

Full-Lesson #10: Forest Bird Family Tree

Overview of Outcomes

This activity will present the Hawaiian forest bird assemblage through the lens of evolutionary biology and taxonomy. The diversification of Hawaiian honeycreepers across ecological niches in the Hawaiian Islands is one of the greatest case studies in adaptive radiation in the world. The fact that these species are only found in Hawaii makes them outstanding candidates for teaching topics like evolutionary biology in Hawaii's schools. Students will be prompted to think about lineages of forest bird groups through this activity, specifically the methods in which organisms are sorted taxonomically. In sorting these species into families, concepts such as **convergent evolution** and **parsimony** may be discussed. Inconsistencies between derived family groups and currently acknowledged understandings of honeycreeper genetics could provide an opportunity to discuss potential errors in deriving taxonomic groups solely based on morphological features.

Materials

Photo resources with species information http://kauaiforestbirds.org/wp-content/uploads/2019/11/activity_7_mix_and_mingle_birds_12.pdf

Taxonomic tree of Hawaiian honeycreeper families
(<https://sites01.lsu.edu/wp/mnspapers/files/2014/10/85.pdf>)

Activity Directions

- 1) Teachers will present a brief introduction on the evolutionary processes that led to the adaptive radiation of Hawaiian forest bird species (depending on previous lessons completed, teachers can decide how long they would like to lecture on this topic, but 10-20 minutes should be sufficient).
- 2) Classes will be divided into groups, with each group given a packet of photographs of Hawaiian forest birds. The students will be instructed to create a "family tree" that represents the evolution of forest birds, with an emphasis on defining specific groups of birds based on shared characteristics.
- 3) After 20 minutes of discussion, each group will present their tree to the rest of the class, providing their reasons for creating their trees.
- 4) This activity will conclude with the teacher giving a brief presentation of our current understanding of the evolution of Hawaiian forest birds from a common ancestor into the multitude of forms seen today. Teachers should present several taxonomic trees that represent our current understanding of honeycreeper genetics. It should be emphasized that scientific consensus of taxonomic classifications is constantly changing; teachers may wish to present analogous scenarios of reclassifications based on modern technologies (e.g. genetic analyses, genome sequencing, etc.).