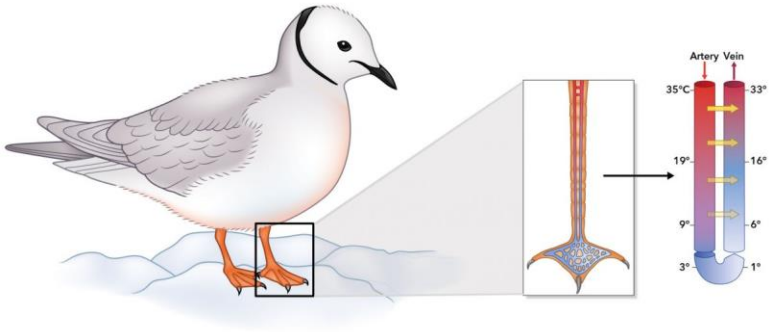
BIRD NOTES by Rick Pyeritz

Darting, hovering helicopter
Fueling at a flower,
Tell me how your engine-heart
Generates such power.
Joel Peters

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 reason for 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 the core temperature to be lowered during hot weather.



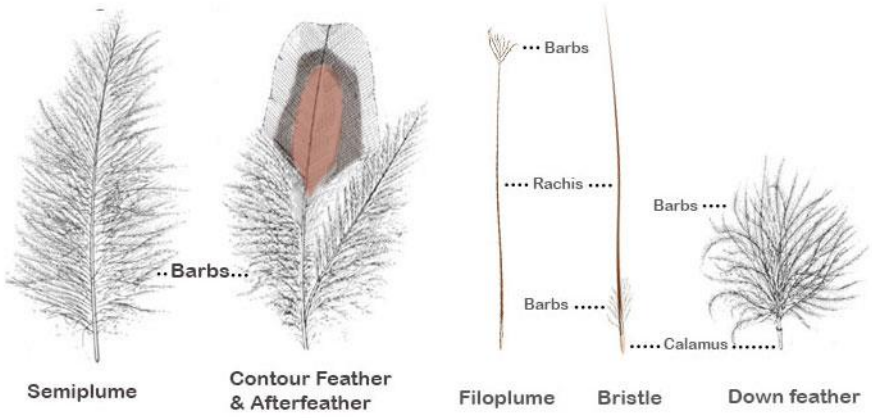
From Cornell Lab of Ornithology

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 32^0F temperature of early March by huddling together on the sand at Horn Island --- a wilderness island off the coast of Mississippi.

Feathers are uniquely avian and are important in birds' 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 and keeping it warm. When compared with birds of the tropics, birds of the arctic have much denser 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 their feathers, birds 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. From that gland, the bird transfers to its bill a substance composed of fatty acids, fat, and wax, which it then rubs on its feathers. This serves several functions. It prevents drying and cracking of the bill, maintains the feathers for efficiency of flight, and aids in water repellency of 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 in mid-winter. In order to survive cold temperatures on a long winter's night, hummingbirds can 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 can lower their core temperature by 20^0F 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 viscous storm. It could have done everything a stressed bird should have, but it may have been too 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.

Questions or comments contact me at eapyeritz@gmail.com.