AT A GLANCE FILM GUIDE

DESCRIPTION

In the short film *Great Transitions: The Origin of Birds* (http://www.hhmi.org/biointeractive/great-transitions-origin-birds), we join University of Texas paleontologist Dr. Julia Clarke on a journey to uncover the evidence that birds are a lineage of theropod dinosaurs. The film illustrates many of the practices of science, including asking important questions, formulating and testing hypotheses, analyzing and interpreting evidence, and revising explanations as new evidence becomes available.

KEY CONCEPTS

A. Species descend from other species. Any two species or groups of organisms, no matter how distantly related, can be traced back to a common ancestor.

B. The fossil record provides a history of life on Earth. It includes organisms with features that are intermediate, or transitional, between major groups.

C. One way scientists infer evolutionary relationships is by exploring patterns in the presence or absence of certain morphological traits in different species.

D. Evidence that birds are descended from theropod dinosaurs includes shared anatomical features, as well as inferred physiological and behavioral similarities.

E. The transition from dinosaurs on the ground to birds flying in the air did not happen in a sudden leap, nor did it happen in a linear, step-by-step progression.

F. Feathers evolved before flight and therefore must have originally served other functions, such as insulation or communication. Traits that serve one function can be co-opted for a different function through evolution.

G. Today, dinosaurs are classified into two groups: avian and non-avian. The non-avian dinosaurs are extinct, whereas the avian dinosaurs are still with us and are called birds.

CURRICULUM AND TEXTBOOK CONNECTIONS

Curriculum	**Standards**
NGSS (2013)	MS-LS4-1, MS-LS4-2 HS-LS4-1, HS-LS4-4
AP Biology (2012–2013)	1.A.1, 1.A.4, 1.C.1, 4.B.4
IB Biology (2016)	5.1, 11.2
Textbook	**Chapter Sections**
Miller and Levine, *Biology* (2010 ed.)	16.3, 16.4, 18.2, 19.1, 19.2, 26.2
Reece et al., *Campbell Biology* (AP ed., 9th ed.)	22.1, 22.2, 22.3, 25.2, 25.4, 25.6, 26.3, 34.6

SUGGESTED AUDIENCE

This film emphasizes using fossil evidence to determine when certain traits evolved and identifying shared anatomical features to infer evolutionary relationships. It is appropriate for students in middle school, high school, and college-level biology courses.

KEY REFERENCE

Ostrom, John H. "Osteology of *Deinonychus antirrhopus*, an Unusual Theropod from the Lower Cretaceous of Montana." *Peabody Museum of Natural History Bulletin* 30 (1969).