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BIOLOGICAL NOTES ON AN OLD FARM

EXPLORING COMMON THINGS IN THE KINGDOMS OF LIFE

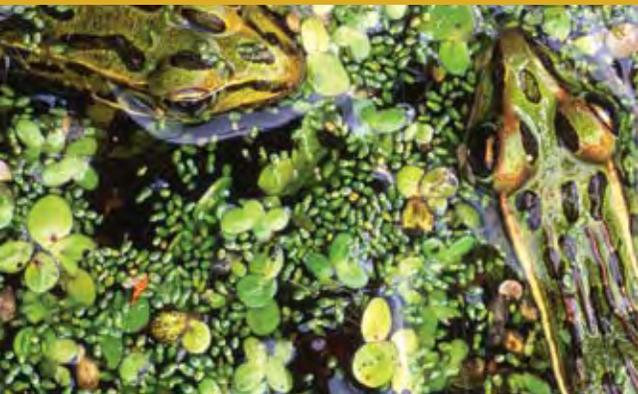




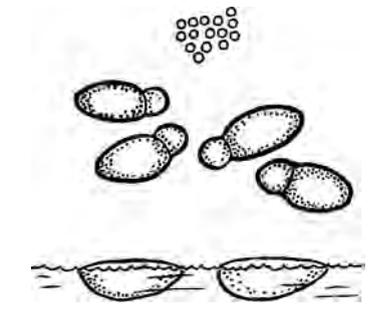
Figure 12. European frogbit (*Hydrocharis morsus-ranae*) is an aquatic plant introduced from Europe and spreading through parts of northeastern North America.

Photograph by Michael Butler.

lobate plants of lesser duckweed (genus *Lemna*). These are green on the underside and bear a single rootlet on each lobe. Also mixed into the surface mat there may be somewhat larger lobes of greater duckweed (diameter up to 10 mm, genus *Spirodela*); these plants are brownish red on the underside, and bear a tuft of tiny roots. Another species of *Lemna*, star duckweed, grows in clumps just below the water surface; lobes of these plants grow in a branching pattern and are somewhat larger than other duckweeds.

Small as they are, duckweeds are not to be confused with algae, which also grow in these still waters but usually in masses of green filaments. As flowering plants, duckweeds can produce flowers and seeds, which algae, of course, cannot do (see Section 5). Even so, duckweeds rarely flower, and when they do the plants are so small that their simple flowers are usually not recognizable with the unaided eye. Pollination, when it does happen, would occur above the water surface. For the most part, duckweeds proliferate by budding off new plants—a more rapid and efficient way of reproducing in the few months of a short growing season at northern latitudes.

When you think about it, floating on the water surface is an effective way of living. All plants compete for the sunlight they must have to convert carbon dioxide of the atmosphere into their own carbon compounds for growth. Conventional plants extend their leaves into the sun's rays from upright stems, supporting the whole with roots held firmly in the ground. Trees competing for sunlight in a forest are the ultimate extension of that approach to life. But duckweeds in their extremely simplified form can float on the water surface beyond the shade of competing plants to gain greater exposure to the sun. In this way, duckweeds fix carbon efficiently, injecting organic compounds into the food webs of marshes and lakes. All species of duckweeds are eaten



Watermeal (*Wolffia*) is the smallest flowering plant.
PSB

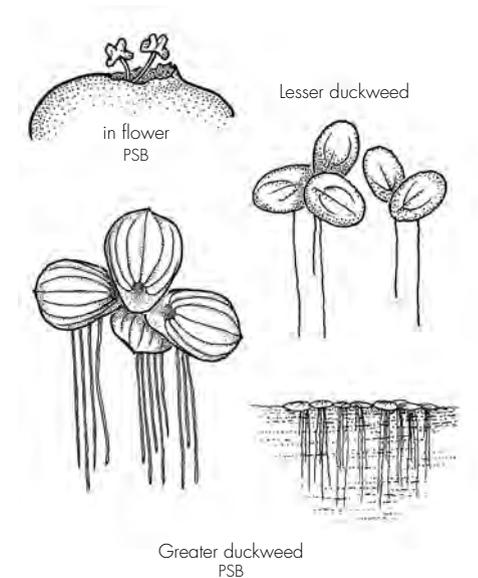


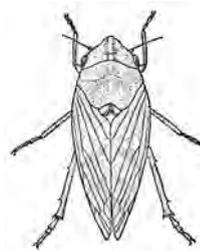
Figure 49. The fiery hunter is one of the ground beetles (family Carabidae), named for the red to coppery pits on its elytra, and also because both adults and larvae are voracious predators on cutworms and other caterpillars. The scientific name *Calosoma calidum* is derived from the Greek *kalos*, beautiful, and *soma*, body; and from the Latin *calidus*, hot, in reference to the red pits. These beetles are widely distributed through North America where they occur in dry open areas with low vegetation. Adults live for several years and begin hibernation in late summer.

Illustration by Anker Odum.



Figure 50. Beetles numbering some 350,000 known species comprise the largest order of insects. Tiger beetles are a small although common group of predacious beetles living in dry habitats such as sandy beaches and roadsides. Adult tiger beetles such as this one (genus *Cicindela*) have stout mandibles; they run and fly rapidly over open dry sites to capture insect prey. The larvae are concealed in short vertical burrows, their large mandibles ready to capture ants and other small insects that pass by.

Illustration by Anker Odum.

Cicada
AOFroghopper adult
EBSLFroghopper nymph in foam nest
PSB

competent medical and psychiatric authorities in recent years. Among these diagnoses, a case was made for Chagas's disease.

Although not implicated in transmission of disease, there are many assassin bugs native to North America, and they can often be seen resting on flowers awaiting potential prey. One common assassin bug, with the typical slender head on a narrowed "neck," occurs commonly on flowers of milkweed (2.3.5.2). Another hemipteran often abundant on these plants is the milkweed bug (Figure 19), one of the large family of seed bugs (Lygaeidae) which feed on seeds; milkweed bugs are marked conspicuously in black and red, colours of some other insects that feed on milkweed and presumably are a warning to potential predators that they have a bad taste (see also stinkbugs above). Another interesting hemipteran is the western conifer seed bug (Figure 43), one of the leaf-footed bugs (family Coreidae), a rather large insect 2 cm or so in length and brownish yellow in colour; it sometimes turns up in houses around windows. This is a native western North American species that has appeared in numbers in the Northeast since about 1980; range expansion of this magnitude is unusual for native insects, which all too often have become more restricted in distribution in recent decades. To my knowledge these insects do no damage in houses, and with the pedigree that these bugs have, I find them intriguing house-guests through the cold months of winter.

Ambush bugs (family Phymatidae; Greek *phyma*, tumour or growth) find prey on flowers such as goldenrod (2.3.5.5). These are compact warty-looking insects with enlarged forelegs for grasping prey (Figure 44); ambush bugs also inject a powerful venom with their piercing beak to immobilize prey.

To this point, we have dealt with typical hemipterans having



Figure 43. The western conifer seed bug (*Leptoglossus occidentalis*) is a relatively large species of the order Hemiptera that often turns up in houses around windows. As a native insect of western North America, its occurrence in the Northeast in recent years is an unusual example of faunal change.

Illustration by Patrice Stephens-Bourgeault.

Figure 62. Monarch butterfly caterpillars with their prominent bands of yellow, black, and white are clearly meant to be seen by predators. These caterpillars feed almost exclusively on milkweed (2.3.5.2); they avoid the milky latex of the plant by severing the lactiferous ducts in the leaves, causing the leaf to droop and the latex to flow from the opening while the caterpillar eats the leaf beyond the puncture.

Photograph by Kit Chubb.



Figure 19). Aposematic colour patterns often focus on patterns of black contrasting with orange, red, yellow, and white.

The most impressive biological feature of monarch butterflies is their extraordinary migration, behaviour more like a bird than an insect. This species ranges through South America and to Australia and New Zealand. Monarch butterflies reproduce year round at warmer latitudes, but in Canada and much of the United States they cannot survive winter conditions. Consequently, natural selection has opened a migratory lifestyle as a solution to exploiting the rich food resources provided by milkweeds in much of North America. Every year in late summer to early autumn throughout eastern and central North America, monarchs fly southward to particular locations in montane forests of central Mexico where they pass the relatively mild winter festooned inactively on the branches of fir trees. On return of spring to their mountain retreat, the butterflies become active again, mate, and begin their return migration. As the migrants follow the northward advance of spring, females deposit eggs on milkweed plants, and adults developing from those larvae continue the return migration northward. Through subsequent generations, monarch butterflies reach the northern limit of their range at latitudes of Ontario, arriving in May and June as milkweeds there are beginning a new season. Monarchs arriving in Ontario complete a first generation in about 6 weeks, followed by a second generation that appears as adults in late summer. These butterflies accumulate an energy reserve of body fat and then, on some cue, fly southward again.

Monarch caterpillars are dependent on milkweeds for their food. Although milkweeds of some species are aggressive native plants, there are fewer of them than there were a century ago. Modern agricultural efficiency, employing larger unbroken tracts of land cultivated for corn and soybeans in eastern and central areas of North America, has reduced milkweed density substantially. In Ontario, milkweed (2.3.5.2) is classed as a noxious weed and its destruction is encouraged; the butterfly relationship seems simple enough—less milkweed, fewer monarchs. Monarch butterflies are now placed as vulnerable on the list of endangered species in Canada (see Sources: 3.6.4.18). In addition to massive reduction in their larval food plants through much of North America, these butterflies are also suffering loss of their overwintering forests in Mexico because trees are cut for firewood. There are, however, movements under way to plant other trees in more accessible areas, saving the fir trees higher up in the mountains for the butterflies and secondarily for the ecotourists.