ART + SCIENCE AT HOME

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BIRDS in MOTION

(Taxidermied Ovenbird on Hemlock, Morgan Tingley)

You may have heard about some of the amazing feats of long distance migration by birds (shout out to the Arctic Tern and pals), but bird motion at a more local level is also interesting to observe. If you completed drawing prompt 3, *Investigating Tree Pests*, you learned about invasive forest pests that are devastating Northeastern forests. One of those pests is the Hemlock Woolly Adelgid (HWA), which was introduced from Eastern Asia by the 1950s and is bad news for hemlock trees. The HWA lacks wings and is too small to crawl or jump between trees. So how can it move from tree to tree? Scientists have long known that the HWA can move through wind currents, nursery plants, and firewood, but are now realizing that the little insect may also be hitching a ride on birds like the Black-throated Green Warbler that spend time in hemlock trees. Although hemlock trees are stationary, birds are highly mobile and can act like airline carriers that pick up the HWA on one tree and drop it off on the next.

In addition to flying from tree to tree within a forest, some hemlock-loving birds are migratory, which means they have the potential to spread the HWA over long distances in a fairly short amount of time. In fact, when scientists found the HWA on the Canadian island of Nova Scotia in 2017, they suspected birds of playing the role of ferrying the insects over the 60 miles of ocean that separate Nova Scotia from the nearest HWA colony! This full article describes the wacky methods scientists use to study HWA hitchhikers, including tricking them with taxidermied bird decoys and using jets of air to blast the bugs out of their feathers.

Even though we are dismayed by birds dispersing invasive species, we know that their mobility is also critical to many other species and ecosystem processes.

For example, you may know that hummingbirds are important pollinators, but did you know that some hummingbird-pollinated flowers (ex: *Penstemmon barbatus*) have evolved different anther and stigma structures than bee-pollinated flowers? This means that hummingbirds are more efficient at picking up and transferring pollen from *P. barbatus* than bees are! Birds play other important roles as dispersers and connectors. If you've ever filled a bird feeder with sunflower seeds, you may have seen sunflowers sprouting below the feeder and realized that birds can spread seeds by dropping them during eating or flight,

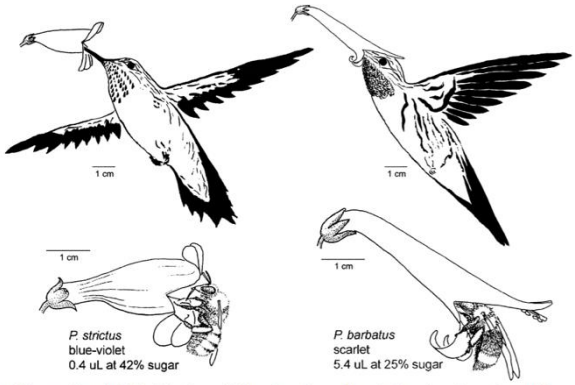


FIG. 1. Bumblebees and hummingbirds visiting bee- and bird-syndrome flowers. The animals are shown just as they would be upon arriving at flowers and before fully reaching into the corolla, except for the bird visiting *Penstemon barbatus*, which is shown with its beak fully inserted. The anthers and stigma of *P. strictus* are held just inside the upper lips. The bumblebees depicted were workers of the small-bodied *Bombus flavifrons* (left) and *B. bifarius* (right). Drawn by P. Wilson from photographs by M. C. Castellanos and P. Wilson.

or by pooping them out in new places. In the Australian rainforest certain tree species depend almost entirely on the large, gangly cassowary to spread and fertilize their seeds through their dung.

And finally, one of the most whimsical consequences of birds in motion is that they disperse microscopic zooplankton from pond to pond. When birds swim or wade in a pond, tiny zooplankton, vegetation, and frog or fish eggs can cling on to their feet and drop off at the next pond. Imagine being a microscopic, water-dwelling creature and taking to the skies on the feet of a bird!

The common trait in all of the motion described so far is FLIGHT. Today we are going to look at different flight patterns and see how many you can spot. The last page of this pdf is a guide to different flight forms.

STEP ONE: Get to know Flight Patterns.

- Using the attached key, draw the different types of flight patterns into your fieldbook.
- We encourage you to draw these, rather than cut and paste the key into your book.
- Drawing them will help you to learn and recognize them, and your hand will experience the movement pattern of the bird through the act of drawing.
- You can practice your recognition skills here.

STEP TWO: Gather your materials and head outside.

- Bring your fieldbook, the guide to flight forms, and drawing supplies.
- Find a place where you can observe some birds.

STEP TWO: Observe the Weather.

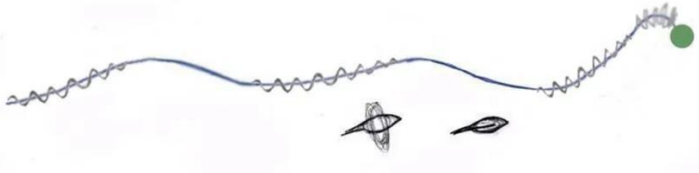
- Record some information about the day. Pick a corner of your journal page and write down your location, the date, and time. Note the temperature, the cloud situation, whether it is sunny, rainy, or snowy, and how windy it feels. You can make some general notes about what you see, and you can also look up the weather for your area online, or use a backyard thermometer if you have one. You might also want to include a note about your internal barometer. How are you feeling today? Jot that down.

STEP THREE: Identify Flight Patterns in the Field.

- Look for birds in flight and see how many flight patterns you can identify.
- Add notes about which ones you see.
- Are there some patterns that are more difficult to identify than others?

STEP FOUR: Detail the flight paths of specific birds.

- Observe a particular bird.
- Do a quick gestural drawing of your bird and then trace its pattern through the air.
- Create a symbolic key for the different types of motion. You could use a smooth line for moments of gliding and a jagged line for moments of flapping. Or, come up with something different.
- Here are two comparative examples by David Allen Sibley. He writes that the House Sparrow has a more direct and effortful flight pattern with less undulation and tail pumping than the Song Sparrow. See what you can discover about the birds you see. Accompany your drawings with questions and notes.

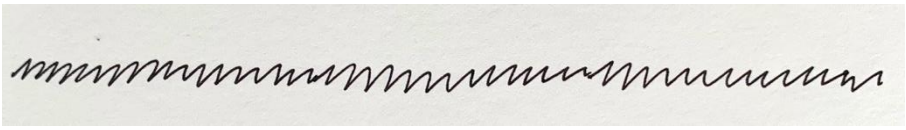


House Sparrow flight path. Gouache, pencil, and digital drawing copyright David Sibley.

Song Sparrow flight path. Gouache, pencil, and digital drawing copyright David Sibley.

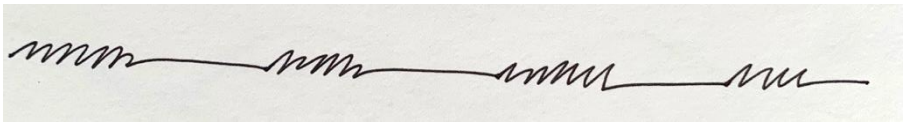
FLIGHT PATTERNS

DIRECT FLIGHT



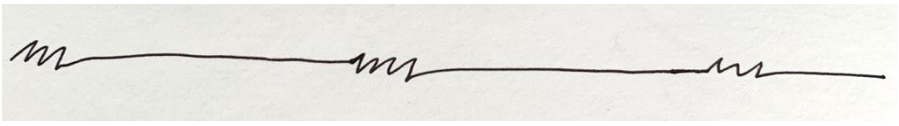
Straight line of flight. Continuous, steady flapping of wings. (American Crows, Great Blue Herons, Red-winged Blackbirds)

FLAP and GLIDE



Flapping of wings followed by holding wings out, gliding in straight line, then return to flapping. (Tree Swallows, Owls, Hawks)

GLIDE

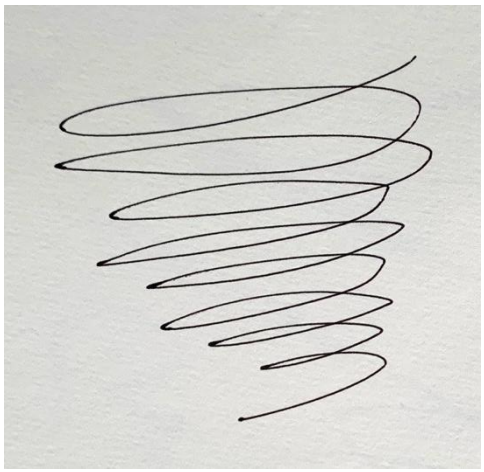


Some flapping, followed by longer periods of gliding. (Chimney Swifts, Barn Swallows)

HOVERING

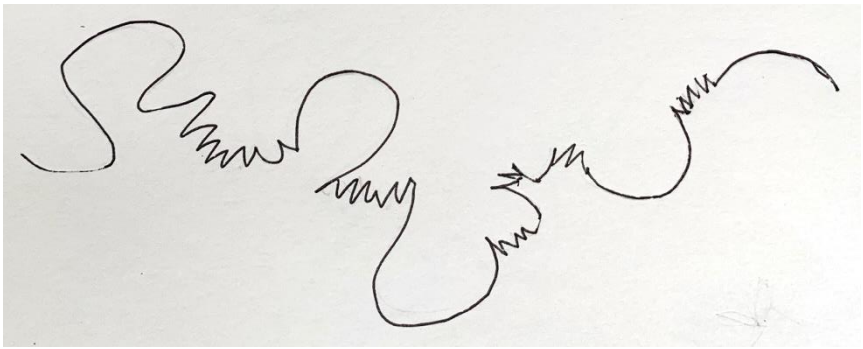
Holding steady in one place. Because of their unique shoulder joints, Hummingbirds are the only species of bird capable of this type of flight.

STATIC SOARING



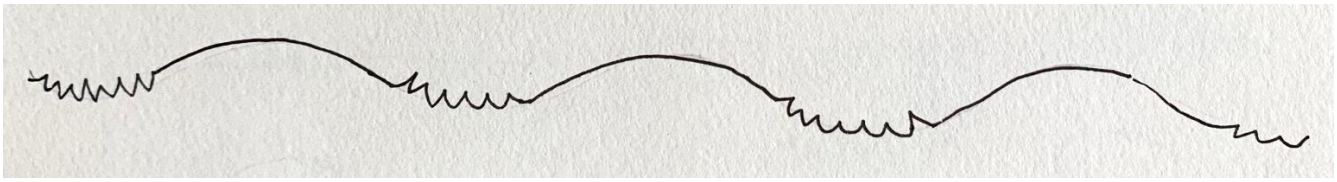
Riding warm pockets of air with wings outstretched. Often takes a circular form, but not always. (Turkey Vultures, Hawks, Bald

MOTH-LIKE



Flutttering wings in flight to change speed and direction quickly. (Owls, Killdeer, Nighthawks)

UNDULATING



Wave or rollercoaster pattern. Flapping during rising phase, then gliding during descent. (Goldfinches, House Finches, Woodpeckers)

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