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RELIGIOUS FAITH VERSUS SCIENCE

Many may have learnt from media reports that Kansas (or more correctly, the Kansas State Board of Education), one of the states in the United States of America, has recently banned the teaching of the theory of evolution in schools, including Darwin's theory of biological evolution, the geological theory of plate tectonics and the cosmological Big Bang theory. These religious fundamentalists, known as Creationists, believe in 'young earth', that the entire universe was created only a few thousand years ago, in the space of six 24-hour days, and hence they argue that any scientific theory that assumes that the world has existed for more than about 10,000 years should either be excluded from the school curriculum or "balanced" by the alternative "Creation Science" doctrine. Although they do not have strong objection to microevolution or the process of change within species, they are against macroevolution, the change from one species to another. Eerily enough, such is the influence of the Creationists that since the Kansas Board approved of their stand, other states in the Bible belt have not hesitated to follow suit : Kentucky recently deleted the word "evolution" from its new state science guidelines, Oklahoma joined Alabama in requiring a disclaimer on biology textbooks and there are bills pending before the state legislatures in Georgia and Ohio that would require teachers to present evidence inconsistent with evolution whenever teaching the topic.

Evolution in the broadest sense teaches us that the universe has a history, that change has taken place through time. If we look today at the galaxies, the stars, the planet Earth, and especially at life on planet Earth, we see that things today are different from what they were in the past : galaxies, stars, planets, and life forms have evolved. Biological evolution refers to the scientific theory that living things share ancestors from whom they have diverged : Darwin called it "descent with modification". There is abundant and consistent evidence from astronomy, physics, biochemistry, geochronology, geology, biology, anthropology

and other sciences that evolution has indeed taken place. What still lies in the shadow region, however, is how evolution has taken place, and what are the processes and mechanisms that produced the change.

The Creationists, on the other hand, are not satisfied with what the scientists believe in and are at pains to establish that scientific laws do not support the theory of evolution. They argue that Darwin's theory of evolution violates the Second Law of Thermodynamics on the argument that entropy can never decrease. Entropy is considered as a measure of disorder, whereas evolution, they argue, is a process that moves from disorder to order and therefore violates thermodynamic laws. The scientific answer to this is that the laws of thermodynamics that we usually learn in our undergraduate classes are based on a "closed" or isolated system. There is enough scientific evidence to suggest that entropy can, and does, decrease in an "open system" where the system is allowed to interact with other external systems. In that sense, our earth is an open system as long as it interacts with other systems such as the sun. In fact, there are examples of many observed phenomena, for instance snowfall, which would never occur if one were to trust the kind of thermodynamics envisioned by the creationists. In formation of snow, during the crystallization of water molecules from vapour, at low temperatures, low energy state with low entropy is favoured over a high energy state with high entropy. As Ludwig Boltzman noted more than a century ago, thermodynamics, when correctly interpreted, does not just allow Darwinian evolution but favours it.

The Creationists' justification for rejecting the multi-billion-year astronomical time scale, on which the Big Bang theory depends, is even more astonishing. When confronted by the ages of some rocks, which have been calculated to be millions of years old from the decay of radioactive isotopes, they argue that decay rates of the isotopes could have been much greater under extreme conditions of the

past. Therefore the rocks are "really" much younger than they seem to be. It goes without saying, there is no legitimate evidence supporting this view in experimental or theoretical physics. In refuting the claim that many stars visible to us must have existed millions of years ago since they are millions of light years away, Creationists claim that God created the light from those stars en route to us in space, to make it look like it came from actual stars, but that no such stars ever existed.

It is wrong to assume that evolution precludes belief in God and that all evolutionists are perforce atheists. In fact many scientists are religious and most mainline religions see no conflict between their faith and evolutionary theory. The overwhelming majority of scientists regard religion and science as two separate domains of inquiry that do not contradict each other. As America's largest professional society of physicists puts it, "Scientific inquiry and religious beliefs are two distinct elements of the human experience. Attempts to present them in the same context can only lead to misunderstanding of both."

What is more alarming about this trend, shocking as it is, is that these theories and *ad hoc* explanations are being

accepted by learned and lettered officers, administrators and policy-makers, and are even finding favour among Senators and hence by a logical extension, among the people that claim to represent. Although American science organisations were prompt and vehement in their disapproval ("what is needed from scientists now is not expressions of outrage, but active participation to reverse this trend"), it is not just the responsibility of the scientific community to counter this thought process. This should be taken up by all citizens as a wake-up call to realize that Education can be threatened by the political power of such religious fundamentalists. Thanks to the revolution in communications, it is easier to propagate misinformation today than it has been possible ever before (one shudders to think what Hitler could have done if he had the Internet at his disposal). Illiteracy and religion, especially in the context of India, can form a volatile and explosive mixture. What can happen in the United States today may happen in our country tomorrow in a more dangerous way because here exists a myriad variety of myths, faiths, beliefs and superstitions to fuel the fire. □

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