Introduction to Carnivorous Plants

Description
With the exception of Antarctica, carnivorous plants are indigenous to every continent on earth. There are about 600 species of plants which supplement or derive their main source of nutrients from the trapping and digestion of animals. These species belong to 7 plant families which in turn are sub-classified into 15 genera. In North America, we have 45 native species of carnivorous plants, the majority of which are considered to be hardy outdoors in the Pacific northwest (zone 8). Many carnivorous plant species are not easy to obtain, and for this reason we will only discuss genera that are commonly available.

Bladderworts (*Utricularia* species)
Plants in this genus are indigenous to aquatic or very damp environments. The carnivorous nature of Bladderworts is not readily apparent, as the trapping mechanism is either submersed in water or buried in the soggy ground, depending upon the particular species. The traps are tiny bladders which ingest their prey by suction. Bladderworts produce small, intricate flowers and also provide attractive ground cover for terrariums.

Butterworts (*Pinguicula* species)
These small, low-growing plants feature oval-shaped leaves radiating outwards in the form of a rosette. Insects are trapped by tiny, sticky hairs covering the surface of the leaves, and digested by glands on the leaf surface. Pinguiculas are prized due to their colourful flowers, reminiscent of African violets.

North American Pitcher Plants (*Sarracenia* species)
The eight species of Sarracenia are native to the sandy and peaty wetlands of eastern North America. Sarracenia purpurea, the provincial flower of Newfoundland, has a habitat range extending to the southern boundary of the Northwest Territories and is the only species indigenous to Canada. The leaves of Sarracenia species are hollow tubes (pitchers) containing nectar-producing glands. The nectar lures insects into entering the pitcher, where they become trapped. Other glands inside the pitcher excrete digestive enzymes which enable the plant to digest the soft parts of the insect prey. In some species the pitcher lies almost flat against the ground while in others, such as Sarracenia flava, the pitcher can grow vertically up to 3 feet in height. It is possible to cross the various species of Sarracenia, and many colourful hybrids are now available.

Cobra Plants (*Darlingtonia californica*)
This pitcher plant, which is closely related to Sarracenia, derives its common name from the forked 'tongue' that projects from the hooded opening at the top of the pitcher. Darlingtonia is native only to boggy areas of northern California and southern Oregon where the source of water is cool mountain streams or springs. Due to the specialized environment in which they have evolved, Cobra Plants are considered to be one of the more challenging carnivorous plants to grow successfully.

Sundews (*Drosera* species)
Sundews, depending upon the species, can vary in size from small rosette-forming plants the size of a coin, up to large bushy plants 3 feet tall or more. The leaves of sundews are covered with sticky, glue-covered tentacles that sparkle in sunlight, hence the name. When an insect comes in contact with the sundew's leaves, it becomes trapped by the glue. The tentacles then slowly close around the prey. The digestive action of enzymes released by glands located on the tentacles enables sundews to withdraw nutrients from the insect bodies.

Venus Flytraps (*Dionaea muscipula*)
The flytrap is the most famous of all the carnivorous plants, but many people are surprised to learn that it is not a tropical plant. The flytrap is actually indigenous to boggy areas of North Carolina and northern South Carolina. The leaf stems (petioles) of the flytrap radiate outwards from the center of the plant in a rosette pattern. At the tip of each petiole is the trapping mechanism, which is actually a modified leaf resembling a miniature bear trap. The trap contains nectar-secreting glands that lure the insect between the two gaping jaws. The movement of the insect brushes tiny hairs within the trap,causing the jaws to slam shut within one second. The insect is then digested over a period of approximately one week.

Tropical Pitcher Plants (*Nepenthes* species)
Nepenthes are native to southeast Asia and are therefore classified as tropical plants . Nepenthes present a vine-like appearance and are much sought after due to the incredible shapes and colours of the pitchers. The pitchers are produced at the ends of long tendrils projecting from the leaf tips and contain digestive glands and fluids. Insects and even small mammals are attracted to nectar secreted by the pitchers, and are lured inside the traps where they drown and are digested.

Habitat
The care of most carnivorous plants is not difficult, but it is important to understand the native habitat of these plants in order to be successful in their cultivation. Many carnivorous plants have evolved in sandy or mossy bog habitats and are therefore specific as to their needs. A sphagnum bog is an acidic, water-logged eco-system and tends to be quite sunny due to the lack of tall trees. In order to mimic this environment, carnivorous plants should be grown in sunny areas or brightly lit terrariums. Carnivorous plants indigenous to North America should never be allowed to dry out during the growing season. Tropical Pitcher Plants (Nepenthes) are native to damp tropical or sub-tropical areas of Southeast Asia and generally need a warmer and more humid environment than Sarracenia species. Nepenthes should be misted regularly in order to simulate the humidity of their natural habitat.

Watering
Rain water, which is naturally acidic, is perfect water for watering carnivorous plants, but distilled water is also fine. Tap water can be used provided it is neutral or acidic and lacking in dissolved minerals. Storing tap water in an open container for a few days prior to usage will allow the chlorine to dissipate.

Lighting
In the Pacific northwest, most North American carnivorous plants and other species native to temperate areas can be planted permanently outdoors in a sunny bog garden. In terrariums, lighting for carnivorous plants should consist of multiple fluorescent tubes, depending upon the size of the tank. For example, the minimum recommended lighting for a 4 foot long tank would be four 40 watt fluorescent tubes. Nepenthes species are similar to tropical orchids and prefer bright, diffused light. Subjecting Nepenthes species to unfiltered mid-day sun can cause result in scorching, particularly in summer.

Dormancy
Carnivorous plants of North America and other temperate regions are subject to a winter dormancy period in their natural habitats. When these plants are grown indoors, they should be moved to a cool, frost-free location of 10 degrees Celsius or less for a period of approximately 10 weeks during the winter season. This will give the plants a chance to rest, which is necessary in order to maintain their overall health and vigor. Hardy carnivorous plants grown in an unheated greenhouse or an outdoor bog garden will naturally slip into winter dormancy. In late fall, the bog garden can be mulched with straw in order to provide protection against freezing. In the Pacific Northwest (zone 8), most temperate carnivorous plants are winter-hardy outdoors, but mulching will protect marginally hardy species such as Flytraps and New Zealand sundews. Another winter option is to place a cold-frame over the bog garden, as an alternative to mulching. In areas colder than zone 7, mulching the bog garden will also help ensure the survival of Sarracenia species indigenous to temperate zones. Many tropical carnivorous plants do not require a dormant period, although some species such as the tuberous Australian sundews benefit from the rest provided by a simulated 'dry season'.

Media
A 50/50 mixture of Canadian peat moss and coarse, salt-free sand is the best media to use for carnivorous plants indigenous to North America and other temperate regions. Live sphagnum moss can be added on top of the peat moss to reduce evaporation and create a natural appearance. The potting mix for Nepenthes species is similar to fine (not coarse) orchid media. A typical Nepenthes mix could consist of 35% coir (coconut fibre), 35% pumice, 10% Perlite, 10% Vermiculite, and 10% horticultural charcoal. This recipe is only an example, most Nepenthes growers create their own formula based upon the availability of local ingredients. Live sphagnum moss is also an excellent potting media for Nepenthes.

Containers
Suitable terrarium containers are aquariums, large fishbowls or glazed ceramic bowls. Outdoor bog gardens are usually dug into the ground in order to protect the plants from freezing. A typical bog garden installation involves digging a hole approximately two feet deep, which is then lined with a synthetic rubber pond liner or a plastic child's wading pool. The bog is then filled with a mix of peat moss and sand (see 'Media'); a wheelbarrow is a convenient tool to use for mixing the media. To prevent stagnation of the bog water, a few small holes should be punched into the bottom of the liner prior to adding the planting mix.

Feeding
Carnivorous plants grown outdoors are fully capable of catching their own insects and supplementary feeding is not necessary. Carnivorous plants in terrariums should be fed approximately once a month; it is always better to underfeed your plants rather than risk overfeeding. Many pet shops stock small containers of dried insects as a reptile food; this is a suitable substitute for live insects. The dried insects are simply sprinkled on the leaves of plants such as sundews and butterworts, or placed inside the traps of pitcher plants and Venus flytraps.

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