

## Mechanical models of Bird Feet

Shared by: A. Fitzgerald, Edgerton Outreach

Specialized tools/technology used:	Experience level required:
Craft materials	Beginner/ intermediate
3D printer (optional)	Intermediate

**Grade Level** 5-9

**Topic/Content Standards:** Biology, Anatomy

### Summary of Project:

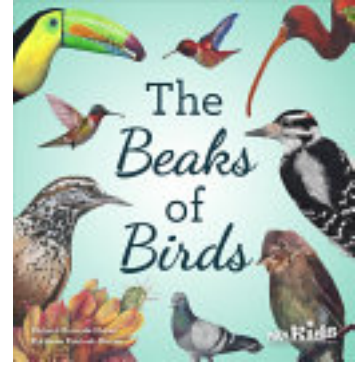
Students are studying evolutionary adaptations in anatomy, focusing on the diversity and similarities in bird feet. They compare bird feet that are adapted to swimming, ripping apart prey, holding on to a branch, and grabbing hold of a tree trunk, looking for similarities and differences. Working in small groups, they define a mechanical equivalent of the foot of a specific bird and create a prosthetic bird foot.

A common collection of various building/ designing/ decorating materials should be made available, as well as testing equipment and tools to bring the students' ideas into physical reality. (If you're testing for a prosthetic foot that will help a bird swim, a basin of water is going to help.) Also, if you're offering materials that require shears to cut, don't only offer child-safety scissors. This project can be tied to other bird-anatomy lessons to lengthen its duration, but plan on at least 90 minutes for planning, building and about half as much for presenting, testing and feedback. (If opting for a 3D printed result, additional time will be required for printing, especially for iterations.)



## Suggested resources:

Having an understanding that there *are* differences is key, so though official field guides *might* be useful, they don't generally zoom in on the feet/ claws. Having a few picture books like this one around is helpful. (*The Beaks of Birds*, Richard Konicek-Moran, NSTA, 2019.) Don't worry if it feels like you brought a picture book to a chapter book party, the student will appreciate the illustrations.



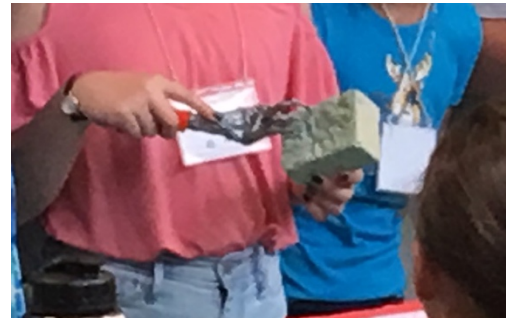
## Possible Content Explorations / Expansions

### ELA / Social Studies

- Mythology, Ancient Civilizations, Storytelling, Literary symbolism
  - Research cultures who used bird symbolism (Egyptians, native Americans, Greek, Mesopotamia, etc) and recreate representations of those birds' body parts and consider their particular importance
  - Birds have long been used by humans for communication, hunting, food, clothing/ homegoods. Demonstrate how certain attributes are preferred for some uses over others

### STEM

- Engineering
  - Students need to determine which features of the foot are variables vs. constants, and what would constitute a failure
  - Re-examine solution for weight (hollow bones, right?) and balance given a specific size/ weight sample bird
  - Plan & create prototypes to accurate dimensions using drawings & 3D printer software



- Biology/ genetics

Classes or groups might choose to concentrate on different body parts (for example, wings or beaks)

- Ecosystems

Consider and describe how the changes in a habitat (landforms, distribution of water, weather, climate, and availability of resources, predation) might affect birds differently according to their diverse body types as they compete for resources.