

## Scientific Views on Life

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Science is based on developing hypotheses or theories that are supported by empirical data. To the extent possible, the hypotheses are tested by making predictions about future observations. For nonexperimental sciences like geology and astronomy, the predictions may be that certain things will be found in future investigations. The strongest scientific evidence comes from experiments in which phenomena are reliably controlled and manipulated. Successful practical applications of a scientific theory, such as developing technology or medical treatments, provides strong evidence that a theory is valid. Theories that do not have verifiable predictions are speculations that have little or no scientific standing.

The human mind appears to be prone to imagine explanations for virtually everything. Many or most of these speculations turn out to be false when tested with scientific methods. It is also common in science for theories to be partially true and need to be revised or replaced. It is important in science to carefully track which theories and which parts of a theory have empirical support, and which remain speculative. Scientists sometimes become overly enthusiastic about their pet ideas and overlook a lack of empirical support.

The aptitude for and interest in rational theories, mathematics, and science in general varies among people.

The prevailing view among scientists is that the characteristics of life have been determined by biological evolution. Living organisms compete and struggle to survive. An organism that has characteristics that provide an advantage will be more likely to successfully reproduce and propagate the characteristics to its offspring. There is a variety of compelling evidence that this basic process occurs. The evidence includes selective breeding of plants and animals, the effects of environmental changes, the pattern of findings for fossils, and the similarities and differences in DNA among related species.

According to the concepts of biological evolution, the basic purpose or goal of life is to reproduce. The characteristics, abilities, activities, and life cycle of a living organism are a result of and directed toward the goal of reproduction. Most scientists view a living organism as being self-serving in obtaining the resources and other advantages needed to achieve this goal.

The first known living organisms were single cell organisms, like bacteria. They proliferated and competed for existence.

One of the most important steps in evolution was when the single cell organisms started combining and working together to form multicellular organisms. The cells in multicellular organism became specialized and developed into organs that served specific functions and depended upon other specialized organs or cells for survival and reproduction. The various organs in an animal's body are the result of this process.

Multicellular organisms demonstrate that cooperation, specialization, and interdependence can provide survival advantages and are a conspicuous result of evolution. Sexual reproduction is another example of cooperation, specialization, and interdependence of living entities. The occupational specialization in human societies and trade between nations are further examples of this principle.

The simplest living organisms can sense aspects of their environment and have genetically programmed responses to certain conditions. A plant tracking the sun is an example. With evolution, the perceptual systems became more sophisticated and the responses became more flexible and context dependent. Animals evolved the capability to generate variations in behavior and to select adaptive behavior during their lifetimes rather than being limited to genetic programming. This ability to learn was another very important step in evolution.

The ability to learn and to adapt culminated in humans, with our self-awareness, abilities for abstract, symbolic thought, memory, communication, imagination, creativity, planning based on hypothetical futures, and development of culture. Humans have become dependent on culture and technology for survival. This is another manifestation of cooperation and interdependence. Human culture can maintain much greater amounts of useful information than the biochemical processes of genetic programming that dominate simpler living organisms.

The human mind and human culture appear to have coevolved, with the mind becoming very plastic and adaptable (Donald, 2001). Given the plasticity of the human mind, culture provides a needed framework for structuring, managing and experiencing life and social relationships. Humans actively seek culture, which includes myths, religion, and science, as well as tools and technology. The human tendency to readily imagine explanations or myths for virtually everything that happens is associated with the need for culture.

The interplay between cooperation and competition has a fundamental role in evolution. The underlying competition and struggle for existence drives natural selection to favor greater intelligence, awareness, communication, and cooperation. This results in more complex living systems.

The cooperation and complexity form hierarchical levels of organization for living systems. For many animals, a living cell is part of an organ (kidney, lung, etc.), the organ is part of an organism, and the organism is part of a community. Each level is a living unit with identifiable boundaries and functions that contributes to and is dependent on a higher level of organization. The control of the living systems involves both top-down and bottom-up guidance. Humans also tend to form social organizations that have interdependent, hierarchical structures.

Many people appear to have an innate desire to be part of something larger than themselves. This is consistent with the hierarchical organization of living systems and may contribute to motivations for various group activities including family, work, politics, religion, and culture in general. It may also contribute to motivations for personal transcendent experiences.

Human intelligence and culture may allow humans to move beyond the underlying drive for self-serving reproduction and associated material success and status. Based on principles of evolution, one would not expect to find monks who choose to not have children and to live an ascetic life. Similarly, the willingness to make sacrifices to help others would be expected to be

limited to situations when there is a direct reciprocal benefit. Of course, monks and those who are extremely altruistic are a minority of the population. Motivations for reproduction and associated material success and status still appear to be the predominate values for humanity as a whole.

### References

Donald, M. (2001). *A Mind so Rare: The Evolution of Human Consciousness*. New York: Norton.

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