

LIFE IN THE UNIVERSE

By David A. Watson, Ph.D.

Recently, I read a brief essay by the great science fiction writer Robert Silverberg. The story, written in the clipped style of a newspaper editorial, described the discovery of life on the planet Pluto in the year 2668 A.D. Silverberg told of crab-like creatures active only during the Plutonian night at temperatures near absolute zero, and feeding exclusively on methane. Far-fetched? Maybe. Impossible? Sorry, but I avoid using that word. Is there any reason at all to think life exists elsewhere besides Earth? For that matter, is the question even important? As a biologist by vocation, and a devotee of space exploration by avocation, I am naturally drawn to the question of whether life (which I define as the ability to indefinitely self-replicate) exists elsewhere in the universe, so allow me to offer my two cents worth.

Yes, I do believe it matters whether we are alone in the universe. I prefer to consider separately the question of whether intelligent life exists elsewhere, simply because for the great majority of our own planet's existence we humans haven't been here, and it may be that on other planets intelligent life has not yet appeared (or has already disappeared). Moreover, humans constitute only one of millions of species existing on our own planet (and in fact we have catalogued only a fraction of the Earth's existing, or extant, life forms), and from a biological perspective the presence of an intelligent, sentient species (such as humans) would at best add little additional biodiversity, and at worst could subtract considerable biodiversity. Biologists seek to decipher the complex mechanisms comprising living systems; to be able to study the ways in which living organisms survive and reproduce themselves on other worlds would add a richness to the discipline of Biology that words cannot adequately describe. Were

we to uncover even a single living extraterrestrial entity that could subsequently be studied in detail, the information gleaned concerning replicative and metabolic processes could prove invaluable to understanding biological systems on our own planet.

In recent years the question of whether life exists elsewhere in the universe has begun to be addressed in concrete ways under the aegis of the nascent discipline of astrobiology (to which NASA is now contributing substantial resources). A group of NASA-funded researchers caused a stir recently when they announced that they had identified from a meteorite of Martian origin what appeared to be fossilized bacteria (or at least something similar). This claim was greeted with considerable skepticism both within and outside of the scientific community. Even so, within the past several days a Russian team has also identified what appear to be fossilized primitive life forms in a meteorite. A key assumption has always been that the environment in which we would at some point identify life would be similar to that of the temperate or tropical regions of the Earth. Even twenty years ago as a Biology undergraduate, I was taught that certain localities on our planet were too inhospitable to harbor life. Again and again, this dogma is proving to be false, as living organisms are being identified in places where science had previously been assumed (in the absence of any data) that life could not survive. Examples include geothermal vents at the bottom of the deep oceans, where temperatures, pressures and nutrient concentrations were all thought to be incompatible with life, as well as in extremely dry, cold valleys and under three miles of ice in Antarctica. If life can exist in these places, why could it not exist in e.g. oceans under the ice of Europa, in the steaming atmosphere of Venus, or on the dry, cold surface of Mars? Indeed, we may one day confirm the presence of extraterrestrial life in our own solar

system—and it could conceivably happen in the near future. In spite of the loss of not one, but two Mars probes in recent months, we can and should continue to explore the solar system and beyond to look for signs of life.

While I admire Robert Silverberg for his imaginative and refreshingly succinct use of the news item as a genre for speculating on the nature and timing of the discovery of life elsewhere in the cosmos, I am in a sense jealous as well. You see, I would like to write this story myself, the real story of the discovery of life elsewhere in the universe—and I would like to do it soon.