



About Life Detection

To help with the development of strategies towards formalizing plans for life detection missions, we are collecting life detection content that already exists that will hopefully be used to stimulate and support discussions about how one would detect extant life beyond Earth.

The types of content we’re collecting includes studies, workshops, literature, white papers, videos, links, and other resources that already exist on this topic. If you would like to contribute, [please submit content here](#).

The NASA definition of life, “Life is a self-sustaining chemical system capable of Darwinian evolution” and considered the specific features of the one life we know —Terran life.

Background from *The Limits of Organic Life in Planetary Systems*.

For generations the definition of life has eluded scientists and philosophers. (Many have come to recognize that the concept of “definition” itself is difficult to define) We can, however, list characteristics of the one example of life that we know—life on Earth:

- It is chemical in essence; terran living systems contain molecular species that undergo chemical transformations (metabolism) under the direction of molecules (enzyme catalysts) whose structures are inherited, and heritable information is itself carried by molecules.
- To have directed chemical transformations, terran living systems exploit a thermodynamic disequilibrium.
- The biomolecules that terran life uses to support metabolism, build structures, manage energy, and transfer information take advantage of the covalent bonding properties of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur and the ability of heteroatoms, primarily oxygen and nitrogen, to modulate the reactivity of hydrocarbons.
- Terran biomolecules interact with water to be soluble (or not) or to react (or not) in a way that confers fitness on a host organism. The biomolecules found in terran life appear to have molecular structures that create properties specifically suited to the demands imposed by water.
- Living systems that have emerged on Earth have done so by a process of random variation in the structure of inherited biomolecules, on which was superimposed natural selection to achieve fitness. These are the central elements of the Darwinian paradigm.