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**HEADLINE:** Leapin' Evolution Is Found in Lizards

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**BODY:**

Darwin's theory of evolution is the foundation of biology, yet the process is so slow that it has seldom been witnessed outside the laboratory.

A remarkable experiment with lizards in the Bahamas has now shown that evolution moves in predictable ways and can occur so rapidly that changes emerge in as little as a decade or so.

The finding bears on debates as to whether evolution on the time scale of millions of years is governed by the same rules as short-term evolution. Biologists favoring the idea of punctuated equilibrium have argued that there are natural constraints that may keep a species unaltered for millions of years.

The new study can be interpreted as showing that there are no such constraints, and no difference between long-term and short-term evolution.

The experiment involved introducing a species of lizard to 14 small, lizard-less islands near the Exumas in the Bahamas and leaving them for 14 years.

Lizards in the Caribbean have been carefully studied by biologists because, like Darwin's finches in the Galapagos Islands, they have adapted to the different conditions on various islands with changes in body shape. For example, lizards that inhabit large trees tend to have long legs, while those that live on twigs are shorter limbed. The reason has to do with speed, which is essential for success in the lizard world, both to catch insects and elude predators.

Dr. Jonathan B. Losos of Washington University in St. Louis said such information enabled him and his colleagues to forecast what would happen to the lizards exiled to the 14 islands, some of which were smaller than a football field.

The more the vegetation differed from that of their original home, Staniel Cay, the more the lizards should evolve, and the direction of evolution should be toward shorter legs, since Staniel Cay is wooded and most of the islands are almost treeless.

Fourteen years after being delivered to their new homes, the lizards have evolved as predicted, with those with the stubbiest legs being found on islands with the scrawniest vegetation, Dr. Losos and his colleagues report today in the journal *Nature*.

Dr. Douglas J. Futuyma, an evolutionary biologist at the State University of New York at Stony Brook, said the study was "distinctive and exciting and one that will be cited for many years to come." Though there are many examples of rapid evolution in terms of an animal's biochemistry, like the development of resistance to pesticides, there are far fewer instances of bodily changes like those seen in the lizard study, Dr. Futuyma said.

A longstanding issue in biology is whether the small evolutionary changes sometimes noticed in a species are the same as giant shifts in the kaleidoscope of species that take place over millions of years or, in biologists' terms, whether microevolution is the same as macroevolution.

The well-studied spread of lizards, which have evolved into 150 species in the Caribbean islands, is a macroevolutionary event. Dr. Losos and his colleagues write that their lizard experiment seems to be a response to the same natural forces, suggesting that "macroevolution may just be microevolution writ large."

Some biologists have suggested that a species may get locked into genetic paralysis and stay unchanged for millions of years until released by some event that shakes up the gene pool. But since the lizards on all 14 islands evolved in the expected direction, Dr. Futuyma said, "it means you don't need to invoke a complicated hypothesis of this type."

The rate of evolutionary change in a species' wing or leg or beak is assessed in units called darwins, which measure the proportional change in an organ over time. The changes typically seen over millions of years in the fossil record usually amount to one darwin or less. But the transplanted lizards evolved at daredevil speeds of up to 2,000 darwins.

The lizard evolution experiment was started in 1977 with a very different purpose in mind by Dr. Thomas W. Schoener of the University of California at Davis. Dr. Schoener installed the lizards on the islands to study extinction. Instead of dying out, most of the lizard colonies thrived.

Hearing of the experiment's misfire, Dr. Losos said he had suggested to Dr. Schoener the idea of converting the goal of the study from extinction to evolution.

Dr. Losos is now planning a second experiment to see whether he can catch the arrival of a new species. One force behind the development of new species, biologists believe, is when a species is adapted to its surroundings and a second, very similar species comes along. Both vie for food in the same environment, forcing the two species to diverge from each other so as to minimize competition. To test the idea, he plans to stock islands with two similar species of lizard.

**GRAPHIC:** Photo: An experiment with lizards, like this Florida native, has found that evolutionary changes can emerge in as little as a decade. Lizards from Staniel Cay have adapted to new environments on islands near the Exumas. (Joe McDonald/Animals Animals)

Map of the Staniel Cay Islands.

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