

The Outside Story

Muscling Through Migration

By Doug Facey

During the autumn months, many birds migrate from their summer breeding grounds in the Northeast to warmer wintering areas south of our region. Migratory birds include many species of raptors and waterfowl, which we often notice because of the birds' large size and their tendency to travel in groups. Sometimes, as is the case with geese, these migratory groups are also quite vocal. Variations in their physiology relate directly to *how* different species migrate.



Raptors (hawks, falcons, and their relatives) have wings that are large relative to their body size, which gives these birds the ability to ride thermal updrafts and coast for long periods with minimal effort. Migrating raptors typically soar skyward in a circular pattern, riding the thermals. When they get high enough, the birds can glide until they catch another thermal to gain altitude again. Continuing this behavior over long distances allows raptors to conserve energy and limit fatigue to flight muscles. We often see migrating raptors soaring in groups called kettles. Although it may appear that these birds are traveling together, it is more likely that they are simply taking advantage of the same thermal updrafts.

Waterfowl (geese, ducks, and their relatives) have a very different body and wing structure than raptors. These birds must constantly flap their wings to remain aloft, and they can fly very long distances without stopping because their breast muscles have evolved to sustain activity for long periods of time without fatigue. In order to do this, the muscles need lots of oxygen, which allows a more efficient conversion of nutrients in the blood to energy needed for repeated muscle contraction. To support this level of endurance, the muscles powering flight have a rich blood supply, plenty of proteins (myoglobin) that store oxygen in the muscles, and lots of subcellular "powerhouse" subunits (mitochondria).

There are additional biochemical differences within the muscles of waterfowl that enhance their ability to work for long periods without fatigue. These physiological adaptations cause the flight muscles of waterfowl to be quite dark in color. These muscles also have a high fat content, which helps provide the energy needed for extended periods of flight. If you've even eaten duck or goose, you probably noticed

the dark color, high fat level, and strong flavor of the meat. This is especially the case for wild waterfowl, which need these physiological features to migrate.

In contrast to migratory waterfowl, consider the muscles of non-migratory birds such as grouse, pheasant, and turkey – the latter being particularly popular in many households at Thanksgiving. These birds spend most of their time on the ground and rarely fly, except for short distances to escape danger. Hence, their breast muscles are developed for short, powerful bursts of activity, but they fatigue rapidly. These muscles are not adapted for sustained flight, with less blood supply, fewer proteins needed for long periods of activity, and less fat than the flight muscles of waterfowl. Therefore, the breast muscles of grouse, turkey, and their relatives are light in color and mild in flavor. But the muscles of the legs and thighs, which are used most of the time and don't fatigue readily, are much darker, have more fat, and have a stronger flavor – somewhat similar to the breast muscles of waterfowl.

Those of you enjoying a Thanksgiving meal featuring duck, goose, turkey, or other fowl may now share with your dining partners your knowledge of avian physiology and its effect on color and flavor of the meat – or perhaps it's best to save that conversation for another time.

For those planning meat-free holiday meals, I'm happy to share the following recipe which we use as a side-dish to our turkey, but which can easily stand alone as a main course. I provide general guidelines on preparation, and leave it to you to adjust proportions of the ingredients to your own taste. Saute minced garlic, chopped onion, and chopped celery in olive oil with a generous dose of celery seed. In a large bowl combine dry seasoned stuffing mix, dried cranberries, and toasted slivered almonds. Add the garlic-onion-celery mix to the bowl, blending thoroughly. Gradually add hot water while stirring to desired consistency. Put mixture in covered casserole dish and place in oven until hot.

Best wishes for a Happy Thanksgiving.

Doug Facey is an emeritus professor of biology at Saint Michael's College and lives in Burlington, Vermont. Illustration by Adelaide Murphy Tyrol. The Outside Story is assigned and edited by Northern Woodlands magazine and sponsored by the Wellborn Ecology Fund of the New Hampshire Charitable Foundation: www.nhcf.org.

**Northern
Woodlands**

PO Box 270, Lyme, New Hampshire 03768
mail@northernwoodlands.org / 603-795-0660
www.northernwoodlands.org

This article is reprinted with the permission of the Center for Northern Woodlands Education. A not for profit organization, Northern Woodlands seeks to advance a culture of forest stewardship in the northeast by increasing understanding of and appreciation for the natural wonders, economic productivity and ecological integrity of the region's forests. Subscribe or donate at www.northernwoodlands.org.