

Life, Definition of



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Definition

There have through history been many attempts to define “life” but there is no generally accepted definition of “life” at this date. As a result, some have come to believe that defining “life” is not a fruitful endeavor. This seems to be a minority view, however, since the quest to find or create a definition of “life” is as active as ever.

Overview

The purpose of defining “life” varies, but the most common purpose is to find a *de re definition* that identifies a *natural kind*.

A natural kind is a grouping of phenomena according to demarcation lines that exist objectively in nature independently of us and can (in theory) be discovered by us, in contrast to a grouping that does not exist independently in nature and thus has to be invented by us.

A *de re* definition is sometimes also called a *real definition* and is contrasted with, for instance, *stipulative definitions* and *operational definitions*.

The purpose of a stipulative definition is to create a definition for a special purpose without

regard for whether the definition refers to any natural kind. Stipulative definitions can be used to define “life” in special situations but are probably not very useful for defining “life” in astrobiology, where life is the primary study object. Given that astrobiology’s ambition is to increase our knowledge about the real world, “life” should reasonably refer to a natural kind, not a grouping created by us for some particular purpose.

The purpose of operative definitions is basically the same as for stipulative definitions, but with the constraint that the definition is based on a particular method, instrument, or the like. It has, for instance, been suggested that different disciplines could define life in different ways. This does not come through as a suitable solution for astrobiology, however, partly because astrobiology is a multidisciplinary project where the arguably most important term has to refer to the same thing for everyone involved, and partly because the study object of astrobiology is life in a very wide sense that covers the origin, evolution, and future of life on Earth as well as in the universe.

A *de re* definition typically takes the form of a list of properties that are supposedly individually necessary and jointly sufficient to identify the phenomenon in question, in our case, life. That is, each of the properties on the list needs to be shared by all life while no non-living entity can possess all of the properties on the list. It may seem surprising that no one has yet managed to compose such a list. One possible reason for why this is the case, is that we still only know about

one instance of life, namely life on Earth, which is all related. This limitation makes it very hard to come up with a general definition of life. Another reason seems to be that life is constantly evolving, which means new properties emerge constantly, while other properties disappear. Life is in that way a moving target and given what we know today about life and evolution, we have no reason to believe that there are any core of properties (also called an *essence*) that is exempt from this process. Even so, many continue to search for one and hope that improved knowledge about life (including a discovery of extraterrestrial life) will reveal such a core of unchangeable properties. Others look for alternative ways of defining life that are more flexible and do not assume a core of unchangeable properties.

One alternative form of definition is called an *ostensive definition*. An ostensive definition is performed by providing examples of the phenomenon that is to be defined. One can, for instance, point at a number of chairs and say for each of them, “that is a chair.” When confronted by other possible chairs we are then supposedly able to tell if they are chairs or not based on our experience of previous chairs. This is a type of definition that may work well for chairs but that is probably not of much use for a multi-faceted phenomenon like life. It may, however, be historically important as an explanation of how our forefathers started to distinguish between life and non-life. Likewise, it can have pedagogical value as a way of teaching children to distinguish between life and non-life.

Another alternative is the *list definition*. A list definition is provided by listing all the phenomena we want to include under our definition. This is, for obvious reasons, impossible to do with life. There is just too much life. Also, new life is born and old life dies off faster than we would have a chance to update the list. Finally, we can only include life that we know on the list. Life that has not yet been discovered, on or off Earth cannot be included, and even if we do discover extraterrestrial life, we will probably never be able to discover all non-extraterrestrial life. The list can therefore never be complete, and we will thus never have a complete definition of life.

Both the ostensive definition and the list definition can be seen as examples of “I-know-it-when-I-see-it” definitions. Though attractive in the sense that they provide a way of producing a definition without the need for identifying any core properties, there are also some important drawbacks. The most important drawbacks of “I-know-it-when-I-see-it” definitions for astrobiology are probably that:

1. They will not help us determine the tricky cases, that is, discoveries that are not obviously life, nor obviously non-life.
2. They will not help us search for extraterrestrial life. It will be very difficult to determine which experiments, instruments, etc. to choose if we do not know beforehand what we are looking for.

There are also some new alternative suggestions for how to define “life” as a natural kind without having to assume a core of unchangeable properties. These include, for instance, suggestions inspired by Ludwig Wittgenstein’s ideas of *family resemblance*, and Alan Turing’s ideas of how to test for Artificial Intelligence (the so-called *Turing test*). Because they are still not fully developed or tested, it is too early to assess these methods at this date.

Cross-References

- ▶ [Astrobiology](#)
- ▶ [Biosignatures](#)
- ▶ [Evidence in Astrobiology](#)

References and Further Reading

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