

ORIGINS AND CREATION

GEORGE V. COYNE, S.J.
Specola Vaticana
V-00120 Città del Vaticano

1. Introduction

It is arguably difficult to find a more heated topic of discussion than that concerning the origins of the universe, and especially of life and of intelligence, and whether such origins can be understood without evoking a Creator God. Responses range from the extremes of a Stephen Hawking or a Pope Pius XII to almost all conceivable intermediate positions. Hawking claims that, if his quantum cosmological theory of the origins of the universe without boundary conditions is correct, then we have no need of God. Pius XII attempted to claim that with Big Bang cosmologies scientists were coming to discover what had already been known from the Book of Genesis, namely that the universe had a beginning in God=s creative action. In between we have such positions as evolutionary naturalism and episodic divine intervention. Evolutionary naturalists would claim that, although our scientific knowledge of evolution is limited, the best explanation of the universe and all that it contains is through complexification in an expanding, evolving system in which both deterministic and chance processes play out their roles in a universe abundant with opportunities, 15 billion years old and containing 10^{22} stars. Those who profess episodic divine intervention would claim that divine activity is required, at least in some phases of the evolutionary process and, in particular at

the occurrence of human life and intelligence, because natural processes alone are not adequate to explain the end result. What is one who is both a believing Christian and a scientist to make of all of this?

2. Scientific Evidence for Universal Evolution

Let us take a sweeping view of a reasonable scientific picture of things. By reasonable I mean that, while we do not have all the answers, the following picture can stand up to any scientific critique. If we look today in infrared light at the center of Orion we see boiling gas and dust. The fact is that stars are being born in this gas. And where the hottest, most massive and, therefore, brightest stars are already born, they are irradiating the gas, and it is giving off hydrogen alpha radiation. In this way we can identify star birth regions. The region of star birth in Orion is just a little part of our Milky Way. Our Milky Way, like most other spiral galaxies, measures 100,000 light years across and it contains about a hundred billion stars. It has several beautiful spiral arms and the sun is located in one of the outer arms, about two-thirds of the distance from the nucleus of our galaxy.

How is a star born? It happens by the laws of physics. A cloud of gas and dust, containing about 100 to 1,000 times the mass of our sun, gets shocked by a supernova explosion or something similar and this causes an interplay between the magnetic and gravity field. The cloud begins to break up and chunks of the cloud begin to collapse. The mass is so great that the internal temperature reaches millions of degrees and thus turns on a thermonuclear furnace. A star is born. Thermonuclear energy is the source whereby a star radiates to the universe. You need a very hot piece of the universe to do this, and so you can only get this thermonuclear furnace by having a cloud collapse and raise the temperature. You can only get it, in other words, in stars, with one exception, namely, in the very hot early universe before

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galaxies or stars were born.

Stars also die. A star at the end of its life can no longer sustain a thermonuclear furnace and so it can no longer resist against gravity. It collapses for a final time, explodes and expels its outer atmosphere to the universe. This may happen nice and peacefully or it may happen in a violent cataclysmic explosion, called a supernova. The most famous of these is the Crab Nebula which has a pulsar at the middle as its dead star. So stars are born and stars die. And as they die they spew left over star matter out to the universe. The birth and death of stars is very important. If it were not happening, you and I would not be here, and that is a scientific fact. In order to get the chemical elements to make the human body, we had to have three generations of stars.

Obviously this story of star birth and death is very important for us. Out of this whole process around one star, which we call the sun, a group of planets came to be, among them the little grain of sand we call the Earth. An amazing thing happened with that little grain of sand when, in the 16th and 17th centuries with the birth of modern science, we developed the capacity to put the universe in our heads. We do that by using mathematics, physics, chemistry and biology.

Let us now review what we know of the history of the expanding universe. As it aged, distances got larger in the universe. As this happened certain key events took place. Quarks combined to form elementary particles, which in turn formed atoms and then molecules. The universe became transparent and the cosmic background radiation came to be. Galaxies and stars were formed. The first microscopic life forms came to be after twelve billion years in a fifteen billion year old universe. Why did it take so long to make even an amoeba? We have already discussed one

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reason. We did not have the chemistry to make even an amoeba until we had had three generations of stars.

3. Human Origins

How did we humans come to be in this evolving universe? It is quite clear that we do not know everything about this process. But it would be scientifically absurd to deny that the human brain is a result of a process of chemical complexification in an evolving universe. After the universe became rich in certain basic chemicals, those chemicals got together in successive steps to make ever more complex molecules. Finally in some extraordinary chemical process the human brain came to be, the most complicated machine that we know.

Let us pause for a moment to review the degree of certainty which we can place in the above scenario. We certainly do not have the scientific knowledge to say how each living creature came to be in detail. We do not know precisely how each more complex chemical system came to contribute to the process of self organization which brought about the diversity of life forms as we know them today. Most importantly, we do not know with scientific accuracy the sufficient elements in nature to have brought about the unbroken genealogical continuity in evolution that we propose actually happened. There are, in brief, epistemological gaps which prevent natural science from saying that a detailed theory of biotic evolution has been proven. What I have presented is the most adequate account conceivable at this time considering the available empirical data. And that empirical data, with respect to biotic evolution, comes from various independent scientific enterprises, including molecular biology, paleontology and comparative anatomy.

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Did we come about by chance or by necessity in this evolving universe? The problem is not formulated correctly. There is a third element that is very important. It is what we may call @opportunity.@ What this means is that the universe is so prolific in offering the opportunity for the success of both chance and necessary processes that such a character of the universe must be included in the discussion. The universe is 15 billion years old, it contains about 100 billion galaxies each of which contains 100 billion stars of an immense variety. For 15 billion years the universe has been playing at the lottery. What do I mean by the lottery? When we speak about chance we mean that it is very unlikely that a certain event would happen. The Avery unlikely@ can be calculated in mathematical terms. Such a calculation takes into account how big the universe is, how many stars there are, how many stars would have developed planets, etc. In other words, it is not just guesswork. There is a foundation in fact for making each successive calculation.

By using the mathematics of nonlinear dynamics, one can say that as this process goes on and more complex molecules develop, there is more and more direction to this process. As the complexity increases, the future complexity becomes more and more predetermined. There are also necessary, deterministic processes occurring. But there is a lot of chance as to what the exact conditions are, so that the necessary process may take place. There are definitely both chance and necessity, but they are happening in a universe that is so prolific that the eventual outcome has a kind of predetermined nature.

This predetermined nature may be represented by a tree, the Tree of the Universe. It is a strange tree in that everything that ever happened in the universe, from the making of quarks to the making of toenails, is all here. Even those processes that never

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succeeded, that failed, every dead leaf and dead branch has been conserved. Every meeting of molecules in inopportune circumstances is there. The tree has never been pruned. But blow a quiet breeze through this tree and what will you see? You will inevitably see something that resembles the bare trunk of a tree with certain branching to various forms of life and ending at the top with the human being. The result is inevitable because with a combination of chance and necessary processes in a very prolific universe with so many opportunities there is a narrowing down of the evolutionary process due to the nature of physics, chemistry, biology and non-linear dynamics.

If we truly accept that there are chance processes involved, then the branching of the tree could be somewhat different. But since complexity proceeds towards an ever more determined direction the trunk of the tree could not be very different. The paleontology, biology and chemistry behind all of this is quite uncertain, but it is clear that something like this would happen. Why is the human being at the top? It is because we are ignorant. We do not know what else to put at the top. The human brain is the most complicated mechanism we know.

4. Implications for Religious Belief

How are we to interpret this scientific picture in terms of religious belief. Do we need God to explain this? Very succinctly my answer is no. In fact, to need God would be a very denial of God. God is not the response to a need. One gets the impression from certain religious believers that they fondly hope for the durability of certain gaps in our scientific knowledge of evolution, so that they can fill them with God. This is the exact opposite of what human intelligence is all about. We should be seeking for the fulness of God in creation. We should not need God; we should

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accept him when he comes to us. The religious believer is tempted by science to make God an explanation. We bring God in to try to explain things that we cannot otherwise explain. How did the universe begin?, How did we come to be? and all such questions. We sort of latch onto God, especially if we do not feel that we have a good and reasonable scientific explanation. He is brought in as the Great God of the Gaps.

The scientific picture traced above deals with the questions of origins, of how what we observe and experience today came to be? The question of creation, and therefore of a God Creator, responds to the question of why is there anything in existence. Creation is not one of the ways whereby things originated as opposed to other ways that can be thought of, including quantum cosmology and evolutionary biology. The claim that all things are created is a religious claim that all that exists depends for its existence on God. It says nothing scientifically of how things came to be, although beautiful stories are told in the Book of Genesis, to elaborate on the dependence of all things for their existence upon God.

Having opened the Pandora's box of the Bible, let us elaborate a bit upon it. The Bible is a collection of writings by various authors at various epochs using various literary genres. And so it best serves reason if one speaks of a specific book rather than of the Bible in general. It is clear that the overall intention of the authors of Genesis is to evoke religious faith, an adherence to the God of Abraham, Isaac and Jacob, and not to teach. There is simply no scientific teaching in Genesis. In the Judaic/Christian tradition, the roots of religious belief reach to 2,000 years before Christ with the prophet Abraham. But Modern Science cannot be dated before the 16th or 17th century, roughly from the time of Galileo and then through many others to Newton, with the

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discovery of the universal law of gravity, the differential calculus, etc. The modern science that speaks to religion today is born much later than the religion to which it speaks. It has to be recognized that the religious tradition is historically much longer and to a certain extent has that richness of the past that modern science does not. It is unfortunate that, at least in America, creationism has come to mean some fundamentalistic, literal, scientific interpretation of Genesis. Judaic-Christian faith is radically creationist, but in a totally different sense. It is rooted in a belief that everything depends upon God, or better, all is a gift from God. The universe is not God and it cannot exist independently of God. Neither pantheism nor naturalism is true.

But if we confront what we know of origins scientifically with religious faith in God the Creator, in the senses described above, what results? I would claim that the detailed scientific understanding of origins has no bearing whatsoever on whether God exists or not. It has a great deal to do with my knowledge of God, should I happen to believe he exists. Let me explain. Take two rather extreme scientific views of origins: that of Stephen Gould of an episodic, totally contingent and, therefore, non-repeatable evolutionary process as contrasted to a convergent evolutionary process such as that of Christian de Duve, in which the interplay of chance, necessity and opportunity leads inevitably to life and intelligence. In either case, it is scientifically tenable to maintain an autonomy and self-sufficiency of the natural processes in a natural world, so that recourse to God to explain the origins of all that exists, is not required. It is not a question of chance in nature, excludes God; destiny in nature requires God. In neither case is God required.

If, however, I believe in God then what nature tells me about God in one case is very different from what nature tells me about God

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in the other. Please note that I am not calling upon faith to adjudicate between contrasting scientific viewpoints. I do think that convergent evolution is more consistent with God's revelation of himself in the Book of Scripture, so that, as Galileo was fond of stating, the Book of Scripture and the Book of Nature speak of the same God.

If we take the results of modern science seriously, it is difficult to believe that God is omnipotent and omniscient in the sense of the scholastic philosophers. Science tells us of a God who must be very different from God as seen by the medieval philosophers and theologians. This is not to place a limitation upon God. Far from it. It reveals a God who made a universe that has within it a certain dynamism and thus participates in the very creativity of God. Such a view of creation can be found in early Christian writings, especially in those of St. Augustine in his comments on Genesis. If they respect the results of modern science, religious believers must move away from the notion of a dictator God, a Newtonian God who made the universe as a watch that ticks along regularly. Perhaps God should be seen more as a parent or as one who speaks encouraging and sustaining words. The universe has a certain vitality of its own like a child does. It has the ability to respond to words of endearment and encouragement. Words which give life are richer than mere commands or information. In such wise does God deal with the universe.

These are very weak images, but how else do we talk about God. We can only come to know God by analogy. The universe as we know it today through science is one way to derive analogical knowledge of God. For those who believe modern science does say something to us about God it provides a challenge, an enriching challenge, to traditional beliefs about God. God in his infinite freedom continuously creates a world which reflects that

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freedom at all levels of the evolutionary process to greater and greater complexity. God lets the world be what it will be in its continuous evolution.