Can you name the birds around us?

Objectives:

- Students will be able to use the *Merlin Bird ID* and recognize the birds around them by using their call.

•Students will tally how many times the bird (s) call for 5 minutes and then construct a graph to identify the bird (s) and how many times the bird (s) made calls.

Grade: 7

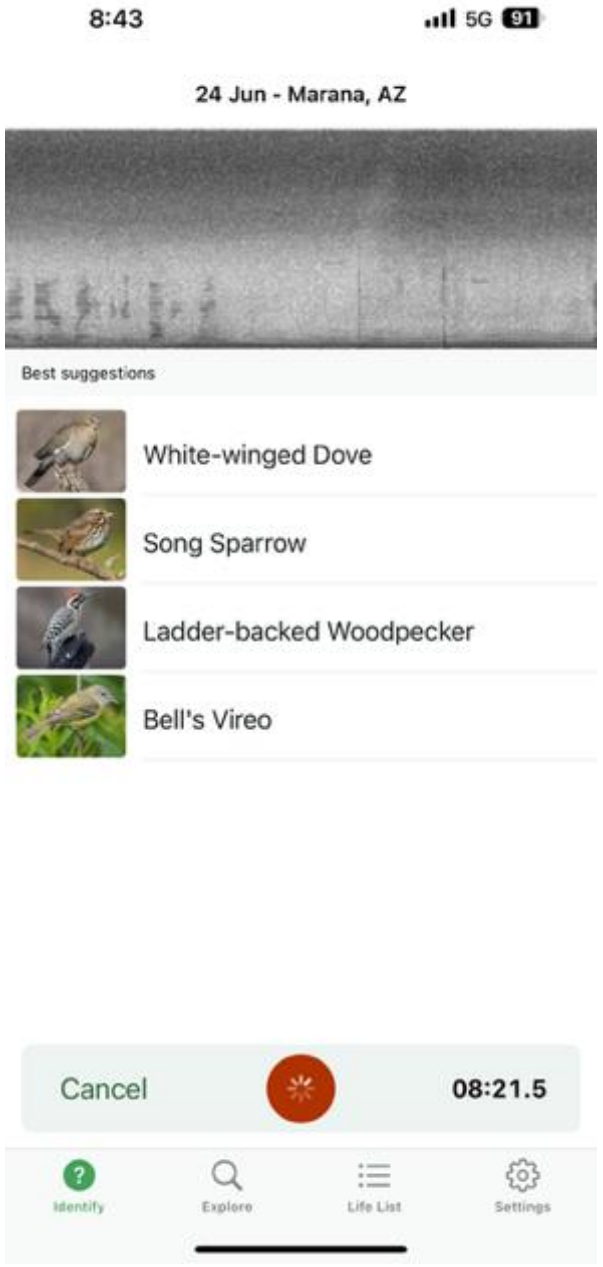
Can you name the birds that live around us?

Download this:
Merlin Bird ID app

Watch how to use it:
https://youtu.be/xmSUOLxyatY
Link that previews the *Merlin Bird ID* app

Download the app and make an account on phone :
https://merlin.allaboutbirds.org/

Example:

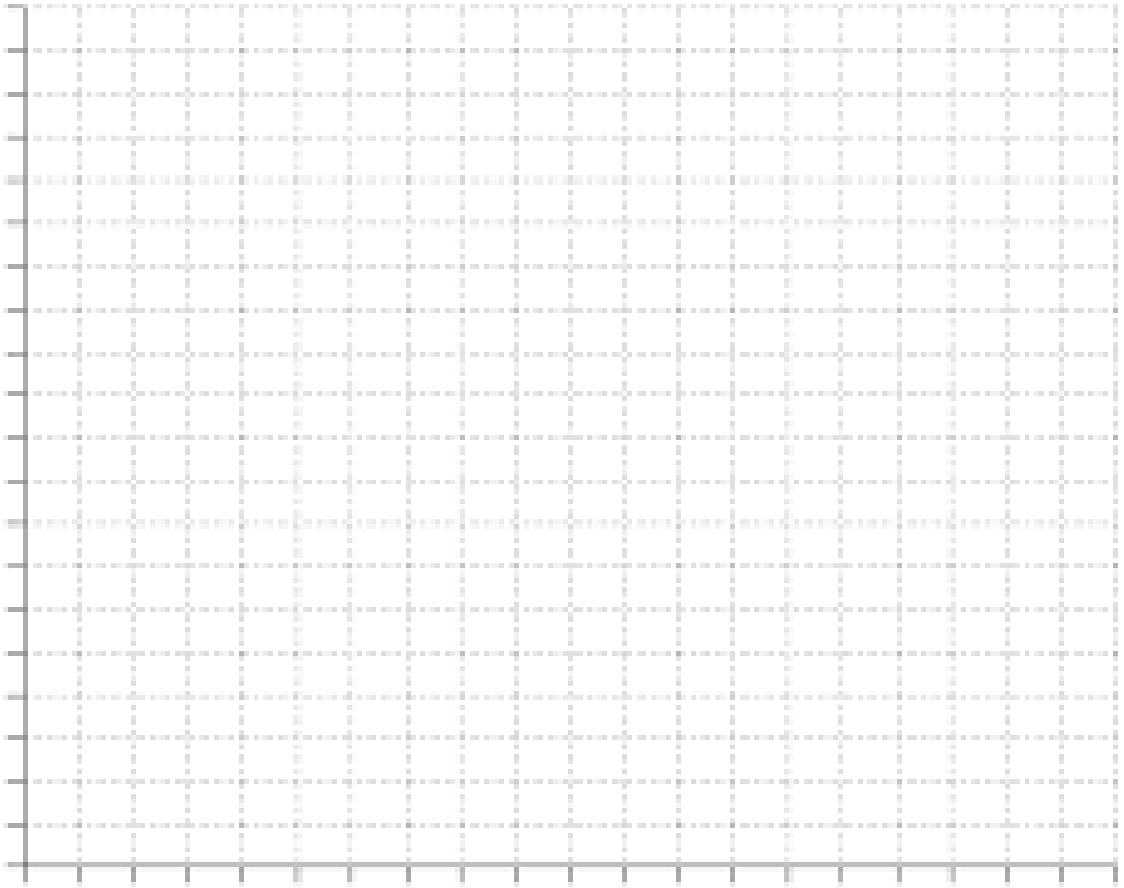

8:43
5G
91
24 Jun - Marana, AZ
Best suggestions
White-winged Dove
Song Sparrow
Ladder-backed Woodpecker
Bell's Vireo
Cancel
08:21.5
Identify
Explore
Life List
Settings

Using the Merlin app, list the birds you hear in this data table.

Bird	How many times did it make a call (place tallies)

Let’s graph your data

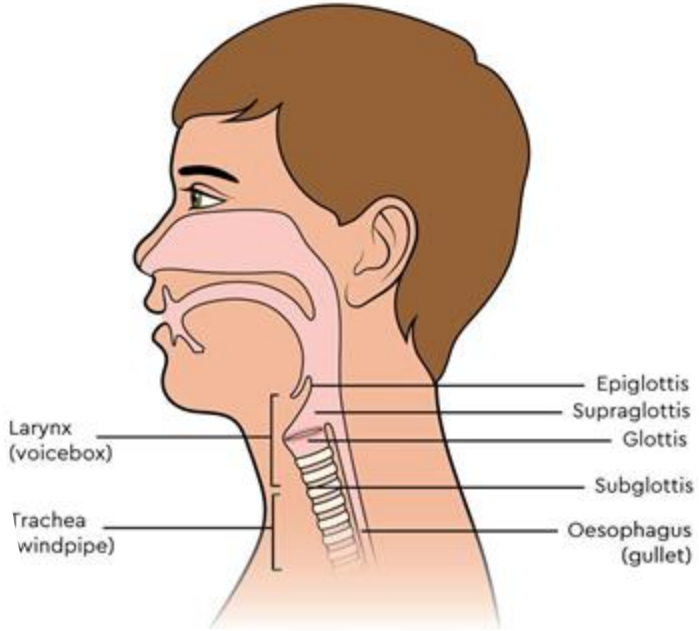
Remember to label the “x” and “y” axis and give this graph a title.

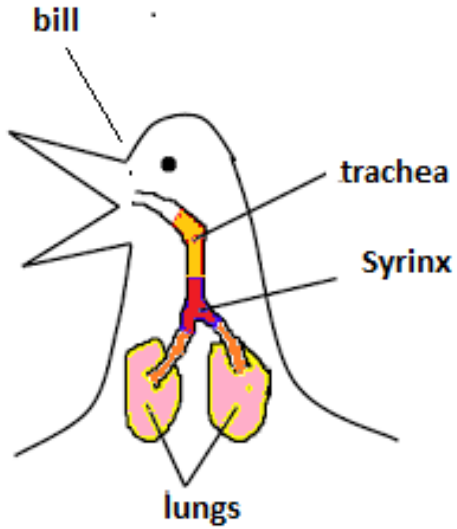


Day 2

Objective:

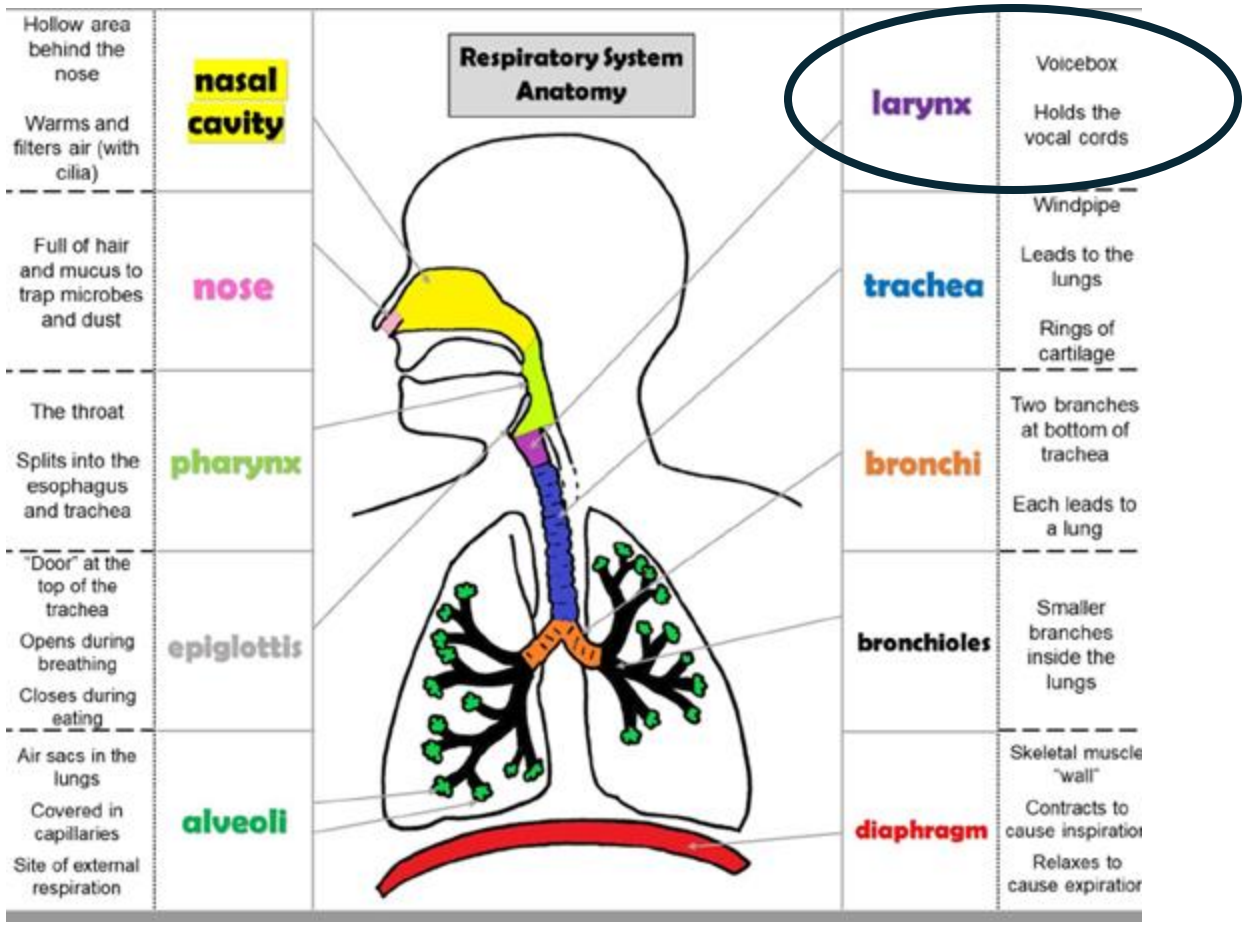
- Students will be able to explain how birds are able to communicate (make calls).





Vocal system in birds

Let’s review:
What allows humans to speak?



Let’s read about a bird’s voice box: https://news.byu.edu/news/study-reveals-birds-surprising-sound-source (link)

The best place for a bird’s voice box is low in the airway, researchers find

Writer: Paul Gabrielsen, University of Utah Science Writer

All air-breathing vertebrates have a larynx—a structure of muscles and folds that protects the trachea and, in many animals, vibrates and modulates to produce a stunning array of sounds.

But birds, although they have larynges (plural of larynx), use a different organ to sing. It’s low in the airway, down where the trachea branches to head off toward the two lungs. Called a syrinx, it’s a uniquely avian feature. For decades, scientists have been asking why the syrinx exists—and how it developed in the first place.

Now, a team that brings together physics, biology, computation and engineering finds that the syrinx confers an advantage: by sitting so low in the airway, the syrinx can produce sound with very

high efficiency. Their results are published in *PLoS Biology*.

"I'm always excited when something is counter-intuitive," says Ingo Titze, director of the National Center for Voice and Speech at the University of Utah and a co-author of the study. "Most people would say 'Put the sound source right by the mouth or the beak, and you'll get the sound to the listener.' But that's not what we're finding."

Testing syrinx evolution

For more than 20 years, University of Utah biologist Franz Goller has studied the mechanics of the syrinx. He found similarities between the control and design of the syrinx with the mammalian larynx, says Tobias Riede, a former member of Goller's lab and now assistant professor at Midwestern University. "But the question of why birds have evolved a syrinx, although they also have a larynx, had remained open," Riede says.

A question in understanding evolution is to identify the trade-offs between two different structures with similar function. Why is the low syrinx the best place for a bird's vocal organs? "And how would you test that in a bird?" Riede says. "You can't, because you can't move the vocal source up and down the tract."

Reading continued:

That led Riede and Goller to collaborate with Titze and with Scott Thomson, a Brigham Young University mechanical engineering professor. Both bring different aspects of acoustical simulation to the study: Titze brings computational modeling, while Thomson brings experience constructing physical models to simulate sound-producing organs.

"In my lab, my students and I primarily study the biomechanics of the human voice. Our long-term goal is to improve the diagnosis and treatment of voice disorders. In this study, tools we've developed to study human voicing were instead applied to study bird vocalization," Thomson said. "It was interesting being part of a team of biologists, physicists, and engineers working together to study a common but beautiful aspect of nature."

The team pursued a three-pronged approach to measure the various effects of syrinx position on vocal efficiency: simplified physical models, computational simulation and real birds of varying body sizes in the laboratory.

Reading continued:

Communication strategies

"We find that sound is produced with greater efficiency by a sound source in syrinx position," Riede says. The result supports a hypothesis that birds with a syrinx low in the airway are better able to communicate and gain an evolutionary advantage. Birds, which have the longest necks of all terrestrial vertebrates, can use the long necks as resonators to amplify the sound.

"If you're small, you don't have too much energy available to produce a signal that is efficient and carries far," Riede adds. "So, by simply moving the sound source, you can make the sound much louder. It's the same problem an engineer faces. If you want to miniaturize your speaker, how do you make that speaker equally loud and intelligible as a big speaker?"

"In the old days we used to think that the sound source just produces the sound and the airway just modifies the sound," says Titze. "Our research has shown that there is strong dependence on both the tube, or airway, and the sound source. Where the sound source is in the tube makes a difference, whether it's in the middle, front or back."

There's a lot to learn from this finding, particularly in how birds position their bodies to take advantage of the syrinx's position. Some birds have a need to communicate with precise vocal "aim" to get a message to a mate, for example, without alerting predators. "So, they have to position themselves to selectively direct that

Reading continued:

sound," Titze says. "That calls for a different shape for the head, body and neck."

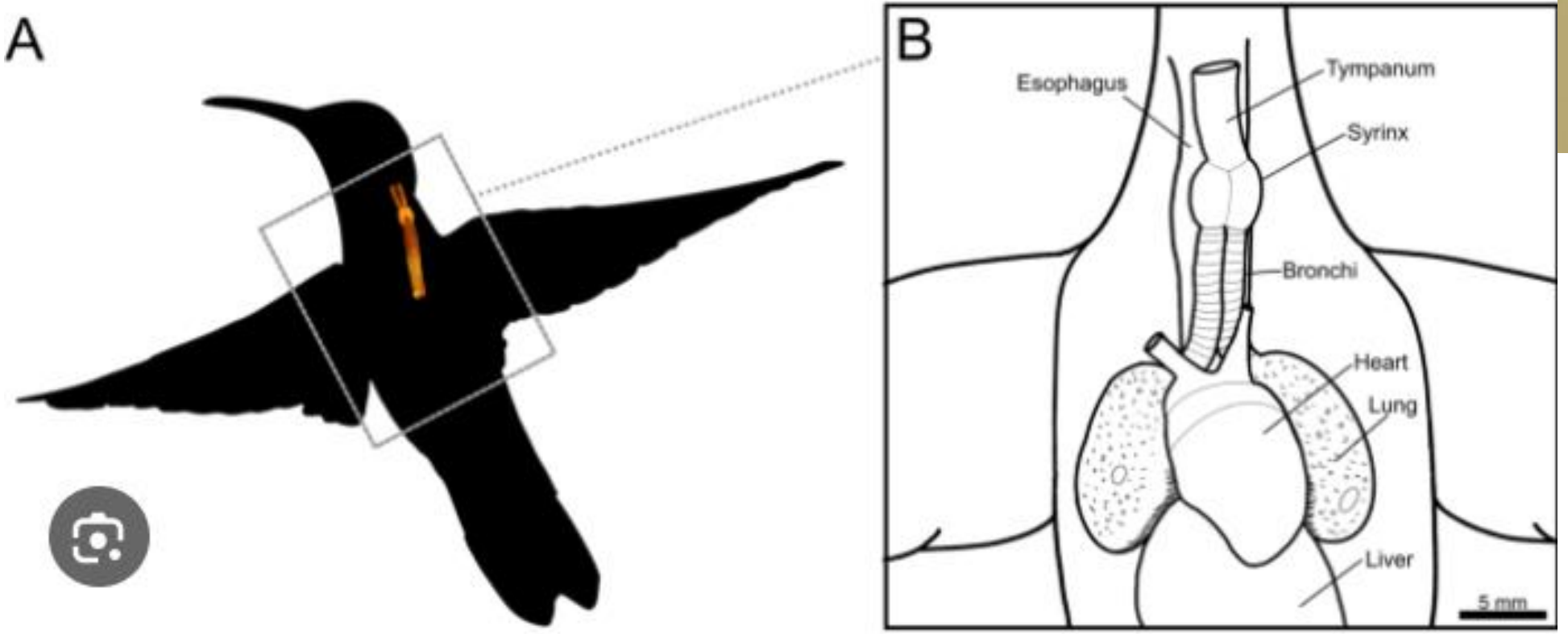
Other factors

Next, Riede plans to look at the diversity of birds to see how their finding applies to birds of different sizes (across the range from hummingbirds to ostriches) and identify other factors that could contribute to syrinx evolution in a particular species. "What does the female prefer?" Riede says. "Which frequency travels best in a certain habitat?"

Perhaps the answers to the tantalizing complexity of birdsong will again show the simple elegance of the answers Riede and his colleagues have discovered so far. "The simplicity of the answer to an old and seemingly difficult question, he says, "was most surprising to me."

Based on the reading, how are birds able to make calls?

Let’s review



Anna’s Hummingbird

Day 3

Objective:

- Students will select one of the birds identified in the *Merlin Bird ID* and research it to find out more about the bird's habitat, feeding, and life history.

Birds

- The Desert Adaptations of Birds & Mammals
- Blackbirds & Orioles
- Caracaras & Falcons
- Cardinals & Grosbeaks
- Doves
- Finches
- Flycatchers, Tyrant
- Gnatcatcher, Black-Tailed
- Hawks & Eagles
- Hummingbirds
- Marsh Birds
- Mockingbirds & Thrashers
- Nightjars
- Owls
- Phainopepla
- Quail

Bird Name:_____
Scientific Name:_____

- Pick one of the birds you heard with the *Merlin Bird ID* and research the following using this website https://www.desertmuseum.org/books/nhsd_birds.php :
- Draw the Bird
- Write about their habitat
- Write about what they eat
- Write about their life history
- Write about what makes this bird unique

Use complete sentences, check your grammar and spelling.

Exit Ticket

Explain the importance of why birds make calls.