

How does life survive?

Life is all around us. It takes on every size, shape and color imaginable. Living organisms have been found in the highest levels of the atmosphere and the most remote depths of the ocean. In spite of its diversity, life displays remarkable unity and interdependence.

Life does not exist alone. All organisms on the planet are dependent on one another and their environment to ensure survival. Organisms do not live in isolation; plants, animals and microorganisms are constantly interacting with each other and with their natural surroundings. Those interactions have consequences, both positive and negative, for not only us but for every other living organism that shares this planet.

Life is organized. The diversity of life on Earth reflects the diversity of the planet's habitats. Despite the wide variety of organisms that live on our planet, organisms share common characteristics that allow them to be classified and organized. At each level of the hierarchy of biological organization, emergent properties appear that further serve to differentiate organisms.

Life changes over time. The characteristics utilized to organize life reflect both the pressures of an organism's ecosystem, and the gradual change of organisms in response. Over millions of years, species have adapted to ensure their survival, leading to the amazing variety and biodiversity we find today.

Life is a continuing stream of genetic information passed from generation to generation. Traits that convey advantage within the ecosystem are encoded within the genes passed along to offspring. Individuals are a source of variation that drives evolutionary processes.

Life is a chemical process. A vast series of interconnected chemical reactions define life at a molecular level. Every heartbeat, every characteristic of living things, and every process of life has a basis in chemistry - the marvelous interaction of matter and energy. From small molecules, chemical reactions produce all the complex molecules necessary for life organisms.

Life is diverse. The world in which we live can be divided into two very basic parts, living and non-living. Although considerable variation exists, every living thing on Earth is composed of cells. From the tiniest blade of grass to the tallest tree, from the algae that turns the pond green to the fisherman standing on its banks, cells are the building blocks in which the chemistry of life occurs.

Life requires energy. Almost all of the energy on Earth originates from the sun, reaching our planet in the form of light, heat, and other forms of energy. Ultimately, this energy drives the chemical processes of life.

Life is continuous. Successful growth and development of an organism hinges on the ability to successfully duplicate their genetic material, acquire matter and energy and maintain stability.

Life operates within a similar set of guidelines. The basis of the genetic code is the same for all organisms. The four bases of DNA, in their multiple combinations, harbor all of the genetic variation represented by life on Earth. The uniform process of decoding genes directs the production of specific proteins, initiating a cascade of reactions that lead to the distinct characteristics of an organism.

Life is an active process. All organisms must control and balance their internal chemistry regardless of changes in their surroundings.

Life is responsive. An organism's growth and development conforms to a well-defined pattern of differentiation controlled by their genetic makeup. Animal development proceeds through an orderly series of stages after fertilization, whereas plants have a more open-ended, indeterminate growth that is influenced by the environment. Regardless of the pattern of development, all living systems respond to stimuli and environmental cues that influence their behavior.