

By the beginning of 2010 the number of known extrasolar planets exceeds 400. Some of the discovered planets have masses which exceed the terrestrial mass only for a few times. One can expect that Earth-size and mass planets within habitable zones will be discovered in the near future. In this work we consider physical conditions which are favorable for the emergence, evolution and existence of life. On Earth the emergence of life is based on amino acids and RNA/DNA and requires a quite narrow range of many of the planet's physical parameters, most important is its mass, the temperature conditions, and liquid water. Besides these factors, a very favorable combination of additional important geophysical parameters may provide the necessary conditions for the life evolution into multicellular animals.

The main parameters of a planet, that is critical for the existence of life, form a peculiar labyrinth with many impasses. Planets feasible for the advent of life as we know it and its evolution towards multicellular organisms may be detected most likely in planetary systems of stars with spectral types, from the late F to late subtypes of K and should possess the following features:

- a moderate level of planetary gravitation with a planet's mass slightly lower or larger as that of the Earth;
- an availability of zones with an interval of environmental temperature comfortable for the life;
- an atmosphere capable of absorbing external hard radiation, but transparent for 1-3 eV photons, with a sufficient density of radiation energy;
- an availability of other (chemical) sources of energy (oxidizing environment or materials);
- a not-too-long rotational period;
- an availability of open basins and water vapor in the atmosphere, together with continents or large islands;
- an important role may play a sufficiently close and massive satellite;
- a semimajor axis of the orbit is determined rather rigidly by the luminosity of the star.
- the eccentricity of the orbit should not be large, as well as an inclination of the equator whose value with respect to the orbital plane should not be too high;
- volcanism and/or plate tectonics;
- mild cosmic catastrophes, which can result in renovation of species and the appearance of the most adapted ones.

Looking for a habitable planet one should keep in mind that the Earth has a unique combination of physical properties needed for the evolution of life based on amino acids and a RNA/DNA and its transition, first into multicellular and then vertebrate organisms. Some of these features may be used for detection of a habitable planet by a transit method. First of all it is a signature of the oxygen-containing atmosphere with low amount of CO₂ in the atmosphere.