BOTANICAL SOCIETY OF AMERICA

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Carnivorous Plants / Insectivorous Plants

The Botanical Society of America is pleased to provide the "**Carnivorous Plant**" pages. We are in the early stages of developing this section of our site; check back regularly. In the meantime, enjoy the images (mainly donated by members) and the stories they tell. We hope these strange and interesting plants open up your possibilities for asking new questions about the fascinating lives of plants!

Carnivorous plants have the most bizarre adaptations to low-nutrient environments. These plants obtain some nutrients by trapping and digesting various invertebrates, and occasionally even small frogs and mammals.

Because insects are one of the most common prey items for most carnivorous plants, they are sometimes called insectivorous plants. It is not surprising that the most common habitat for these plants is in bogs and fens, where nutrient concentrations are low but water and sunshine seasonally abundant. As many as thirteen species of carnivorous plants have been found in a single bog (Folkerts, 1982). Most plants absorb nitrogen from the soil through their roots. But carnivorous plants absorb nitrogen from their animal prey through their leaves specially modified as traps.

Traps work in a variety of ways.
Pitfall traps of pitcher plants are leaves folded into deep, slippery pools filled with digestive enzymes.
Flypaper (or sticky or adhesive traps) of sundews and butterworts are leaves covered in stalked glands that exude sticky mucilage.
Snap traps (or steel traps) of the Venus flytrap and waterwheel plant are hinged leaves that snap shut when trigger hairs are touched.
Suction traps, unique to bladderworts, are highly modified leaves in the shape of a bladder with a hinged door lined with trigger hairs.
Lobster-pot traps of corkscrew plants are twisted tubular channels lined with hairs and glands.

Carnivorous plants are fascinating because, even when they are not trapping insects, their unusual forms are intriguing. However, you should not collect plants in the wild because most of them are relatively rare. Habitat destruction and over collection are two of the greatest conservation threats to carnivorous plants. If you are interested in growing carnivorous plants in your home or classroom, purchase the plants from a reputable grower who uses tissue culture or vegetative means to grow the plant, or starts them from seeds.

Unraveling the story of carnivorous plant evolution and ecology has occupied biologists for centuries. Charles Darwin's extensive experiments confirmed the carnivorous habit for several genera. Carnivory has been documented in at least 9 plant families and 600 species.

We now know that the carnivorous habit evolved independently in many plant lineages (Albert et al., 1992; Ellison and Gotelli, 2001; Cameron et al., 2002; Muller et al., 2004). Pitfall traps evolved independently in four plant groups (the eudicot orders Caryophyllales, Oxalidales, Ericales, and the monocot family Bromeliaceae), and sticky traps, in at least three (the Caryophyllales, Ericales, and Lamiales). These are examples of **convergent evolution**. In contrast, the snap trap and lobster-pot traps evolved only once among carnivorous plants. In the descriptions below, the plant groups and names follow the Angiosperm Phylogeny Group II (1993) and Peter Stevens' Angiosperm Phylogeny Website, which do not use formal classification ranks above the level of the order.

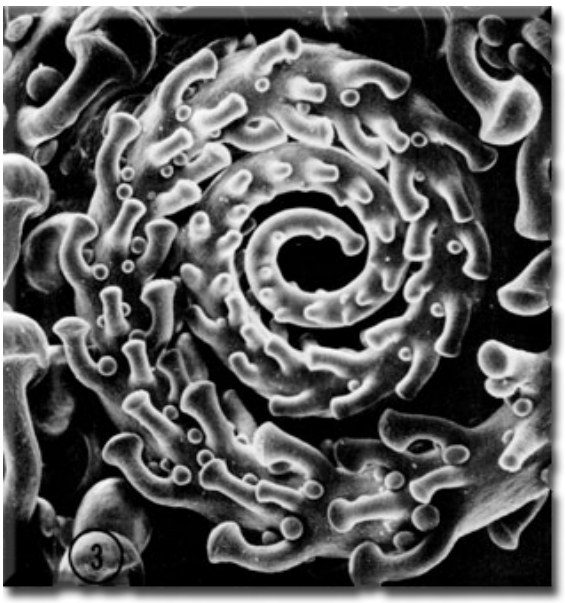
Kingdom: Plantae — Eudicots, Basal Eudicots
Order: Caryophyllales

Family: Nepenthaceae
Genus: *Nepenthes*
Tropical Pitcher Plant or Monkey Cup

Currently 90 listed species occupying tropical habitats in Australia, Madagascar, Papua New Guinea, the Seychelles, Southeast Asia and Sri Lanka.
For more *Nepenthes* information and images - CLICK HERE

Family: Drosophyllaceae
Genus: Drosophyllum
Dewy Pine or Portuguese Sundew

One species occupying coastal habitats in northern Morocco, Portugal, and southwest Spain.
For more *Drosophyllum* information - CLICK HERE



Family: Dioncophyllaceae
Genus: *Triphyophyllum*

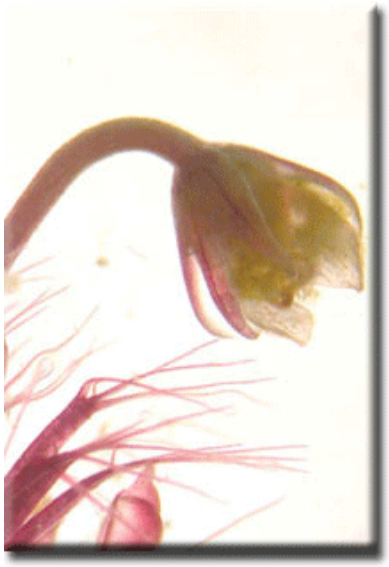
One species occupying rainforest habitats in West Africa (Liberia, Sierra Leone, and Ivory Coast).
More *Triphyophyllum peltatum* information COMING SOON!

Family: Droseraceae
Genus: *Drosera*
Sundew

Currently 152 listed species occupying temperate and tropical habitats throughout the world.
For more *Drosera* information and images - CLICK HERE

Family: Droseraceae
Genus: *Dionaea*
Venus Flytrap

One species occupying habitats in the southeastern United States of America (North Carolina, South Carolina).
For more *Dionea muscipula* information and images - CLICK HERE



Family: Droseraceae
Genus: *Aldrovanda*
Waterwheel Plant

One species occupying aquatic habitats in Europe, Asia, and Australia. Once widely distributed in Africa, India, and Japan.
More *Aldrovanda vesiculosa* information COMING SOON!

Kingdom: Plantae — Eudicots, Rosids, Eurosids I
Order: Oxalidales

Family: Cephalotaceae
Genus: *Cephalotus*
Albany or Western Australian Pitcher Plant

One species occupying peaty swamps in southwestern Australia.
For more *Cephalotus follicularis* information - CLICK HERE

Kingdom: Plantae — Eudicots, Asterids, Basal Asterids

Order: Ericales

Family: Sarraceniaceae

Genus: *Darlingtonia*

Cobra Lily

One species occupying boggy habitats in the northwest United States of America (southern Oregon, northern California).

More *Darlingtonia californica* information COMING SOON!

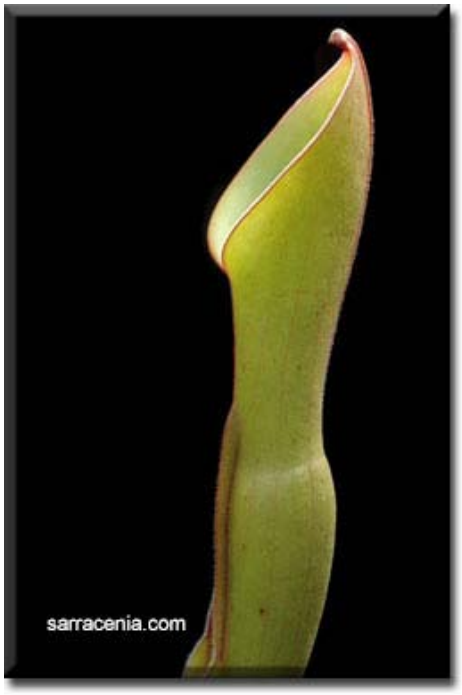
Family: Sarraceniaceae

Genus: *Sarracenia*

Pitcher Plant

Currently 10 listed species occupying habitats in eastern North America (central Canada to southeastern United States of America).

For more *Sarracenia* information - CLICK HERE



Family: Sarraceniaceae
Genus: *Heliamphora*
Marsh or Sun Pitcher

Currently 7 listed species occupying mountain plateaus of the Guiana Shield in north-central South America (Venezuela and bordering Brazil and Guyana).
More *Heliamphora* information COMING SOON!

Family: Roridulaceae
Genus: *Roridula*
Bug Plant or South African Fly Bush

Two species occuring in fynbos of Southern Africa. *Roridula* has sticky leaves to trap insects but lacks enzymes to digest them. It has sometimes been considered as carnivorous, sometimes not. Evaluate the evidence and decide for yourself.
More *Roridula* information and images COMING SOON!

Kingdom: Plantae — Eudicots, Asterids, Euasterids I
Order: Lamiales

Family: Lentibulariaceae
Genus: *Utricularia*
Bladderwort

Currently 220 listed species occupying temperate

Family: Lentibulariaceae
Genus: Genlisea
Corkscrew Plant

Currently 20 listed species occupying habitats in

and tropical habitats throughout the world--the most diverse and widespread genus of carnivorous plants.
For more *Utricularia* information and images - CLICK HERE

Africa, Madagascar, and South America.
More *Genlisea* information and images CLICK HERE

Family: Lentibulariaceae
Genus: *Pinguicula*
Butterwort

Currently 79 listed species occupying habitats in Europe, Asia, North America, and South America.
For more *Pinguicula* information and images - CLICK HERE

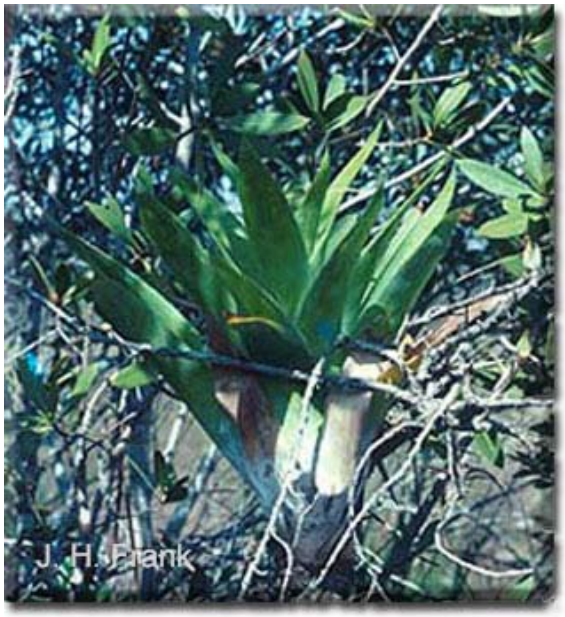
Family: Byblidaceae
Genus: *Byblis*
Rainbow Plant

Currently 5 listed species occupying habitats in northern and western Australia and New Guinea.
For more *Byblis* information and images - CLICK HERE

Kingdom: Plantae — Monocotyledons, Commelinids
Order: Poales, Family: Bromeliaceae

Subfamily Pitcairnioideae
Genus: *Brocchinia*

Of the 5 species in the genus occupying lowland savanna and mountain habitats in South America, at least 2 species are carnivorous.
More *Brocchinia reducta* and *B. hectioides* information COMING SOON!



Subfamily Tillandsioideae
Genus: *Catopsis*

Of the 21 species in the genus, 1 species is carnivorous. It occupies humid habitats in South America, Central America, Mexico, the West Indies, and Florida, U.S.A.
More *Catposis berteroniana* information COMING SOON!

Protocarnivorous Plants and Predatory Fungi

Carnivorous plants have features to attract, trap, kill, and digest prey, and absorb nutrients. A number of plants have only some of these characteristics. Glands that secrete sticky substances are found in many plants. Pitcher-like tanks are common in bromeliads and in few other plants. While perhaps not fully fledged sticky traps or pitfall traps, these features hint of the potential for carnivory. The list of plants described as near carnivorous, protocarnivorous, or borderline carnivorous is quite diverse, including *Ibicella lutea* (Mameli, 1916), *Dipsacus* (Christy, 1923), *Passiflora foetida* (Radhamani et al., 1995), *Paepalanthus bromeloides* (Jolivet, 1998), and *Geranium viscosissimum* and *Potentilla arguta* (Spomer, 1999). No single definitive list exists. *Ibicella lutea*, which has not been studied since 1916 (Juniper et al., 1989), is sometimes listed as carnivorous, and *Catopsis berteroniana* is sometimes described as borderline. The ability to digest prey and absorb the amino acids is considered the real clincher.

Carnivory is more widespread than just the plant and animal kingdoms. The fungi kingdom has flesh eaters also (Pramer, 1964). Living in the soil are over 200 species of fungi (identified as zygomycetes, basidiomycetes, and hyphomycetes) that use special structures to trap nematodes. Like carnivorous plants, these fungi have the ability to trap prey and to absorb nutrients from the body of their prey. The traps of fungi come in two general types: constricting rings (active traps) and adhesive structures (passive traps). These trap types occur in separate fungi lineages (Ahren et al., 1998).

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