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An Essay on Evolution

Evolution and The Origin of Life are Separate and Distinct Concepts

Today, February 12, 2009, is the 200th birthday for two remarkable individuals, Abraham Lincoln and Charles Darwin. Celebrations for both of them are ongoing in Lincoln today, but I suspect that Abraham Lincoln's birthday is more universally celebrated in our city than is Charles Darwin's. However, at UNL the School of Biological Sciences and the Center for Great Plains Studies will celebrate Darwin Day tomorrow, Feb 13, culminating in a talk at the Nebraska Union at 7:30 PM by George Levine (Rutgers) entitled Darwin's Prophetic Apprenticeship on the "Beagle" Voyage. The public is invited.

Two years ago on a Saturday morning, I was asked quite pointedly by two friends how I could be both spiritual and a scientist. My questioning friends felt that these qualities were incompatible. It turned out their church taught that scientists were 'the enemy' because scientists believe in evolution. Since that time, Letters to the Editor regarding evolution have attracted my attention. Many of the published letters stated that the author did not believe in evolution, and argued in support of his/her position that God had created life. The authors thoroughly confuse two concepts which are separate and distinct: Evolution and the Origin of Life.

Evolution can be defined as the genetic changes which take place over time within a group of organisms. Natural selection determines which changes persist and which may be lost depending on whether any particular genetic change confers some benefit for survival. Evolution pertains to the history of life on earth. Critically, evolution only began after life first appeared on earth. Evolution says nothing about how that life arose. Evolution is compatible with a religious origin of life. It is also compatible with a spontaneous origin from non-living molecules or the introduction (accidental or intentional) of life by extraterrestrials.

The most compelling evidence for evolution is not in the fossil record. Recent advances in molecular biology and the instrumentation for sequencing proteins and the nucleic acids (DNA and RNA) have revolutionized how scientists study the relationships among organisms. Molecules such as the small subunit ribosomal RNA (rRNA) can act as molecular clocks. When rRNA sequences from thousands of different organisms are compared, all are largely similar. But with a most useful twist: organisms which appear to be closely related have

sequences that differ very little whereas organisms that appear to be only distantly related exhibit much wider divergence in their molecular sequences. The differences and similarities among all these sequences make sense only when interpreted by evolution. Gene sequence information is accumulating at such a rate that it now constitutes most of the evidence supporting evolution. There is nothing hypothetical or theoretical about the data from gene sequences: it is experimental evidence from living organisms and can be reproduced in the laboratory. Upwards of a million such molecular sequences are now available. They represent a quantum leap beyond the types of evidence available to Darwin, or any scientists in the century following him.

Questions about the Origin of Life are in a distinctly different scientific discipline. How might life have arisen, given the chemical and physical conditions thought to have been present on earth 3.5 to 4.5 billion years ago? My own contribution to this field “A hypothesis on the role of pressure in the origin of life” was published in 1984 in the *Journal of Theoretical Biology*. Two key words which should be carefully noted here are Hypothesis and Theoretical. There is no way to test or prove anything which might have happened 4.5 billion years ago. There is no experimental data, only logical suggestions as to what might have happened, nothing more.

A recent worldwide poll reported in *The Economist* indicated that less than half of the US public said that they believed in “evolution.” This figure was the lowest in the developed world. That’s a dubious honor for the US. Moreover, I think that the distinction between Evolution and The Origin of Life transcends philosophy and religion because confusion on this point has political repercussions in the form of attitudes towards science in general. The purpose of this letter is not to convince anyone of the correctness of a particular position but instead to keep further discussions on topic, i.e. to frame the question. Evolution and the Origin of Life are separate concepts. Accepting evolution does not require denial of God as the Creator of Life.

— Nickerson, K.W. 2009. An essay on evolution: evolution and the origin of life are separate and distinct concepts, *Lincoln Journal Star*, Community Column, February 12, 2009.