

Meadowlily Butterfly Habitat Restoration

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by Stan Caveney and Jane Bowles

Early this summer, lit by the late afternoon sun, an old-field meadow in the Meadowlily Nature Preserve was a whirl of freshly-hatched common ornate ringlet butterflies. The numerous ringlets appeared to be constantly in motion, together with northern crescents and a few other species of butterflies flying quickly between the flowers of common fleabane (*Erigeron philadelphicus*) and bramble (*Rubus* spp.). Butterflies often emerge in a synchronized fashion, and the day's ringlets provided a good example. Skimming dragonflies exploited the bonanza of flitting butterflies by plucking them out of the air. One ringlet photographed flew off and seconds later became dinner for a clubtail dragonfly. Although sun-filled meadows offer a wide range of grasses, rushes and shrubs as food for the small caterpillars of skippers, blues and some smaller brushfoots, this habitat lacks many of the food plants required by the larger caterpillars of our spectacular native butterflies, such as swallowtails and larger brushfoots.

The Thames Talbot Land Trust (TTLT) decided to address this issue in the Meadowlily Nature Preserve, a natural area of just under six hectares secured by the Trust in 2002 through a private donation. The site is part of the Meadowlily Woods Environmentally Significant Area (ESA) in London, Ontario and consists of a section of Thames River shoreline, an old-field meadow on a former floodplain terrace, a previously manicured lawn and a forest incorporating a meandering ravine. The Management Plan calls for renaturalization of the manicured area and enhancing butterfly habitat. Conventional butterfly gardening is clearly inappropriate in a significant natural area, where the emphasis needs to be on maintaining ecological integrity by using native species adapted to the local conditions.

TTLT is planning two very different approaches. In the manicured area, where the long-term objective is to recreate native forest, we are concentrating on encouraging trees that are food plants for native butterflies. Furthermore, since deer browse is a problem, we plan to use direct seeding to populate the site. This more closely mimics - but will speed up - the natural processes that would occur if we left the area alone. Site preparation will involve removing the sod-forming lawn grasses and then spreading large amounts of seed of the chosen trees. The principle is that if large numbers of seedlings are present some will survive the onslaught by deer, but the cost per plant will be kept to a minimum. Volunteers will collect all the seed in the London area. Training is to be provided by the Forest Gene Conservation Association through a Seed Collectors' certification course.

Butterfly caterpillars might be termed fussy eaters. Most exploit a very restricted set of food plants and their dietary needs are an essential consideration in butterfly restoration projects. But why are they such specialist feeders? One likely explanation is provided by the host plant's defensive chemistry. Many secondary chemicals stored or exuded by plants are strong feeding deterrents, or even toxic. The cardiac glycosides produced by milkweeds (*Asclepias* spp.) and dogbanes (*Apocynum* spp.), for example, are normally extremely toxic to insects (and humans!). Yet monarch (milkweed) caterpillars are able to tolerate high glycoside levels because they make the caterpillars distasteful to birds and other vertebrate predators. The negative effects of toxins on the health of a caterpillar are balanced by the increased odds of not being eaten and thus reaching adulthood. Similarly, viceroy and mourning cloak butterflies (and other large brushfoots) are able to feed on willow (*Salix* spp.), aspen and cottonwood (*Populus* spp.) because they are able to tolerate the high salicylic acid content of the leaves. The host plant selectivity seen in many caterpillars may be the result of the long-term "co-evolutionary battle" waged between the chemical arsenal produced by the host plant and the ability of caterpillars to neutralize it. Giant swallowtail caterpillars feed mainly on plants in the Rutaceae (citrus) family, such as prickly-ash (*Zanthoxylum americanum*) and hop-tree (*Ptelea trifoliata*). This family synthesizes similar distasteful, even toxic, aromatic oils and photosensitive toxins. Most swallowtail caterpillars store the pungent aromatic oils obtained from their host plants in a special gland behind their heads, and when provoked, release them into the air. Unlike monarch butterflies, which later use the dietary toxins acquired as caterpillars as defensive chemicals, our local swallowtails do not retain these aromatic deterrents into adulthood. Instead they rely on being able to mimic the appearance of other distasteful butterflies to escape predation by birds.

Other chemical compounds made by plants serve as rendezvous signals for courting butterflies (i.e. they help a butterfly find a mate) and also trigger egg-laying behaviour in mated females. Before laying her eggs, the female scrapes her forelegs on the surface of a leaf to confirm that a host plant detected from afar (by sight and scent) is

indeed suitable food for her caterpillars. This “drumming” behaviour brings chemicals on the leaf’s surface into contact with receptors on the tips of the female’s legs. Unlike moths, butterflies usually lay only a few eggs on individual plants, so that the leaf damage caused by feeding caterpillars is less noticeable to predatory birds. As a side benefit, the impact of feeding is less stressful to the host plant. Female butterflies even appear to be able to sense when another female has laid her eggs on a food plant, and move on to find another one.

Eventually Meadowlily Nature Preserve will have a range of vigorous young plants to offer up to the ravages of caterpillars. The dominant trees in the mature upland forest currently include sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*) and white ash (*Fraxinus americana*) and American beech (*Fagus grandiflora*). Although these species do not host many butterflies, they are used by a good variety of moths. We shall enhance the butterfly habitat merely by choosing among other species already on offer at the preserve (see Selected Butterfly Plants list) without resorting to the ecologically dubious practice of introducing new species to the margin of the natural woodland.

In the meadow on the floodplain terrace we will be using a different strategy. The area is flanked by a mixture of early- to mid-successional trees such as hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), basswood (*Tilia americana*), cottonwood and big-toothed aspen (*Populus deltoides* and *P. grandidentata*) and Manitoba maple (*Acer negundo*). We want to maintain the area as an open meadow, with the grasses, sedges, common milkweed (*Asclepias syriaca*), and other food plants that are already there and simply enhance some of the plants that provide nectar for adult butterflies and other insects. Again, we will use what is already present, but increase the abundance of native butterfly plants by planting plugs of selected species. In the fall, the meadow will offer goldenrods (*Solidago* spp.) and asters (*Aster* spp.) as rich sources of nectar for migrating monarchs as well as for butterflies preparing to overwinter, such as mourning cloaks and red admirals. Butterflies may not be important flower pollinators, but they add drama and spectacle to a meadow .

Meadowlily Nature Preserve has a well-maintained trail and is open to the public during daylight hours. TTLT plans to host demonstrations on how to create butterfly-friendly habitat with local native plants.

Stan Caveney is a freshly-minted emeritus professor in entomology at the University of Western Ontario. His passion is in preserving and restoring the diversity of Carolinian Forest habitat along the north shore of Lake Erie. Jane Bowles is a freelance botanist and ecologist, director of the Sherwood Fox Arboretum at the University of Western Ontario and curator of the UWO Herbarium. She concentrates most of her energy on documenting, conserving and monitoring native species and habitats in southern Ontario and on species at risk recovery..