

Great Transitions: The Origin of Birds (<http://www.hhmi.org/biointeractive/great-transitions-origin-birds>; Howard Hughes Medical Institute, 2015; ~19 minutes)

Have dinosaurs gone extinct? Present this question to students and you will most likely field responses in the positive. However, viewing HHMI BioInteractive's new video entitled *The Origin of Birds* may change students' perspective. This short film is one of the latest in the Howard Hughes Medical Institute's series about the "Great Transitions" of life. Fitting nicely in between films on the *Origin of Tetrapods* and the *Origin of Humans*, it takes the viewer through several million years of bird evolution.

The Origin of Birds is narrated by paleontologist Julia Clark from the University of Texas at Austin. She takes the viewer to archeological digs where bird fossils have been discovered and explains how Charles Darwin was one of the first to describe the relationships between birds and ancient reptiles. Darwin, however, lacked the most important part of evidence present today – fossils.

Since the discovery of *Archaeopteryx*, the scientific community has been turned upside down with the flow of new evidence

that supports the bird–reptile connection. Prior to this, many scientists argued that birds and reptiles could not be connected because they have different metabolisms (i.e., warm-blooded vs. cold-blooded). Once *Archaeopteryx* was discovered, new thinking emerged that perhaps the dinosaurs were actually warm-blooded. Additional evidence presented in the film includes the presence of three forward-facing digits and one backward-facing one, plus the existence of a wishbone-type of sternum. This type of anatomy is common between birds and a group of dinosaurs called "theropods."

The origin of flight is another concept addressed in the film. Feathers are believed to predate flight and may have been used for courtship or for warmth, just as they are in modern birds today. Over time, they became an essential mechanism that allowed the primitive birds to take off from the ground. Also, the forelimbs of the theropods became modified into wings.

The Origin of Birds is an excellent video that would be appropriate for grades 6 and up. It fulfills several different requirements of the *Next Generation Science Standards*, including interpreting data from the fossil

record, explaining similarities and differences among modern and fossil organisms, and constructing explanations for how natural selection leads to adaptation. While the concepts offered are somewhat complex, the presentation and colorful animations are engaging and will hold the attention of even younger viewers. If a school has an elective course in ornithology, this film will fit beautifully into the curriculum. If not, it will also be relevant in discussions of evolution and descent with modification.

Hopefully, after viewing this film, students' opinions about how birds came about will be changed. After all, dinosaurs are still with us. We just now call them birds.

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