

AT A GLANCE FILM GUIDE

DESCRIPTION

Evolution is happening right now everywhere around us, and adaptive changes can sweep through a population in an evolutionary eyeblink. Dr. Michael Nachman, working in the field and lab, has quantified predation on rock pocket mice and identified adaptive changes in coat-color genes that allow the mice to travel under the radar of hungry predators.

KEY CONCEPTS

- A mutation is a random change to an organism's DNA sequence.
- The environment contributes to determining whether a mutation is advantageous, deleterious, or neutral.
- Mutations that increase fitness of an organism increase in frequency in a population.
- Evolution can happen quickly (hundreds of years, or even less); advantageous genetic mutations can increase in frequency in a population quite rapidly, even if the fitness advantage to the organism is small.
- Different mutations in the same gene, or even mutations in different genes, can result in the same phenotype.
- While mutations can be random, natural selection is not random.
- Selective pressure depends on the environment in which an organism lives. This means that other organisms in the environment (in this case, the predators) can be a selective force.

CURRICULUM AND TEXTBOOK CONNECTIONS

Text/Curriculum	Chapter Sections/Curriculum Topics
Miller & Levine Biology (2010 Ed.)	13.3, 16.3, 16.4, 17.1, 17.2
Campbell Biology (9 th Ed.)	1.2, 17.5, 22.2, 22.3, 23.1, 23.3, 23.4
Common Core*	*Will be updated when curriculum is announced
AP (2012-13 Standards)	1.A.1, 1.A.2, 1.C.3, 3.C.1, 3.C.2
IB (2009 Standards)	4.1, 5.4, D2

PRIOR KNOWLEDGE REQUIRED

Students should:

- have a basic understanding of natural selection, evolution, and adaptation.
- have a basic understanding of what a food web is and that organisms fill specific niches in their environments.
- know what a gene is, and that genes can code for proteins that determine traits.
- know that genes and the traits they produce are inherited, and that some traits provide organisms with a greater chance to survive and reproduce.

KEY REFERENCES

Carroll, S.B. Evolution in Black and White. *Smithsonian Magazine*. February 10, 2009.

Nachman, M.W., Hoekstra, H.E., D'Agostino, S.L. The genetic basis of adaptive melanism in pocket mice. *PNAS* vol 100, no 9, 5268-5273 (2003).

Additional references can be found in the in-depth film guide.