



Sundew plant with captured dragonfly.

## *Sundews, Butterworts and Bladderworts, Oh My!* *—The carnivorous plants of New York*



**By John L. Turner; Photos by Matthew M. Kaelin**

If you've seen the popular movie or musical *Little Shop of Horrors*, you undoubtedly remember its central character, Audrey II, the florist shop's meat-eating plant. Somewhat reminiscent of a Venus flytrap, Audrey II consumes increasingly copious amounts of animal protein before ultimately meeting her demise.

While Audrey II is an exaggeration of a meat-eating plant, in reality she is only a modest one, since nature is replete with plant species that can do exactly what she does: consume animals. In fact, we have four major groups of carnivorous plants in New York State alone, including 19 species and one hybrid. These cousins of Audrey II are the pitcher plants (one species), sundews (three species and one

hybrid), bladderworts (14 species), and butterworts (one species).

Why have so many different groups of unrelated plants developed the carnivorous lifestyle? The answer is tied to the benefit of carnivorism. The majority of carnivorous plants grow in moist to wet habitats where basic nutrients—such as nitrogen, an element necessary for plant maintenance and growth—are very limited. Thus, the ability to obtain additional minerals and nutrients contained in the bodies of small animals allows these fascinating plants to effectively and efficiently supplement their nutrient uptake. This, in turn, enables them to inhabit and even prosper in marginal, nutrient-poor wetland environments such as fens and bogs.



sundew

Carnivorous plants employ a variety of different techniques to capture their prey, which largely consists of insects, arthropods and other small animals. Sundews and butterworts have what's known as flypaper/adhesive traps, while pitcher plants use pitfalls, and bladderworts, as their name suggests, use water-filled bladder traps.

There are two other techniques also used by carnivorous plants: snap traps and lobster-pot traps. Neither is used by New York species, however. The most famous snap-trap plant is the Venus flytrap. While house plant varieties can be purchased at a number of places, naturally occurring species of Venus flytraps are restricted to a small area in northeastern South Carolina and southeastern North Carolina.

### **Flypaper / Adhesive Traps**

Sundews are the most numerous members of the flypaper group. Of the

seven species found in North America, three species grow in New York: the round-leaved (*Drosera rotundifolia*); narrow, or spatulate-leaved (*Drosera intermedia*); and thread-leaved sundews (*Drosera filiformis*). The genus *Drosera* in Latin means "dew of the sun." Also referred to as "Catch-Fly" by some, their name derives from the glistening dew-like glands at the end of tentacles projecting from the main stem. Sundews typically grow in acidic, sandy or peaty soil conditions along pond edges. Each sundew produces from several to more than a dozen, pretty, five-petaled purple flowers, which each blossom for no more than a day.

The dew is quite sticky ("mucilaginous") and the unfortunate insect that comes into contact with it is not likely to escape. Its chances for freedom decrease over time as adjacent stalked glands on the leaf blade remarkably respond by moving toward the prey and making

Sundew with captured insect.



contact with it. Charles Darwin was one of the first biologists to study this process in great detail. He found that it takes from three to twenty minutes for the adjacent tentacles to respond (sloth-like for an



sundew

bladderwort blossom



animal, but fast for a plant!). This is often followed by the leaf blade folding inward to increase the number of tentacles that can reach the entangled prey. Scientists aren't entirely sure how the leaf and the stalked glands respond so rapidly, but electrical discharges within the plant are thought to play a role.

Butterworts are another New York member of the flypaper group, for which we have one species, common butterwort (*Pinguicula vulgaris*). They get their name because they were believed to have magical powers, and farmers would rub the juice of the leaves onto the udders of milk cows whose milk was used to make butter. Sporting bright purple flowers, common butterworts are sometimes called bog-violets, however, they are not violets and have stalked, mucilaginous glands on their leaves, similar to sundews, though smaller. As with sundews, the gland stalks and the leaf margin itself can move to more extensively come into contact with captured prey. Other glands on the leaf surface release several types of digestive enzymes that make short work of prey.



pitcher plant



### Pitfall Trap

The spectacular and unique pitcher plant (*Sarracenia purpurea*) is our sole representative species belonging to the pitfall trap family. Like all members employing the pitfall strategy, pitcher plants need an added ingredient: water. Unlucky prey drown in the water, and the plant secretes digestive enzymes into the water which accelerate the breakdown of the animal bodies and promote the release of minerals and nutrients.

But the ill-fated process begins farther up the plant, toward the opening, when an unsuspecting insect lands on the inside collar of the pitcher plant. Guided by downward pointing hairs, the insect works its way down the collar, which is populated by many nectar-secreting glands. Attracted to this area, the insect moves ever lower until it hits a surface like roof shingles that readily dislodge. The unlucky prey falls into the water and drowns, then it is dissolved and absorbed.



### Bladder Trap

Bladderworts (*Utricularia spp.*)—the most numerous group of carnivorous plants in the world with more than 200 species, a dozen of which are found in New York—are marvelously adapted to a carnivorous lifestyle. They employ snap traps to capture their prey. Numerous small, round bladder traps are found in the stems (officially referred to as “stolons”) of this floating group of mostly aquatic species. The traps of bladderworts are generally regarded as the most advanced and sophisticated of any carnivorous plant.

A bladder that’s set for prey is flattened and contains a vacuum as the plant has pumped out all of the water from the bladder. In this state, the sides of the bladder are deformed and contain built up elastic energy. When prey trips the trigger hair near the bladder door, the sides of

the bladder spring back to their normal shape, drawing the prey and surrounding water into the bladder. This happens in lightning-fast fashion, in as little as 1/50<sup>th</sup> of a second; the animal has no chance for escape. Almost immediately the plant releases enzymes to digest the trapped animal. The numerous forked hairs on the vegetative stems holding the bladders may play a role in guiding prey toward the bladders.

When you consider that carnivorous plants prey on insects, pollination can be a challenge. After all, a stuck insect—or a dead one for that matter—can’t be an agent for pollination. To address this concern, many carnivorous plants have tall flower stalks, thereby creating a significant separation between the flower and the lethal area of the plant. That way, an insect can pollinate the flowers without becoming lunch.

If you would like to experience carnivorous plants, you have two basic choices: see *Little Shop of Horrors*, or visit a local bog to view New York’s native carnivorous plants up close, in vibrant, living color. I think you’ll agree that the second option is the better bet. Just watch your fingers if you do.

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