

## **Bird Notes**

Within my Garden, rides a Bird  
Upon a single Wheel –  
Whose spokes a dizzy Music make  
As 'twere a traveling Mill –  
Above the Ripest Rose –  
Partakes without alighting  
And praises as he goes  
(Emily Dickinson)

Ever wonder why gulls, terns and wading birds never get frostbite? Or why shorebirds tuck their bills under their wing? Or why they stand on one leg at times? The answers to these questions can be explained by an arrangement of blood vessels in the bill and legs of birds called the rete mirabile. Distal veins and arterioles wrap around each other which allow warm blood from the arterioles to be transferred to either the veins or the surrounding tissue—wherever heat is needed. This countercurrent mechanism allows birds to stand in freezing water without tissue damage, but also allows their core temperature to be lowered during hot weather.

Birds face a constant challenge between the heat they generate with their intense metabolic activity and ambient temperatures which may be very hot or cold. Each species has a range of core temperature which allows it to function optimally. This is called the range of thermoneutrality. When the lower critical temperature is reached, a bird's ability to function normally begins to suffer. If it is not eating enough to keep the metabolic fires burning, it must find food. A well-nourished bird is better able to withstand extreme temperatures. If the weather is cold, windy and wet, it must find shelter.

When the lower critical temperature is reached, birds begin to shiver. Pectoral muscles are the first to begin shivering, followed by the leg muscles. This is an excellent source of heat for birds but this comes at a cost. It requires a lot of energy to keep shivering for an extended period. The bird must find adequate food and water to keep up this activity.

Birds use additional strategies to stay warm. Nests and tree cavities provide much protection from the outside air. Some species will huddle together to decrease heat loss. I once witnessed a group of 20 barn swallows, exhausted from their trans-gulf migration, protecting themselves from the 32°F temperature of early March by huddling together on the sand of Horn Island --- a wilderness island off the coast of Mississippi.

Feathers are uniquely avian and are important in the bird's defense against a cold environment. Most birds have thousands of feathers. The Tundra Swan has over 25,000 feathers while songbirds have around 2,000 to 4,000. The weight of feathers is roughly 2 to 3 times the weight of its skeleton. Each feather has its own muscle which gives the bird some control over each feather. Contour feathers, which give shape to the bird's body, and adult down feathers, which

are just below the contour feathers, are able to be fluffed up, trapping air next to its body, keeping it warm. When compared with birds of the tropics, birds of the arctic have much more dense down. Since feathers play an important role in bird's thermal regulation, the observation that birds spend a lot of time taking care of their feathers makes sense. While preening its feathers, a bird will reach back to the base of its tail with its bill and rub over the only gland of its body, the uropygial or preen gland. It extracts a substance composed of fatty acids, fat and wax on its bill which it rubs on its feathers. This serves a number of functions. It prevents drying and cracking of the bill, maintains the feathers' efficiency of flight, and aids in water repellency of its plumage. Wet down is not a good insulator.

With wingbeats of 50 to 80 beats per minute, and heart rates which may increase from 120 beats per minute at rest to over 600 beats with flight, birds have the highest metabolic rate of vertebrates, rivaled only by the Pygmy Shrew. To maintain this high rate of metabolism, a hummingbird must frequently eat a diet of small insects and nectar -- not an easy task at night or mid-winter. In order to survive cold temperatures on a long winter's night, hummingbirds have the ability to lower their core body temperature almost to the ambient temperature, by ceasing activity, lowering their heart rate, and breathing only a few times per minute. This activity is unique to hummingbirds and caprimulgids (especially the Poorwill) and is called torpor. Other bird species, such as chickadees, are able to lower their core temperature by 20°F and enter a state of regulated hypothermia and not go into torpor. Birds are able to monitor the available fat reserves to get them through the night.

I do not know why the robin died. It was a vicious storm. It could have done everything a stressed bird should have, but it may have been old or injured..... Things we can do to help birds in the winter are to provide food, water and shelter. Providing dog hair for the birds to line their nest or roosting sites may be beneficial.

If you have any questions or comments on the past two articles, or have suggestions for future topics, please contact me at [eapyeritz@gmail.com](mailto:eapyeritz@gmail.com).

--by Rick Pyeritz