



The Origin of Species: Lizards in an Evolutionary Tree

OVERVIEW

[*Lizards in an Evolutionary Tree*](#) is one of three films in HHMI's Origin of Species collection. This film describes how the more than 700 islands of the Caribbean are home to about 150 species of anoles, a closely related group of lizards (genus *Anolis*) that occupy diverse habitats and niches. Research on these lizards is enriching our understanding of evolutionary processes, such as adaptation by natural selection, convergent evolution, and the formation of new species—and it is helping to illuminate how and why there are so many different kinds of living organisms on Earth.

Figure 1. Diverse anoles share common features. *Anolis cristatellus* is a common anole species found in Puerto Rico. It has a colorful flap of skin under its throat that it uses to communicate. All but two of the nearly 150 known species of Caribbean anoles have this flap. These species live in diverse habitats and vary greatly in size and other obvious physical features such as leg and tail length. (Photo courtesy of Luke Mahler, University of California, Davis.)



KEY CONCEPTS

- An adaptation is a structure or function that confers greater ability to survive and reproduce in a particular environment.
- Islands are good natural laboratories for scientists to conduct experiments on the role of natural selection in driving adaptations in populations because they are isolated and have relatively simple ecosystems.
- Microevolution refers to evolutionary changes or adaptations that occur within populations, and macroevolution refers to changes leading to the formation of new species.
- The biological definition of a species is a group of interbreeding individuals that are reproductively, and thus genetically, isolated from other groups.
- When two groups within one species become geographically isolated—separated by a physical barrier, such as a river, canyon, or mountain range—genetic changes in one group will not be shared with members of the other, and vice versa. Over many generations, the two groups diverge as their traits change in different ways.
- For two groups to become distinct species, traits must change in ways that will keep members of each group reproductively isolated—meaning that they will not mate or produce fertile offspring with members of the other group—even if they come to be in the same geographic location.
- DNA sequence comparisons among different populations and species allow scientists to determine how distantly related different species are and how long ago they shared a common ancestor.
- Organisms in different evolutionary lineages can independently evolve similar traits as a result of adapting to similar environments or ecological niches, a process known as convergent evolution.
- One reason there has been and continue to be so many different species on Earth is that there are so many different types of habitats and niches.

CURRICULUM CONNECTIONS

Standards	Curriculum Connection
NGSS (2013)	LS2.A, LS3.B, LS4.B, LS4.C
AP Bio (2015)	1.A.1, 1.A.2, 1.A.4, 1.B.2, 1.C.1, 1.C.2
IB Bio (2016)	5.1, 5.4, C.1
AP Env Sci (2013)	II.C
IB Env Systems and Societies (2017)	3.2
Common Core (2010)	ELA.RST.9-12.4, WHST.6-12.9, MP2
Vision and Change (2009)	CC1, CC5

KEY REFERENCE

Losos, J. 2011. *Lizards in an Evolutionary Tree*. University of California Press, Berkeley, CA.