

WHAT EVOLUTION IS *NOT*

Biological Evolution...

1. is NOT a theory...(it is a FACT; it has been observed directly, and its extension to all life is supported by more evidence than there is for the spherical shape of the planets, and there is no evidence against it.)
2. is NOT something one should believe in...(it's based on science, not faith).
3. Is NOT concerned with the origin of life... (it deals *only* with the origin of *species*).
4. Is NOT just concerned with the origin of humans...(no more than any other species).
5. was NOT discovered or first explained by Charles Darwin... (there were others)
6. is NOT the same thing as natural selection...(which is the *how* of evolution, the real "Theory of Evolution ...by Natural Selection", also deeply confirmed).
7. is NOT something that happened only in the past... (it's still going on).
8. is NOT something that happens to individuals...(it happens to populations).
9. is NOT an accidental or random process...(there are built-in limited options and selective aspects; even mutations are influenced by environmental factors). Its complex patterns are just as natural as the randomly generated and diverse patterns of snowflakes and crystals.
10. does NOT have any evidence against it... (all observations support it).
11. was NOT contrived to undermine religion...(rather, our awareness of it grew as we tried to make sense of many observations of life that were not consistent with traditional explanations.
12. does NOT deny the existence of God...(It is neutral; God is neither required nor eliminated; for all we know, evolution could be part of God's creation, or it might not, but science cannot determine that).
13. does NOT conflict with any religion...(It can't, since it is only another way of trying to make sense of the natural world, based on scientific observation and critical analysis. Most religions have no problem with evolution, and those that do typically base their objections on an inaccurate view of science and evolution).

If these popular misconceptions about evolution are all wrong, then what **IS** evolution?

Continue on...

WHAT EVOLUTION IS

Biological Evolution is essentially the process whereby **new species** arise from earlier species by **accumulated changes**. This is often referred to as "descent with modification." At the species level, this speciation process is sometimes called *microevolution*.

By extension, as this process of speciation proceeds with time, increasing numbers of species appear, becoming increasingly different. The pattern of this, over time, looks like a branching tree; all the species we see today are like the growing tips of that tree, except that each tip has become somewhat different from the others (unlike a real tree). Close clusters of tips are most similar, and have most recently branched (evolved); more distant tips are more different, and can be traced to much lower (earlier) branchings in the tree. What we call a "genus" would be a close cluster of tips. The "family" level of classification (which may include several genera) refers to a group of several closely branched clusters. And so on. Evolution at these "higher" levels is sometimes called *macroevolution*, but it should be obvious that this simply results from continuous microevolution repeated and accumulated over long periods of time.

The recognition of this pattern of change of life-forms over time was developed from many observations. It has even been directly observed in some species, and inferred in many others from clear independent evidence mainly in comparative anatomy, embryology, paleontology, geology, biogeography and molecular biology. Although there are some curious examples of evolution, there are no empirical observations of life, living or extinct, that evolution cannot explain, and there is no evidence against evolution.

The mechanism for how evolution happens has been largely explained by **natural selection**. In 1859, Charles Darwin published his best known book (out of some 25 books he wrote): *On the Origin of Species by Means of Natural Selection*. In it, he presented the results of some 20 years of work pulling together massive amounts of evidence showing how natural selection must be the primary working mechanism for evolution. Natural selection is observed constantly, and its role as the main driving force of evolution has been observed, tested and challenged many times and in many ways, and has survived fully intact. There are also many independent lines of evidence that are consistent with natural selection as the main mechanism of evolution. There is NO observed evidence against this as a working mechanism for evolution. Efforts by some to point out "evidence against evolution" always turn out, under critical examination, to be totally without merit. The Theory of Evolution by Natural Selection (or, more precisely, the Theory of Natural Selection), therefore, holds the high status of near certainty: it is a scientific theory.

In short, evolution as a real phenomenon is scientifically solid; it is a scientifically demonstrated fact; and the scientific theory for how evolution happens is so well documented by the evidence that this explanation is as close to a scientific fact as any explanation can be. Remember: scientific facts refer to observed or demonstrated natural phenomena, e.g., evolution; scientific theories are the best explanations we have for how those phenomena occur, e.g., the theory of natural selection.