was just plain occult and superstitious...

Dawkins et al go the other way. They use their stature as scientific spokesmen as a bully pulpit for atheism. Evolution as a materialist philosophy is ideology, and presenting it as such essentially raises it to the rank of final cause. It's as wrong to present evolution as a final cause as it is to offer ID as a substitute for an efficient cause.

Galileo wrote that the reality of the world was expressed in the Books of Scripture and of Nature, and God is the author of both [he wasn't the first]. Gingerich believes the book of nature suggests a God of purpose and of design; and that makes him no less a scientist.

'Today science marches on not so much via proofs as through the persuasive coherency of the picture it presents. What passes for truth in science is a comprehensive pattern of interconnected answers to questions

posed to nature – explanations of *how* things work (efficient causes), though not necessarily *why* they work (final causes). 95

EO Wilson in introduction to his edition of Darwin: 'Evolution in a Darwinian world has no goal or purpose: the exclusive driving force is random mutations sorted out by natural selection from one generation to the next. Evolution by natural selection means, finally, that the essential qualities of the human mind also evolved autonomously. The revolution begun by Darwin showed that humanity is not the centre of creation, and not its purpose either' – 98. This contains a curious leap of logic – hard to show that humanity is the centre of creation, but equally hard to show it's not. That's Wilson's own ideology.

Whether mutations are anything other than mathematically random is a question without answer in a physical or scientific sense. It would make more sense if a divine will operated at this level to design the universe in a purposeful way – but that can be neither denied nor proved by scientific means. It is a matter of belief how we choose to think about the universe, and it will make no difference how we do our science. 101

Einstein: 'the most beautiful experience we can have is the mysterious.. Whoever does not know it and can no longer wonder, no longer marvel, is as good as dead..' 102.

'The God having the creative force to make the entire observable universe in a dense dot of pure energy is incomprehensible, beyond human imagining.. And yet we can see the consequences of this unimaginably powerful creative act: a universe congenial to the ultimate formation of life, life giving rise to intelligence that can ask questions science cannot answer. It is God's universe'. 105

What does it mean to be human? Anthropologist Ian Tattersall suggests it's language – invented c. 200,000 years ago. It's at about that time that evolutionary biologists have discovered, from studies of mitochondrial DNA (an additional amount of DNA found in the mitochondria and inherited intact from the mother, which means it's constant throughout history apart from occasional mutations), that the entire world population stems from a single source, a comparatively small group. Perhaps it was that group which invented language. It's that which makes us different from the rest of the animal kingdom.

Johannes Kepler: *there is nothing I want to find out and yearn to know with greater urgency than this: can I find God, whom I can almost grasp with my own hands in looking at the universe, also in myself? (1613).*

'Surely the existence of fossils of extinct creatures shows not a universe laid out according to a plan for instant perfection, but a universe that makes itself. Most creatures that ever lived are with us no longer. Extinction is the name of the game.' 116

Suffering – we live in a dappled world, where chance and randomness join with choice and inexorable law. Why creation is this way is perhaps the most unanswerable question of all.

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