

*Curiosities of Plant Life**

*By Alexander Lurie, Horticulturist, and G. H. Pring,
Floriculturist*

Missouri Botanical Garden



SO MANY plants are of curious or unique form, have unusual ways of getting their food, or are protected by coverings that excite the wonder of mankind, that some account of the most interesting of them, with illustrations of the most striking are presented in this and further installments of an article which should interest readers of the JOURNAL. The often devious ways that Nature employs to preserve a given plant or to ensure its perpetuation are literally beyond belief, and the accounts that follow, some of almost dramatic import, are only the most salient features of the great scheme of the adjustment of plants to their living conditions. Such curiosities of plant life furnished a never ending source of wonder to Darwin,—they are just as vital and interesting to us to-day.

INSECTIVOROUS PLANTS

The insectivorous or carnivorous plants are like the parasites, the climbers, or the succulents, an assemblage belonging to several distinct families. They all agree in the extraordinary habit of adding to the supplies of nitrogenous matter afforded them in common with other plants by the soil, by the capture and consumption of numerous insects and small animals. All insectivorous plants inhabit bogs, marshes and other situations where water is abundant but where the plant does not receive sufficient nitrogenous food.

* Photographs for this article were taken at the Missouri Botanical Garden.

A process of digestion similar to that of the human being is ascribed to these insectivorous plants. The nitrogenous elements of insects are rendered fit for absorption by the action of a ferment. Similar to human digestion, the body of the insect is steeped in the digestive fluid, the secretion of which is stimulated by the presence of the substance to be digested. This secretion is acid.

The feeding and thriving of various insects upon plants has become such a natural course of events that the justice of it is taken for granted. But when the plant apparently turns about and sets traps for its enemies, a shock is experienced at the retaliation. The object of Nature in providing this state of affairs is to compensate these bog loving plants for the lack of nitrogenous food in their ordinary plant food.

Despite the various ingenious contrivances found among these plants, they are sometimes deprived of their lawful prey by other insects and even animals which feed upon decaying animal matter. In some species of *Nepenthes* and *Sarracenia*, white maggots live and thrive upon the decayed matter inside. Across the mouth of the *Nepenthes* pitchers webs are often spun by spiders which feed upon the remains in the cavity below.

The best known and the most important family of insectivorous plants—Droseraceae includes six genera *Byblis*, *Roridula*, *Aldrovanda*, *Drosera*, *Drosophyllum* and *Dionaea*, of which the last three are the better known. The Sarraceniaceae contain the genera *Sarracenia*, *Darlingtonia*, *Heliamphora*, while the true pitcher plants (*Nepenthes*) belong to the Nepenthaceae. These three families are closely allied. *Cephalotus*, *Pinguicula* and *Utricularia* are somewhat farther removed, the first belonging to the Cephalotaceae and the last two to Lentibulariaceae.

Bladderwort

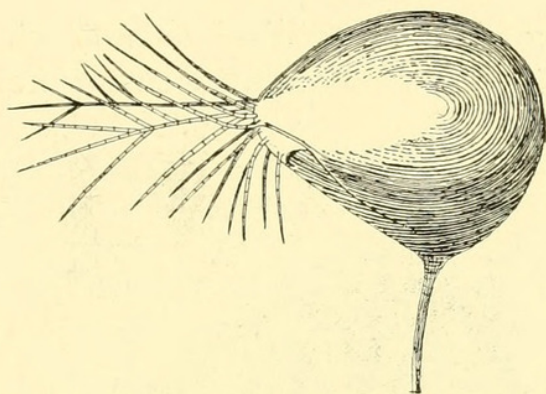
Utricularia vulgaris

Lentibulariaceae

An insectivorous aquatic plant native of Europe and North America.

The immersed stems are crowded with many-parted capillary leaves bearing many bladders. The flowering stalks bear 5 to 12 yellow flowers.

The most interesting part of the plant is the translucent green bladder which is supported on a short stalk. A valve-like door is located at one end through which insects and other aquatic animals enter in search of food or when trying to escape from other animals. The bladders contain water and air bubbles. It is presumed that decay is hastened by substances secreted in



BLADDERWORT, UTRICULARIA
VULGARIS

the interior and it is thought that some absorption takes place. Fish fanciers are reluctant to use this plant as an oxygen generator during the breeding period, because cases have been reported where the newly hatched fish have found their way into the bladder and become the prey of the plant.

Darlingtonia californica

Sarraceniaceae

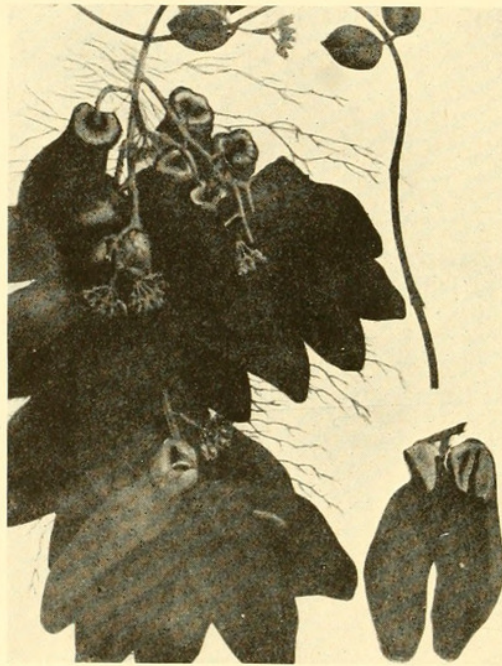
A monotypic representative of the Sarraceniaceae, closely related to the trumpet pitcher plants and growing abundantly in swampy regions of California and Oregon. The open mouth of the *Sarracenia* is in this plant replaced by a hood which is translucent through its white markings. This hood bears many honey glands on the outside, while the interior is covered with downward pointing hairs which impel the insect into the

lower portion. Disintegration takes place in the sticky secretion, the nitrogenous matter being absorbed by the thick walls at the base. The action takes place during spring, when the pitchers become half filled with animal remains, amongst which centipedes and slugs have been found. The plant blooms from May to July, producing greenish-yellow and brownish flowers.

Dischidia Rafflesiana

Asclepiadaceae

An interesting plant of tropical Asia which was discovered during the middle of the eighteenth century near Malacca by a



DISCHIDEA RAFFLESIANA

missionary named Koenig. It is an epiphytic plant with numerous roots proceeding from its stem and with fleshy orbicular leaves. The irregular, angled pitchers are borne on short lateral shoots. Numerous adventitious roots arise from the base of the pitcher at the opening and dip into the cavity. The pitcher is really a modified leaf, the inner surface corresponding to the lower surface of the true leaf. The prevalent opinion is

that the pitchers merely collect water and retain it. Some believe that they act as ant shelter traps, but this view is hardly tenable as the roots hanging down into the inner recesses afford a ready means of escape. It is true that small inoffensive ants troop in great numbers to these pitchers, which secrete a liquid pleasant to their palate and often meet their death from drowning. There is nothing to show a carnivorous habit in the structure of the pitchers.

Fly Catcher

Drosophyllum lusitanicum

Droseraceae

A rare plant found in Portugal and Morocco, where it grows abundantly upon dry hills and is called fly-catcher.

The leaves arise from a narrow woody stem several inches in length. The upper surface is concave with a central narrow channel. Glandular, mushroom-like discs supported on slender stalks are arranged in regular rows on both upper and lower surfaces. The glands are variable in size, pink or purple in color, exuding large drops of a sticky secretion. In addition to these there are numerous, colorless, microscopic projections which are similar internally to the large glands. They differ, however, in one important respect—their spontaneous secretion upon contact with insects. The mushroom-like glands are incapable of movement, but their copious supply of sticky matter counterbalances this deficiency. In its effort to escape, the insect comes in contact with the numerous glands which eventually smother it with the secretion and cause complete exhaustion and death. The minute glands excited by contact then discharge the fluid which finally dissolves the animal matter.

Guiana Pitcher Plant

Heliamphora nutans

Sarraceniaceae

This unusual plant was first discovered in 1839 by the Schomburgk Brothers and was rediscovered in 1881 by an Englishman, Burke.

A perennial about 1 foot high, the leaves pitcher-like, tubular, enlarged at the top with a flaring opening and a small rudimentary lip terminating the midrib. The pitcher is hairy inside and winged down the front, conspicuously veined with red in its native habitat.

Similarly to the other members of the family, *Heliamphora* secretes a fluid for the destruction of insects.

Mexican Butterwort

Pinguicula caudata

Lentibulariaceae

Native of Mexico, being the most interesting species of the genus. The peculiarities of the plant are its two distinct manners of growth. During the growing season a rosette of large obovate leaves is formed. These are covered with thousands of minute glandular hairs. During the resting period a rosette of closely imbricated stipule-like leaves is produced. At this time it will withstand considerable drought.

The *Pinguiculas* are only capable of holding fast gnat-like insects because of the minuteness of the hairs. The exuded digestive fluid performs a function similar to that of *Drosera*. The flowers, appearing singly on a scape 10 inches high, are deep carmine in color with a lighter throat streaked with red. The lower lip is attenuated in a spur-like nectar tube.

The plants are propagated by means of leaf cuttings of both winter and summer stages.

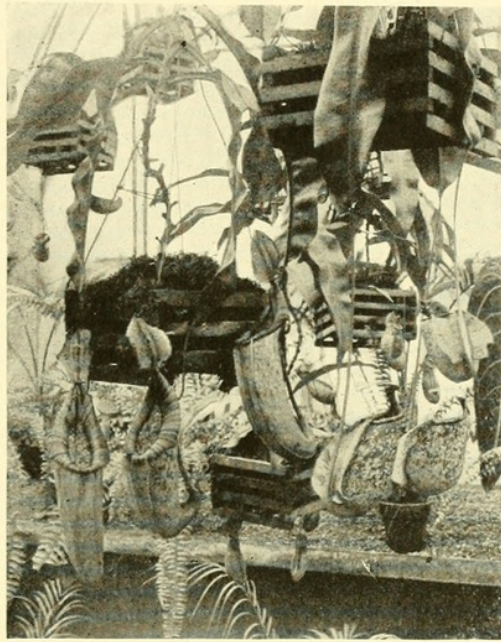
Pitcher Plant

Nepenthes sp.

Nepenthaceae

The pitcher plants are native of tropical Asia, Australia, Malayan Archipelago and the island of Madagascar, where the climate is uniformly warm and moist. The flowers are greenish and inconspicuous. The leaves are, however, remarkable and are responsible for the classification of the pitcher plants among the wonders of the plant world. They are alternate, with a prolonged spirally twisted midrib terminating in an appendage called the pitcher. These appendages vary from flask shaped to cylindrical, with often decided differences in shape on the same plant and are colored green, yellow or purple. The mouth of the pitcher is furnished with a corrugated rim which serves three purposes, namely it strengthens the mouth and keeps it distended, it secretes nectar and often de-

velops into a funnel-shaped tube which projects into the pitcher preventing the escape of any insects that enter. A pathway of two rows of long teeth-like hairs extend from the rim to the base of the pitcher. The mouth is usually closed by the lid until fully developed; then the lid is permanently lifted. The popular impression that the lid closes when an insect enters is fallacious.



NEPENTHES DYERIANA AND NEPENTHES
CHELSONI EXCELENS

The interior is covered with numerous glands which secrete a digestive fluid before the opening of the lid. The insects are attracted by the nectar on the under side of the lid or the rim and usually enter, seldom being able to escape. They are drowned in the liquid which later partially digests them. This digestive fluid is said to be collected by the natives of Borneo from the fresh pitchers and used as a remedy for indigestion.

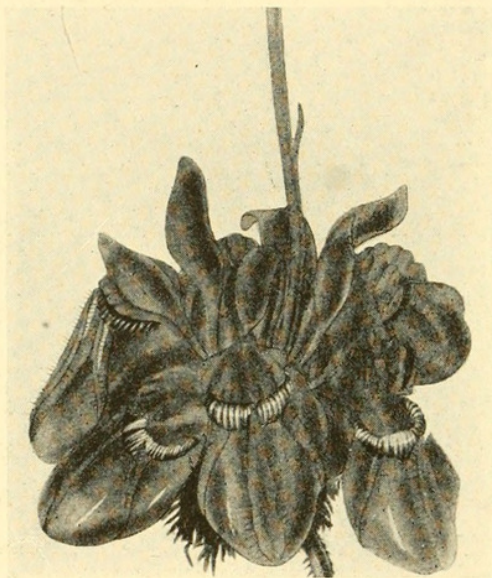
Handling of the pitchers soon causes them to wither and die, particularly if the fluid is turned out. Some of the larger pitchers will hold as much as a quart of water.

Pigmy Pitcher Plant

*Cephalotus follicularis**Cephalotaceae*

A native of southwest Australia where it abounds in the moist regions of King George Sound and Swan River. The plant has short rhizomes which throw a rosette of small rounded leaves. The minute ornamental pitchers are greenish crimson, 1 to 1½ inches long, covered externally with microscopic glands, which, combined with the coloration, attract insects. The external surface of the pitchers is provided with bristled wings which form pathways to the ribbed smooth rim. Upon reaching this the insect slips off into the secreted fermentation fluid below which is exuded by special glands.

It is rarely seen in cultivation due to the difficulty in propagation and successful transportation.



CEPALOTUS FOLLICULARIS

Sun Dew

*Drosera capensis**Droseraceae*

There are upwards of 90 species of this genus scattered over the world though most abundantly in Australia.

The marshy regions form the principal habitat of these plants. Some of the Australian species form tubers which carry them through a resting period. Our native species have the herbaceous perennial habit of losing the foliage during the

winter season. The leaves are strap-shaped forming a terminal rosette, and are covered with prominent glandular hairs. The flowers are purple, primrose-like, produced on scapes reaching 1 foot in height and all facing in one direction.

The plant is insectivorous through the action of the dew-like deposit on the numerous red hairs. When an insect alights upon the leaf it is held fast by the hairs immediately in contact. Later the entire leaf doubles over and in several hours encloses



SUN DEW DROSERA CAPENSIS

the insect. The clear acid fluid exuded by the hairs excretes proteinaceous ferments which aid in the digestion of the insect for the plant's own nutrition.

The tropical species are rarely seen in cultivation outside of botanical gardens. The plants are raised from minute black seeds which should be sown on the surface of peaty soil. Division of the thick roots of some species serves as another method of propagation. Full sunlight and tanks of water underneath are essential for the best development. The elongated growths

should be pegged to the surface in order to obviate the necessity of annual transplanting, which produces a deleterious effect.

Toothwort

Lathraea squamaria

Orobanchaceae

This plant has been suspected of carnivorous habits only a comparatively short time, having been previously classed with root parasites. During the greater portion of the year it feeds upon the roots of trees, to which it is attached by suckers. In the spring a number of short fleshy flower-stalks are sent up covered with white flowers tinged with violet. Below the flowers are located several fleshy scale like leaves, on the under-side of which are located complex chambers to which entrance is gained through the tip of the leaf. Small insects seeking a cool shady retreat find their way into these chambers, rarely ever escaping therefrom.

It is not known whether a digestive fluid is exuded, some advancing the theory that bits of protoplasm are sent out from the inner cells which act as absorption organs, extracting the soft tissues of the insects. This theory is corroborated by the fact that shortly after imprisonment only the horny parts of the insects remain.

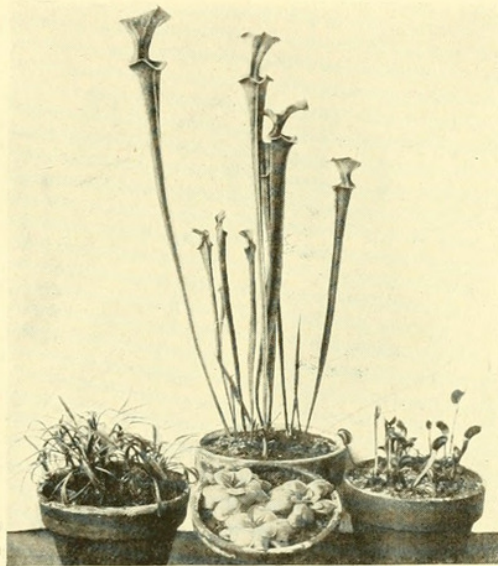
Trumpet Pitcher Plant

Sarracenia spp.

Sarraceniaceae

Bog plants of Eastern United States. They are of rhizomatous perennial habit producing a rosette of 3-8 pitched leaves in the spring. The shape of the pitcher varies according to the variety, from the small squatty trumpet with purplish pitchers of *S. purpurea* to the elongated ones of *S. Drummondii*. The pitchers of *S. flava* are 10 to 34 inches long, with prominent longitudinal yellowish veins and a crimson throat. The lid is ovate, slightly inflexed over the mouth. The flowers are curi-

ous as well as ornamental, extending above the pitchers and appearing first in the spring. They vary from 1 to 3 inches in diameter and are yellow to deep crimson in color. The five banner-like petals appear from the umbrella-like pistil which is covered with numerous nectar-secreting warts. The umbrellaloid style is five-pointed, each point bearing a dry peg-like stigma on the under side. Directly above are situated the numerous stamens which discharge abundant pollen into the style cavity. The construction of the flower aids in ready intercrossing and hybridization among the existing species.

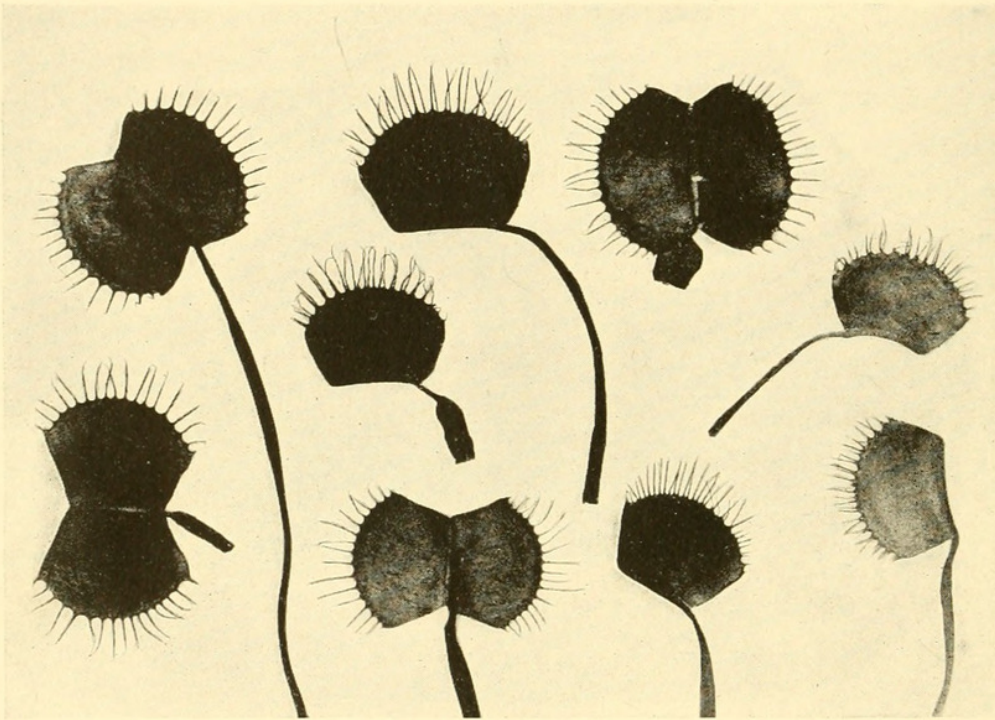


DROSERA CAPENSIS (LEFT)
SARRACENIA FLAVA (BACK)
PINGUICULA CAUDATA (FRONT)
DIONAEA MUSCIPULA (RIGHT)

A fluid is secreted in the trumpet-like pitcher attracting various larvae as well as flying adults. The lid is densely covered with glands and downward pointing hairs which force the insect upon the glabrous surface of the upper part of the pitcher, which, offering no foothold, precipitates them into the secretion. No digestion takes place but the dissolved material is absorbed by the pitcher walls, affording nitrogenous food. An overabundance of this material causes the death of the pitchers.

Venus Fly Trap
Dionaea muscipula
Droseraceae

This most remarkable of all insectivorous plants is native of North Carolina where it thrives upon the edges of moist bottom lands. It is found wild only in a strip of territory 10 miles wide and 40 miles long. The plant is of perennial habit, forming a bulbous swelling which may be dug and distributed during the winter months.



VENUS FLY-TRAP, DIONAEA MUSCIPULA

The leaves are obovate, terminating in a trap-like appendage which when open resembles two hands joined at the wrist with the fingers distended. The bringing together and interlocking of the fingers represents the closing of the trap. On the interior of each lobe are located three highly sensitive hairs in triangular formation. The least contact with the hairs causes the immediate closing of the trap. The escape of the insect is

prevented first by the interlocking of the teeth-like horns. Later through the energetic struggle of the insect to escape it becomes necessary for the horns to unlock, at the same time exerting greater pressure upon the lobes and thus ending the struggle.

The interior of the lobes is lined with glands which are not active until brought in contact with the insect. The action which occurs is similar to that of *Drosera*, the peptonizing fluid readily dissolving the proteids of the entrapped insect, which are absorbed by the plant for its nutrition.

In the native state the traps open again after complete disintegration of the animal matter, exposing the shell of the insect, but under cultivation the reopening occurs rarely and only in the case of an exceptionally well-grown freshly obtained plant. The movement may be readily repeated however by touching the hairs with a needle, which causes the closing and reopening of the trap in 10 to 15 minutes.

The life of the average plant under cultivation is of short duration even when grown in virgin soil. Such unusual interest is attached to the behaviour of this plant that it is distributed to various botanical institutions of the world for experimental study and educational purposes. Several dealers in this country offer this and some of the better known insectivorous plants for sale. Their cultivation would add a note of interest to many greenhouse collections.

(To be continued)



COLUMNAR FORM OF
JUNIPERUS CHINENSIS



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