New species appear to arise from sudden changes

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(Phys.org)—Folmer Bokma, researcher at Umeå University, explains that living species have a limited ability to adapt to the environment. His results suggest that species do not change gradually, as the modern evolutionary theory assumes, but suddenly when a new species arises.

Evolutionary stasis is an alternative scientific interpretation to the widely accepted Neo-Darwinism. It means that most species show little evolutionary change through history, instead, evolution occurs more abruptly and it can result in one species becoming two different species. The theory originated among paleontologists who study fossils. They found that no intermediate forms of fossils exist. However, it is relatively difficult to determine the species of fossil organisms.

"I have developed algorithms to discover how evolution stasis occurs among contemporary, existing species' characteristics, in groups of species that do not leave fossils," says Folmer Bokma, researcher at the Department of Ecology and Environmental Science, who was a guest speaker at the 2013 American Association for the Advancement of Science (AAAS) annual meeting in Boston on February 17th.

The method is based on that one first uses DNA to reconstruct the species' relationship to each other in the form of a family tree. Thereafter, one uses statistical techniques to reconstruct how the evolution of traits has been like, such as body size.

Folmer Bokma has analyzed various animal groups, such as the fruit fly

(Drosophila melanogaster) and body size in birds and mammals. His results suggest that species do not change gradually, as Neo-Darwinism predicted, but suddenly when a new species arises. This means that when the animals' environment changes, the species do not respond to adapt and can become extinct, even though there are more than enough genetic variations at the individual level to make adaption possible. This is the paradox.

"I believe that the explanation for the paradox is that many features are designed primarily to each other within the species," says Folmer Bokma and further exemplifies what he means:

"Proteins in polar bears are not adapted to the temperature at the North Pole, but the body temperature is 37 degrees Celsius. Polar bears have the same body temperature as a camel in the desert, despite their differences in living environments. In order for body temperature to adjust, it requires many genetic changes simultaneously affecting all proteins in the right direction and it's very unlikely to happen. Therefore, species do not adapt their body temperature to their surroundings, but polar bears and camels have about the same body temperature as all other mammals. "

Evolution then becomes limited to the characteristics which are outside such complex of properties which are adapted to each other. Thus, polar bears get a thick white fur instead, which provides the isolation required for invariable high body temperature.

Folmer Bokma also discussed the extent to which this pattern is a general feature of complex systems that can be used in completely different contexts. A concrete example is the university that falls behind due to societal changes because they have created a complex regulatory framework that makes it impossible to change some routines without re-writing about half the regulations.

Provided by Umea University