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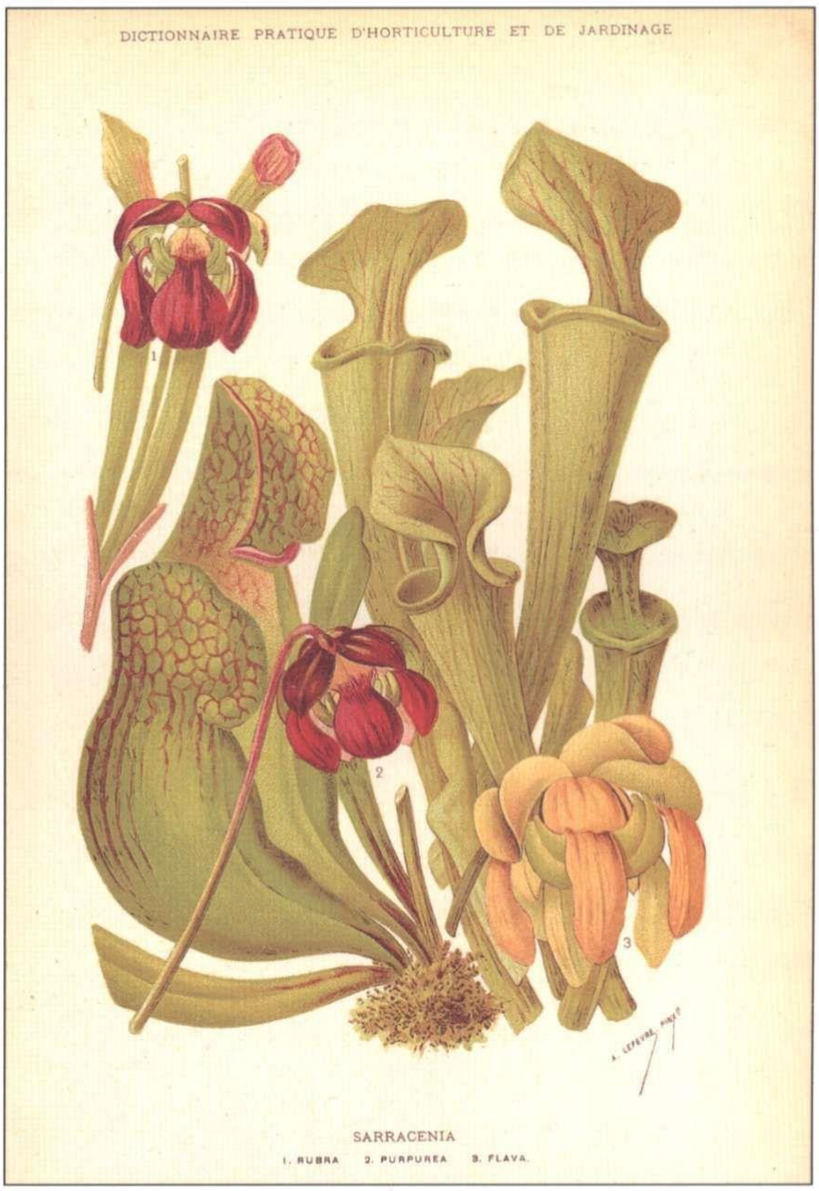
THE AMERICAN PITCHER PLANTS

(*SARRACENIA*)



French print of *Sarracenia*

BEAUTIFUL AND EASY TO GROW, American pitcher plants may be the most ravenous and underappreciated plants in horticulture. The bizarre and often handsome leaves can sometimes catch thousands of nasty insects such as ants, flies, and wasps. Their flowers are showy, brilliant, and very unusual—a wonderful bonus to an already handsome

class of foliage plants. Yet of the few varieties sometimes available on the mass market, tens of thousands die needlessly due to poor handling in countless nurseries, where the plants often go down the dismal path to the compost heap, like millions of Venus flytraps before them. What a shame! The *Sarracenia* are one of the simplest carnivorous plants to grow, and certainly among the most fun and rewarding.

There are currently assumed to be eight species, all of which are confined to the southeastern United States with the exception of one species extending north along the seaboard into the upper midwest and much of Canada. For such unusual and once-common plants, they were slow to be recognized by the early European settlers. The first published illustration was of *S. minor* from Florida in 1576. In 1700, Tournefort described *S. purpurea* from plants sent to him by Dr. M. S. Sarrazin of Quebec, and Linnaeus followed his lead, naming the genus *Sarracenia* in 1731. William Bartram, in a 1793 book about his travels in the southern United States, first mentioned the vast quantity of insects caught in the pitcher leaves but doubted that the plants could benefit from them. Darwin suspected their carnivorous nature but did not study them. It was in 1887 that Dr. Joseph H. Mellichamp's research ultimately proved *Sarracenia* eats insects. The general knowledge of the plants was greatly extended by the field and laboratory studies of Dr. Edgar Wherry in the 1930s, and more recently by Drs. Donald Schnell and Frederick Case. There is still some controversy over the natural species and subspecies status of the genus. Here I will follow the general conclusions of Schnell.

A wet meadow of white trumpets in the Florida panhandle. Scenes like this were once abundantly common.

The typical habitat of American pitcher plants is found on the southeastern coastal plain of North America. Scattered individuals or dense colonies are most frequently found in permanently wet, open, grassy savannas, fens, swamps, and similar wetlands. The soils are a

sandy peat, often derived from sphagnum moss. Stands of long-leaf pine or other trees may populate the area, but the pitcher plants will prefer the sunniest areas and avoid the dense shade of trees. In its natural state, these wetlands were frequently the targets of lightning strikes, and the ensuing brush fires kept scrub, bushes, and tree seedling in check, keeping the habitat grassy and open. In the past, Native Americans started fires for a similar purpose, primarily to maintain open fields for the ease of hunting deer. The pitcher plants thrived in such areas.

At lease one species *(S. oreophila)* and a subspecies *(S. rubra* ssp. *jonesii)* are severely endangered plants in mountain or foothill remnant wetlands above the coastal plain, in places such as northern Alabama and the North and South Carolina piedmont foothills of the Appalachian Mountains. The northern purple pitcher plant, *S. purpurea* ssp. *purpurea,* is the only species found north of Virginia. Its habitat is primarily wet, acidic sphagnum bogs found in scattered areas of northeastern North America and throughout much of Canada. Ironically, in the Great Lakes area, this plant is also found in wet, marly, alkaline wetlands.

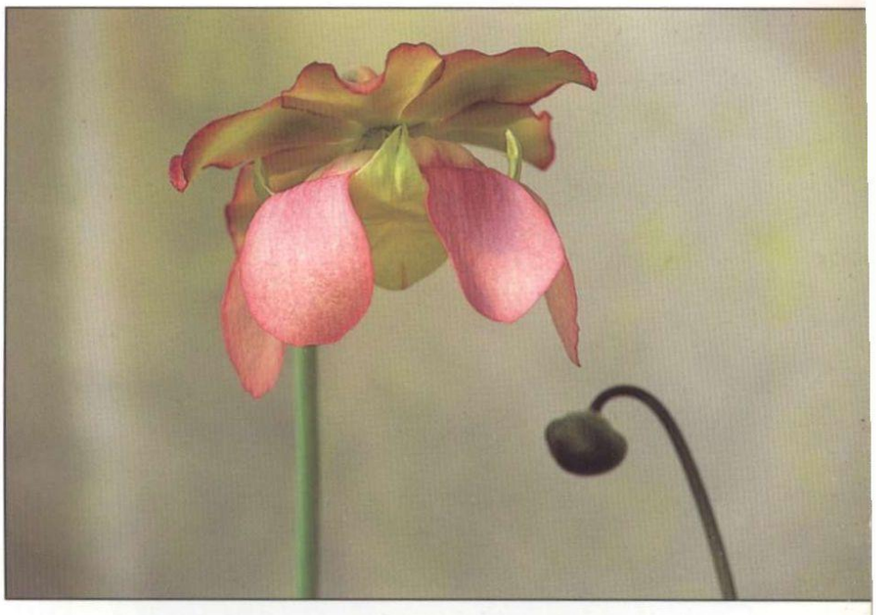
The climate of the southeastern coastal plain is considered warm-temperate. Rain falls throughout much of the year, and summers are warm and humid. Winters are cool and often frosty at night. Occasional brief deep freezes and rarer light snowfall also occur. In its northern range, *S. purpurea* ssp. *purpurea* experiences extremely frigid winter conditions, often with a lot of snow.

The seeds of *Sarracenia* are usually dispersed in autumn. In late winter and spring of the following year, they begin to germinate as the weather warms. By the end of the first year's growth the seedlings will have tiny pitcher leaves one or two inches long. A typical plant takes around five to eight years to reach maturity. Over the years, individual plants develop a thick, branching underground rhizome, from which several growing points emerge.

The annual growth cycle of mature plants begins after winter dormancy. Most plants start the season by flowering. Each growing point will send up one bloom on a one-to-three-foot-high stalk. The first pitcher leaves appear from the rhizome soon after the developing flower bud, but the plant flowers first, before any pitchers open. They wouldn't want to eat their pollinators!

The flowers are showy, and depending upon the species may be

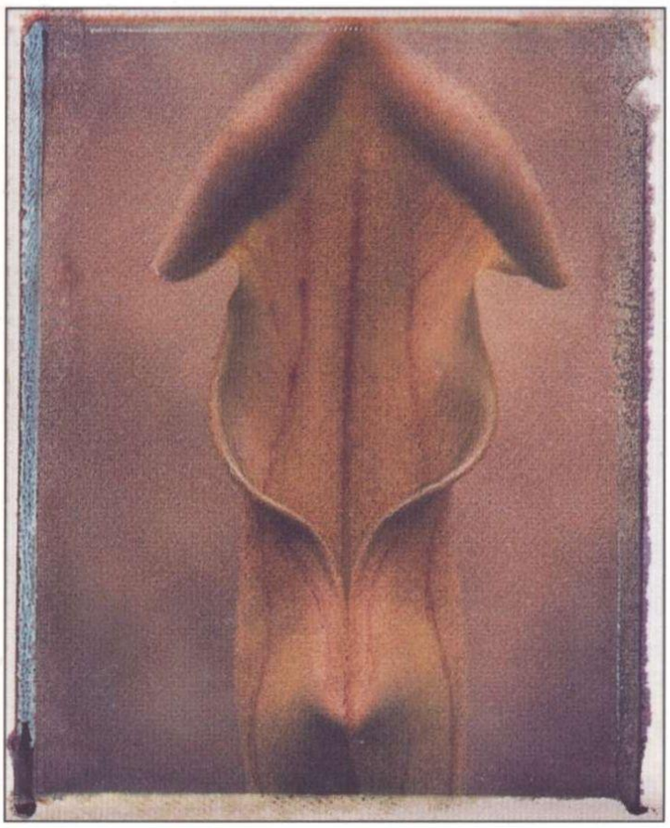
from one to over four inches in diameter. The flowers hang upside down from the tall stem. The five petals, from one to several inches in length, hang pendulously from the bloom. Four of the eight species have yellowish petals; the other four have various shades of red petals. The flowers are rather unusual and beautiful, and most are in bloom from one to two weeks. Bees are the primary pollinators. Each species flowers at slightly different times between late February and May. In areas where two or more species grow together, this usually eliminates cross pollination of species. However, quite often two or more species may flower at similar times, often resulting in swarms of hybrids. Hybrids of *Sarracenia* species occur fairly frequently in the wild. At the turn of the century, many commonly found hybrids were thought to be species.



The flower of *Sarracenia purpurea* ssp. *venosa*

Almost all of the species have flowers that are scented. The aroma may be strong or mild, sweet to musty. As the petals drop off, the ovary and style remain all summer as the seed develops for autumn release. The fruit or seed pods are so often attractive in their own right that many people assume them to be flowers even though they have lost their colorful petals.

It is after petal-drop that the first pitcher leaves of the season open for business. The difference in the structure and trapping mechanism of the various species is rather dramatic and will be described later. But generally speaking, insects are lured to the leaves by a combination of nectar and color. It is generally assumed that a drug in the nectar strongly assists in the trapping of prey. A drug called coniine has been isolated from the nectar of *S. flava.* This narcotic causes paralysis and eventually death to those insects drinking enough of it. While most American pitcher plants catch insects in a pitfall method, where the prey fall into tubular leaves from which they cannot escape, at least one, *S. psittacina,* catches victims with a one-way trap, while another, *S. purpurea,* drowns its prey.



A pitcher of *Sarracenia flava* opening for business.

Pitcher leaves are produced from spring until late summer or early autumn. Some species produce leaves more or less on a continuing basis throughout the growing season. Others will send up their leaves in crops: spring, early summer, and late summer. The individual leaves are in prime condition for a period of time ranging from several weeks to a couple of months. After this period they begin to deteriorate, often filled with insects. After the autumn equinox most species stop leaf production and by winter are in a dormant state. Usually all leaves brown and decompose over winter, although some species may hold on to some of their leaves during this time, only to lose them rapidly when spring growth resumes, as with *S. purpurea.*

Insects that encounter the purple pitcher plant, *S. purpurea,* drown in collected rainwater, where they slowly decompose by bacterial action and weak enzymes. All of the other species trap their prey in tubular leaves, near the bottom of which digestive acids and enzymes are produced and secreted more heavily as more insects are caught. Microorganisms also play a part in digestion. The soft parts of the insects break down, and the plant slowly absorbs this nutritious soup, gaining nitrogen, potassium, phosphorous, and other trace elements that are lacking in the plant's soils. Research indicates these minerals play heavily on the plant's ability to flower and set seed.

Authorities estimate that less than 5 percent of the original *Sarracenia* stands remain in the southeast.

THE PURPLE PITCHER PLANT

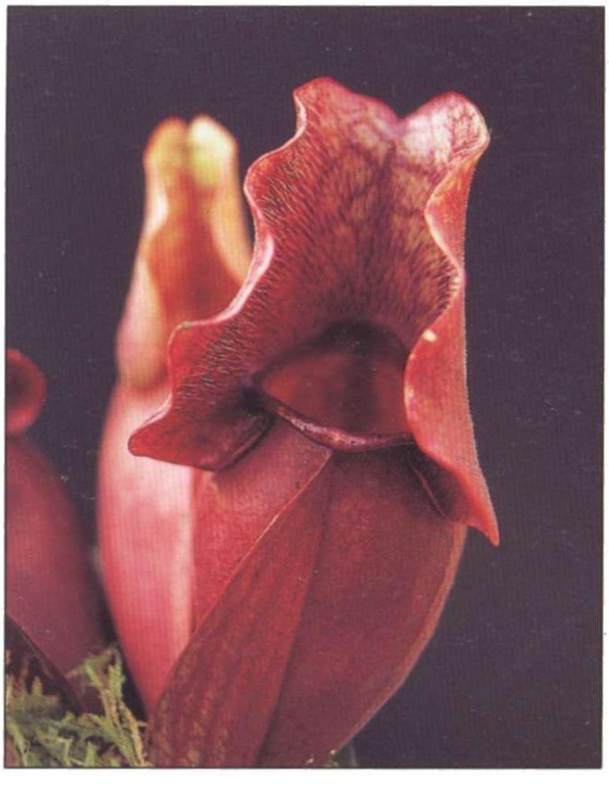
(SARRACENIA PURPUREA)

Sarracenia purpurea has the widest range of any American pitcher plant, and is divided into two subspecies, one variety, and several forms.

In all of the plants the pitchers are decumbent, more or less sitting on the ground in a rosette fashion. The length of the leaves can be from a few inches to over a foot in length. The hollow leaves resemble colorful, flared cornucopias. A large, often undulating collar is open to the sky, allowing rainwater to be collected by the leaf, unlike the leaves of other *Sarracenia*. This collar is also covered in bristly, downward-pointing hairs. Insects often cling to and slip from these hairs, which are wet with nectar. The prey tumble into the water below, where they drown.

The subspecies known as *S. purpurea* ssp. *purpurea* is sometimes called the northern pitcher plant. Its range is throughout much of Canada, the Great Lakes region, and the eastern seaboard from Newfoundland south to New Jersey, where it meets its southern subspecies. It has also been introduced and naturalized in some regions of Europe. The pitchers are narrower than those of its plumper sister to the south, and are often more numerous and more densely packed. They frequently last through the most frigid winters.

Normally a denizen of acid sphagnum bogs, the form ruplicola is found in alkaline fens around the Great Lakes, where the smaller pitchers take on a more brittle consistency. These plants revert to normal when moved to acid conditions. The flowers have red to purplish petals, and the plants may bloom in midsummer in its most northerly range. The form heterophylla is an uncommon strain in which the all-red color is absent—instead, the pitchers and flowers are entirely yellowish green.



***Sarracenia purpurea* ssp. *venosa* "red form"**

S. purpurea ssp. *venosa* is the southern subspecies of the plant, and the one most commonly found in cultivation. Its range begins in the New Jersey Pine Barrens, where intermediates between it and *S. purpurea* ssp. *purpurea* occur. From New Jersey, the plants grow south along the coastal plain to Georgia. There they continue west (with a gap in central Georgia) across Alabama, the Florida panhandle, Mississippi, and into Louisiana.

The southern purple pitcher plant produces leaves much more robust than its northern cousin, appearing fatter and broader and often with fewer leaves. The pitchers are usually green with red venation, but there have recently been found all-green plants much like in the far north, which are also called form heterophylla. Throughout its range, a common genetic variant produces solid maroon or red leaves, which is very popular in cultivation. While the flowers of *S. purpurea* ssp. *venosa* are typically red, the plants along the Gulf Coast consistently have oval pinkish petals, sometimes variegated with white, and a pale green to white umbrella style. For many decades these forms were nicknamed "Louis Burke" after a horticulturist who once grew them. Dr. Donald Schnell has given this race the varietal name "burkei", as it is a true genetic form quite distinct from the Carolina plants.

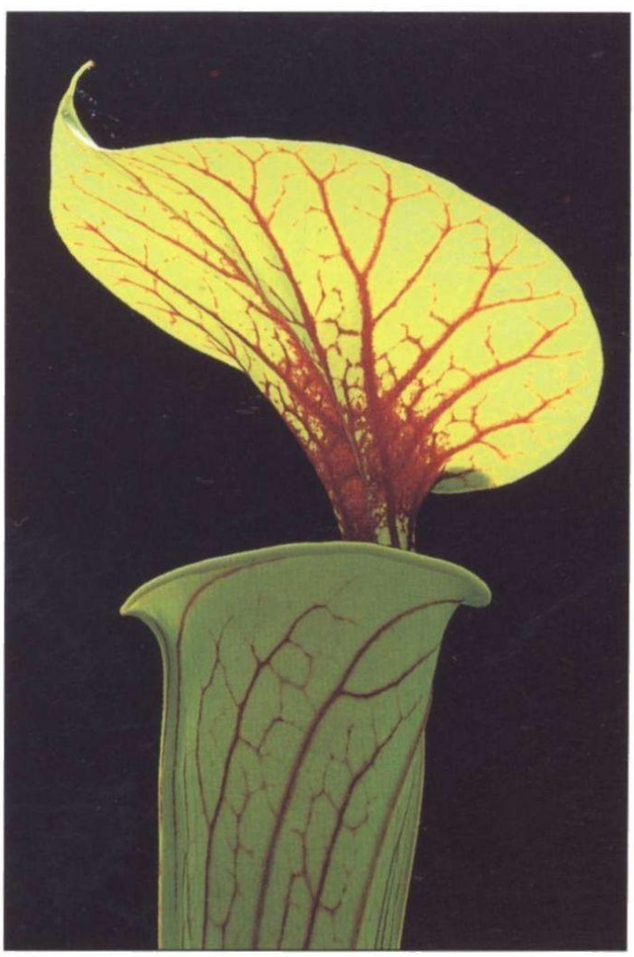
The flower of *Sarracenia purpurea* ssp. *venosa* var. *burkei*

The purple pitcher plant is often the first Sarracenia species the hobbyist encounters. Although a poor insect catcher compared to other species in its genus, its beauty and compact size make it a popular mass-market plant, second only to the Venus flytrap. The species is so variable, many collectors hunt out exceptional forms. To my knowledge, the only cultivar in existence is *S. purpurea* ssp. *venosa* 'Red Ruffles'. This plant produces short, squat, maroon leaves that are almost held upright by the leaf petiole, and have a highly undulating collar. 'Red Ruffles' is also known to produce numerous offshoots over time, developing dense clumps of pitchers. It is my own selection from a plant given to me by Don Agnostinelli of California State University in Sacramento. See the photograph in the section below on "cultivars."

The Yellow Trumpet Plant
(*Sarracenia flava*)

Sarracenia flava is another highly variable pitcher plant, and is second in popularity after *S. purpurea*. Named for its large tall flowers with long, pendulous, bright yellow petals, it occurs from southern Virginia, where it is almost extinct, south along the coastal plain to extreme northern Florida, and then east to Mobile Bay, Alabama. Plants have been introduced into areas such as eastern Pennsylvania with some success.

S. flava produces erect, tall pitchers from around twenty inches to thirty-six inches, and occasionally taller. The species is often one of the first to flower, sometimes as early as late February in its southernmost range. The best pitchers are usually grown in spring and summer, although some varieties continue pitcher production until early autumn. This species is one that produces secondary leaves known as phyllodia, which look similar to flat, straight iris leaves. Phyllodia usually appear in late summer and can remain on the plant through winter, long after the pitchers have deteriorated.



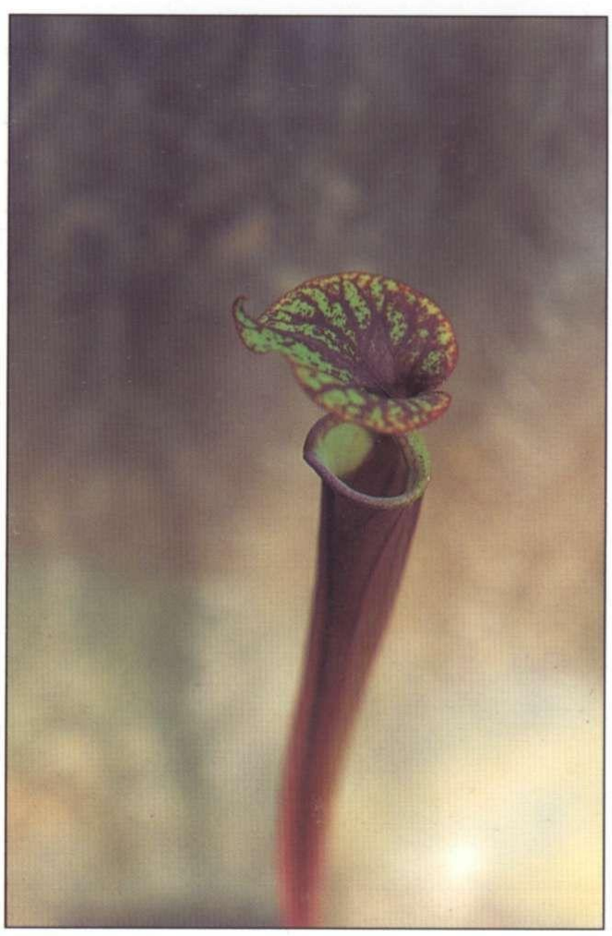
***Sarracenia flava* "veined form"**

The pitchers themselves are rather handsome. They appear as elongated, narrow funnels with a flared mouth and rather broad lip, or peristome, and a narrow neck that holds erect the large, almost horizontal lid. Unlike *S. purpurea*'s collar, this lid effectively keeps out most rain, and acts as a landing platform for flying insects. Crawling insects follow nectar trails up the pitcher's length, particularly along the reduced ala at the leaf's front seam. Various color patterns lead the prey to the most treacherous parts of the leaf. Insects appear quite intoxi-

cated by the time they are in the vicinity of the wide mouth, under the lid, or at the neck where the foothold is rather slippery. Drunk insects fall down the narrowing tube. The beating of wings may cause a vacuum in the pitcher, sucking it down further.

The interior is so waxy smooth the insects rarely can maintain foothold. Downward-pointing, needle-like hairs are found at its deepest point. Digestive juices are secreted by the plant in the lowest portions of the trap, and the level of this liquid rises as more insects are caught. The first victims typically drown in this fluid, which dissolves them down to their exoskeletons. Yellow trumpets may catch such enormous quantities of insects, the pitchers may topple from the weight. Flies, ants, wasps, beetles, and moths are the most common prey.

Although no subspecies have been named, there are several naturally occurring varieties known to exist, plus an assortment of forms grown by hobbyists who often bestow nicknames upon them. The taxonomy of these plants is in much confusion. Names used by collectors for years have been shown to be incorrect, and similar plants may be known by different names in different countries. Add to this many artificially produced hybrids between the forms, and the confusion becomes rather acute. Below is a small attempt at sorting all this out.



***Sarracenia flava*, a red tube form**

"Typical form"

Found naturally throughout its range, the pitchers are primarily green with a large red splotch at the throat. Incorrectly known as 'Rugelli' and 'Maxima'. Commonly called "cut throat" or "red blotch."

"Veined form"

The pitchers are green with red veins over much of the leaf, and a concentration of red color at the throat. Veining is variable, from light to heavy. Naturally occurring in the Carolinas. The 'Heavy Veined' forms are most desirable. One form is called "Ornata."

"Coppertop"

is the common name of this Carolina variety, in which the lid and upper pitcher have a coppery red coloration with heavy red veins throughout.

"All Green form"

This tall form from the Carolinas lacks any red pigment in the pitchers, although the phyllodia may have faint tints of red. This is the true 'Maxima' named in the late 1800s.

"Red Tube form"

This popular variety comes from the Florida panhandle. The exterior tube is richly red in color, while the lip, throat, and lid are green with red veins. Sometimes much of the lid is reddish as well. The color temporarily fades when the plant is moved, or may fade late in the season. Commonly called "Burgundy," in England, by Adrian Slack, and "Atropurpurea" in the United States.

"All Red form"

Another rare Carolina plant, in which the whole pitcher is a stunning deep red. Unfortunately, this maroon color is difficult to maintain in cultivation, and plants often end up looking like a reddish "Coppertop."

Adrian Slack, a British nurseryman and author, mentions a few varieties grown primarily in England. 'Claret', which he introduced into cultivation, he describes as being tinted maroon with heavier red veins. I grow his handsome but incorrectly named cultivar 'Maxima', an unusual lightly veined plant notable for a bluish gray tint in the phyllodia and lower pitcher. 'Marston Dwarf', a cultivar chosen by Slack, produces clumps of heavily veined pitchers not more than twelve inches high. If anyone is still growing this latter plant, please contact me, and name your price!

The Sweet Trumpet

Sarracenia rubra

Sarracenia rubra is a species with a long and controversial history that is still debated today. Currently the plants are divided into five subspecies. Some botanists argue that a few of these are species in themselves, while others point out that the similar flowers of all tend to indi-

***Left to right: Sarracenia rubra* ssp. *rubra*, *S. rubra* ssp. *gulfensis*, *S. rubra* ssp. *jonesii*, *S. rubra* ssp. *wherryi*, *S. rubra* ssp. *alabamensis*, and *Sarracenia alata*.**

cate one rather variable group. There are also plants that are clearly *S. rubra* but don't seem to fall under any yet defined group.

As a whole, the plants are generally clump-producing trumpets that are comparatively smaller in stature than some of their cousins. *S. rubras* are notable for their small, bright red to dark red flowers—some of which are fragrant to variable degrees, hence the common name. The scent of some is reminiscent of roses or, as some collectors have noted, cherry-flavored Kool Aid. Since the rhizomes commonly branch into multiple growing points, not only are masses of pitcher leaves produced, but the multiple flowers in spring, added with their perfume, can make a showy spectacle.

All of the subspecies produce two types of pitchers. In the spring, the pitchers are generally small, somewhat floppy, and snakelike, looking remarkably similar among the different forms. The summer pitchers are much more erect and robust, and all are highly veined in fine red venation.

The insect-catching mechanism is rather similar to the other upright trumpet species. The prey are lured by color and nectar to the area of the mouth, where the insects fall down the lanky, narrow tubes.

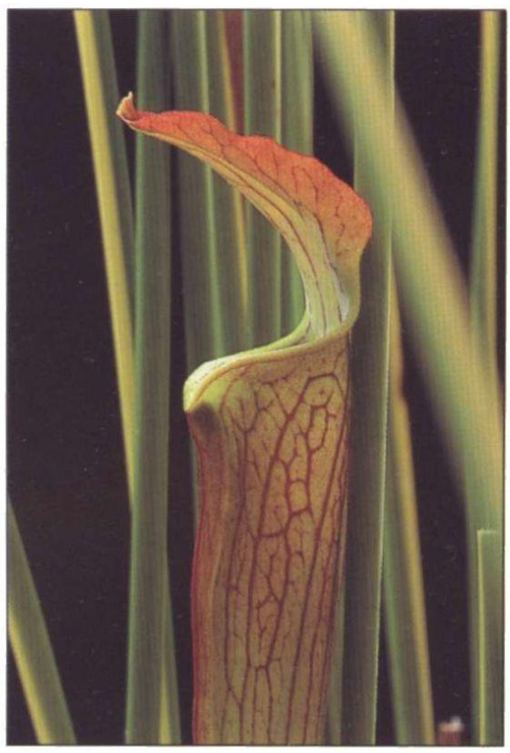
S. rubra ssp. *rubra*

This most popular subspecies has highly fragrant flowers. The summer pitchers are narrow, highly veined, with a short pointed lid, and reach a height of twelve to eighteen inches. From eastern North Carolina and South Carolina.

S. rubra ssp. *jonesii*

This very endangered species is virtually extinct in its mountainous habitat of North and South Carolina. Notable for its handsome pitchers, which are rather similar to ssp. *rubra* but with a noticeable bulge in their

upper parts. The flowers are particularly sweet smelling and are a very bright red color. The pitchers can be over twenty-four inches tall. This variety is especially cold hardy.



Sarracenia rubra ssp. *wherry*

S. rubra ssp. *gulfensis*

A plant from the Florida panhandle, the pitchers are tall and superficially resemble ssp. *jonesii,* but can be more variable. The large lid undulates slightly. The flowers have a weak scent.

S. rubra ssp. *alabamensis*

Also known as *S. alabamensis,* this plant is endangered and only found in a small area north of Montgomery, Alabama. The pitchers are robust and stocky, with a large lid that has very wavy margins. Up to twenty inches tall.

S. rubra ssp. *wherry*

Rather similar in appearance to ssp. *alabamensis,* this plant is limited to southern Alabama. The undulating lid may be tinted red. The flowers are very fragrant.

The Pale Trumpet

(*Sarracenia alata*)

Sarracenia alata occurs naturally in a somewhat broken range from southern Alabama west along the Gulf Coast into eastern Texas. Its unique flowers are the palest of yellow to almost pure white, hence its common name.

The pale trumpet, *Sarracenia alata*

The upright trumpets are generally green with much red venation, and can be thirty inches tall. The pointed lids are not as flared as in *S. flava,* but are held more closely to the mouth with a wider column or neck, rather similar to *S. rubra* ssp. *rubra.*

There is some strong variability in this species, with the most colorful forms fur-

ther west in its range. Near Mobile Bay, some of the populations have stockier pitchers that are covered with a soft, fuzzy hair, and are often referred to as "pubescent." Further west, in Mississippi, the plants often have a reddish bronze coloration in the upper pitchers. But it is in Texas that the most stunning variants occur. ("Nigra purpurea") is a form in which the throat and underside of the lid can become such a dark red color, it nearly approaches black.

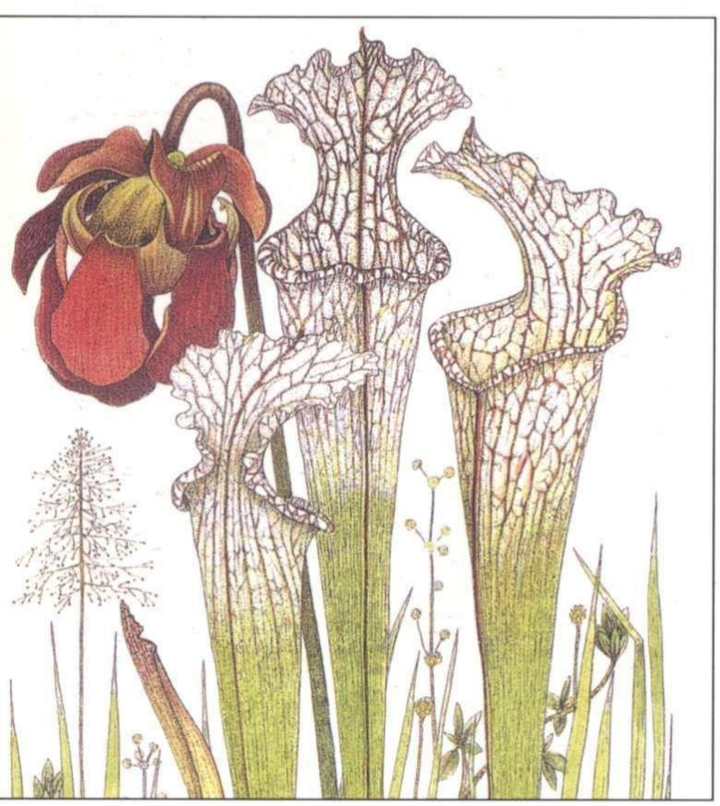
THE WHITE TRUMPET

(*SARRACENIA LEUCOPHYLLA*)

Considered by many to be the most beautiful of the American pitcher plants, *S. leucophylla* grows from southwestern Georgia to southern Mississippi, being most abundant in the Florida panhandle and southernmost Alabama.

The flowers are large and red. The pitchers are green in their lower parts, while the upper pitcher, mouth, and lid are a pure, bright white, heavily laced with a network of veins. Pitchers can top thirty-six inches.

The plants are rather variable. In some populations the veining can be rather coarse, while in others it appears as a thin netting. There are color differences as well in the veins—from green to the darkest burgundy. Hence plants may be given nicknames to describe them, from "Green and White" to "Typical" to "Red and White." One green-and-white variety is a true genetic form lacking any red-colored genes, as the flowers are yellow. It has been called "Schnell's Ghost" by hobbyists.



White Trumpets

S. leucophylla generally sends up two crops of pitchers. The spring set, with thinner pitchers, is the weaker of the two. In early summer a few phyllodia are grown. But the species is truly at its best in late summer and early autumn. It is then that robust

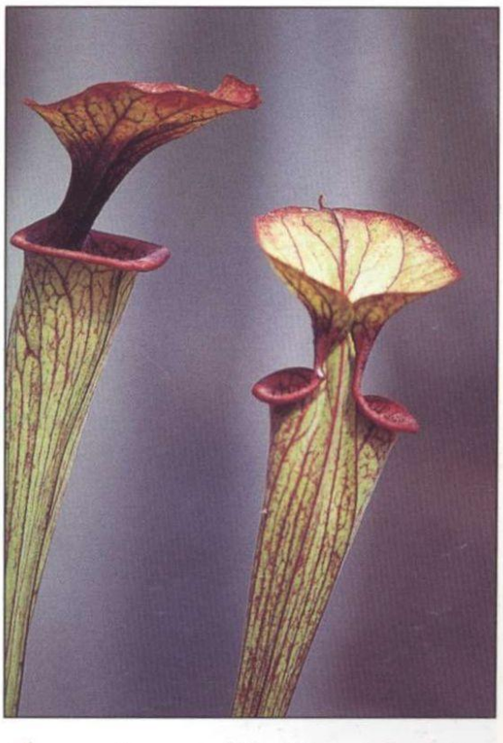
pitchers appear, being in prime condition until the first frosts occur, often as late as early December.

White trumpets are most attractive to their insect prey, and when the pitchers open they are often filled to the brim much faster than other *Sarracenia*. The highly decorative pitchers, with their hair-lined ruffled lids, are often sold as cut flowers for floral arrangements. This practice is controversial, as the leaves are often removed en masse from the rapidly disappearing wild populations.

A green-and-white form of *Sarracenia leucophylla*

The Mountain Trumpet
(*Sarracenia oreophila*)

On the verge of extinction, *Sarracenia oreophila* manages to survive in only a handful of populations in central and northeastern Alabama, and in the mountainous areas where Georgia, North Carolina, and South Carolina meet. It was once more populous but always considered rare, and may soon disappear from the wild.



***Sarracenia oreophila* 'Don Schnell,' a cultivar named by the author**

The plant is unusual in that the pitchers are primarily produced in spring and early summer. By midsummer its natural habitats often become somewhat drier, and the pitchers wither and are replaced by strongly curved phyllodia. This carries over in cultivation even when the plants are kept very wet.

The flowers are yellow. The pitchers, vaguely similar to *S. flava* except for the more broadly opened mouth, wider neck, and somewhat dome-shaped lid, grow to about twenty-four inches tall. Typically the plants are green with light red venation, but some varieties, particularly from the Sand Mountain

The hooded pitcher plant

The drooling nectar of *Sarracenia minor* lures insects to the edge of doom, while the light windows offer a false hope of escape.

plateau in Alabama, are so richly colored and veined they are much sought after by hobbyists.

Two points are notable with this rare species. One is its cold hardiness, as its mountain habitat will see snowfall more regularly than will other *Sarracenia* on the warmer coastal plain. Temperatures briefly down to zero degrees are not unheard of. The second is the plant's capacity to add vigor to offspring when hybridized with other species of *Sarracenia*. Hybrids with *S. oreophila* can attain stunning coloration and spectacular size.

THE HOODED PITCHER PLANT (*SARRACENIA MINOR*)

S. minor is a curious-looking and widespread pitcher plant. Its range is along the coastal plain from southeastern North Carolina south into much of the Florida panhandle and all of the northern half of Florida. Recently, populations have been found as far south as Okeechobee County, making it the most southern-growing member of its genus.

The unusual pitchers of *S. minor* have an almost grinning, monkish appearance. In most of its range the leaves average around twelve inches in height. The tubes are smooth with a wide ala at the front seam. The lid of the pitcher forms a domed canopy over

the mouth. On the upper portion of the back side of the pitcher are many opaque light windows. The pitchers are generally green with a coppery red coloration along the upper parts when grown in full sun.

Trapping of prey is rather unique. When insects are lead to the lip of the mouth by nectar trails, they find themselves in a rather darkened position, due to the overhanging hood. Crawling insects are encouraged to enter the trap where it is much brighter, due to sunlight shining through the windows. Flying insects are fooled into believing the windows are escape hatches. The crawling prey find no foothold on the waxy interior of the hood, while the flying ones slam into the windows for a stunned surprise. Either will tumble helplessly down the narrowing tube and into digestive juices below. In the wild, hooded pitcher plants seem most attractive to ants, although a large buffet of flying insects are lured and eaten, too.

The flowers are medium-sized and of a pleasant, buttery yellow. Unique among *Sarracenia,* the spring flowers often open simultaneously with the first leaves of the season.

Hooded pitcher plants are mildly variable over their range. Some populations have thinner, stiffer pitchers, while others may be plump and soft. The exception are plants from the Okefenokee Swamp in southern Georgia. Here, often growing on floating mats of sphagnum moss, the plants can attain a startling size of three or four feet in height. In cultivation, *S. minor* "Okee Giant," as it is called, more commonly reaches a still impressive height of thirty to thirty-six inches.

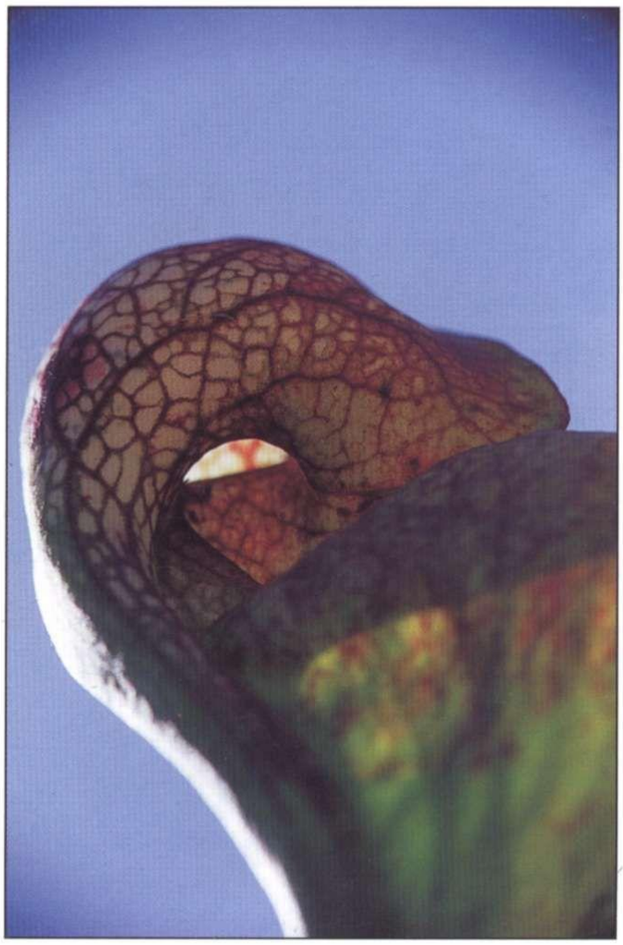
The Parrot Pitcher Plant

(*Sarracenia psittacina*)

Unlike any other plant in its genus, *Sarracenia psittacina* seems to have more in common with its distant Pacific coast relative *Darlingtonia* than with a typical trumpet plant.

Parrot pitcher plants have an affinity for wetter, low-lying areas of swampy savannas, and are often flooded by heavy rains. The species grows along the coastal plain throughout southern Georgia, the Florida panhandle, and west into southern Mississippi.

The pitcher leaves are decumbent, lying in a rosetted pattern pressed along the ground. The elongated tubes have a large, wavy ala, and end in a hollow, puffed hood that is rather beaked, hence its com-



The entrance of a beaked leaf of the parrot pitcher plant. Upon entering this doorway, an insect is assured a painful death.

mon name. Under the beak, where the nectar-baited ala ends, is a small circular opening. Inside of the inflated hood, this opening is surrounded by a collar, making it not unlike a minnow trap or lobster pot. The back side of the hood and upper part of the narrow tube is laced with numerous light windows, similar to those of *S. minor and Darlingtonia.* The interior of the tube is lined with extra-long, intermeshed, needle-like hairs, all pointing towards the base of the leaf.

Prey caught by this plant suffer a hideous death. Once inside the hood, the exit is difficult to find due to the puckered collar. Insects thus enter the brighter tube lighted by the windows. However, there is no retreat, for to back out means to be painfully pierced by the numerous needle-like hairs. The victim has no choice but to proceed into the digestive acids in the lower part of the pitcher.

That the parrot pitcher plant catches aquatic animals when underwater is known by the numerous tadpoles and other swimming creatures found in the leaves after a flood. When the water recedes, the plant resumes catching ants, slugs, and other crawling things. Flooding the plant in cultivation is not necessary for good growth.

The small flowers are red and have a mild, sweet aroma. The plants are variable in nature, mostly in color and leaf size. Some leaves are mottled in green, red, and white, while other forms may have extra large hoods of predominantly red and white coloration. Typically, a pitcher is five to eight inches in length, but within some populations, as in Mississippi and the Okefenokee Swamp, the leaves can be over twelve inches long with particularly globose hoods. There is also an all-green form with yellow flowers, as there are with most other *Sarracenia* species.

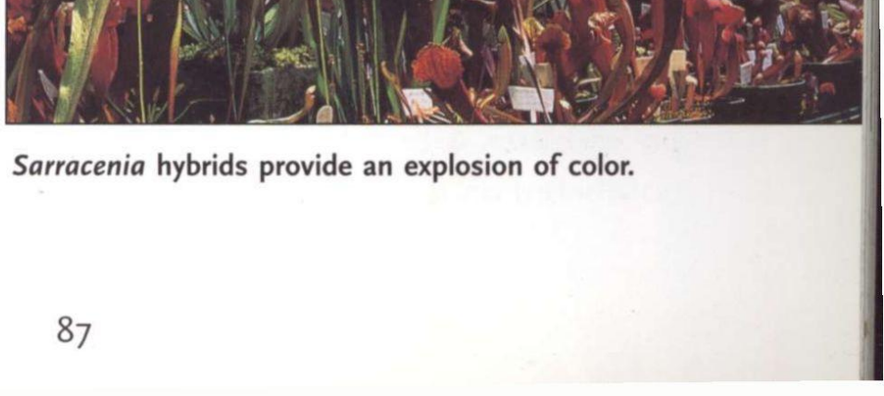
Sarracenia Hybrids

American pitcher plants are unusual in the plant world because the species can be readily hybridized, and these offspring are not sterile, as with most other plants, but are capable of being self-pollinated or hybridized even further.

This situation can be vexing to the field botanist, as it was in the last century, when many natural hybrids were thought to be species, and in fact were given Latin names. But to the horticulturist the ease of hybridizing *Sarracenia* is both fun and exciting, as the results are often beautiful. Further, when one takes into account the already intriguing forms of some of the more complex crosses already existing and projects into the future the additional possibilities as hybridization programs become more serious and popular, the results will probably be utterly fantastic. As with orchids and roses and African violets, there is no end to the possibilities. Carnivorous vegetable gargoyles may be the future of *Sarracenia,* with carefully selected breeding.

In the wild, where two or more species are found growing together, the differing flowering times usually keep hybrids in check. But now and then the flowers of different species coincide, and the result may be scattered hybrid offspring or the occasional hybrid swarm. Add to this future backcrossing, and the result in some stands may be pitcher plants of very confused ancestry.

Because some of the common natural hybrids were once given Latin names, as if they were a separate species, these names have remained in use. These are names of convenience, and most modern growers will also know them by their correct species name. Thus *S. leucophylla* x *rubra* is also called *S.* x *readii.* (See the sidebar on page 105.)



***Sarracenia* hybrids provide an explosion of color.**

For many decades, very few people were hybridizing *Sarracenia* and horticultural crosses rarely went much

beyond simple liaisons. Also, when a cross was done, it was usually known by its parentage. In other more advanced plant hobbies, as with orchids, a complicated system of registering hybrids is usually set into place: all new crosses are given fancy names and registered with the society, and if a particular seedling merited distinction, a cultivar name would be given to that single plant.

This is so only halfway with carnivorous plants. When a cross is made, no matter how complicated, all the seedlings are still referred to by its heritage, such as *S. (leucophylla* x *rubra)* x *(purpurea* x *flava)*. However, if a single seedling of this cross seems to merit distinction, then it can be given a fancy name and registered as a cultivar (cultivated variety) with the International Carnivorous Plant Society (ICPS).

Sarracenia purpurea* x *flava

If this sounds confusing, it is. Laws pertaining to the naming of artificially produced plants could fill a whole book, and here I can only present the most basic information. Eventually, as the hybridizing of *Sarracenia* becomes more and more complex, it will be impossible to call resulting plants by their ancestry, and growers will have to begin following laws similar to those followed by orchid growers. Thus complex crosses will be given fancy names for all resulting offspring, and fancy cultivar names given only to those rare, outstanding individuals that should be only reproduced vegetatively, to preserve their unique characteristics. Until the ICPS can take on the burdensome task of registering all crosses, and not just cultivars, the situation will likely remain controversial.

In the meantime, I would strongly suggest that anyone hybridizing the plants be careful to keep good labels and records of the crosses. Eventually pedigree will not be so important to the collector who simply admires a beautiful plant. But even if a plant is merely coded or numbered on its label, do keep file cards recording as much known data

about the history of the plant as possible. For helpful tips on record keeping, see page 90.

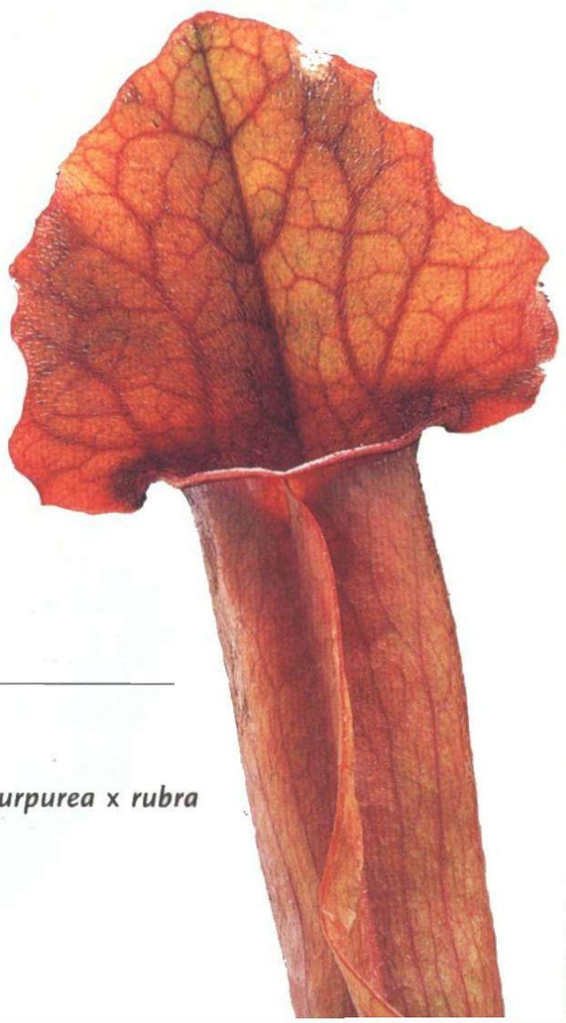
Actual pollination techniques will be covered below under "Propagation." Here I will discuss what you can expect with the general results of hybridizing, as well as a few simple descriptions of some of the more popular representative crosses.

Remember that under the laws of genetics, 50 percent of the offspring will generally look intermediate between both parents, while the remaining plants will lean more toward one parent or the other. Variability is the rule, and extremes are certainly common, particularly when the ancestry of a plant is complex.

SIMPLE *SARRACENIA* HYBRIDS

Below are the Latin names of simple* Sarracenia *hybrids found in the wild.

S. x catesbaei	=	*S. purpurea x flava*
S. x moorei	=	*S. flava x leucophylla*
S. x popei	=	*S. flava x rubra*
S. x harperi	=	*S. flava x minor*
S. x mitchelliana	=	*S. purpurea x leucophylla*
S. x exornata	=	*S. purpurea x alata*
S. x chelsonii	=	*S. purpurea x rubra*
S. x swaniana	=	*S. purpurea x minor*
S. x courtii	=	*S. purpurea x psittacina*
S. x areolata	=	*S. leucophylla x alata*
S. x readii	=	*S. leucophylla x rubra*
S. x excellens	=	*S. leucophylla x minor*
S. x wrigleyana	=	*S. leucophylla x psittacina*
S. x ahlesii	=	*S. alata x rubra*
S. x rehderi	=	*S. rubra x minor*
S. x gilpini	=	*S. rubra x psittacina*
S. x formosa	=	*S. minor x psittacina*



Sarracenia purpurea* x *rubra

RECORDKEEPING

Below are suggested codes for use with* Sarracenia. *I have slightly amended Adrian Slack's codes from his book* Carnivorous Plants. *The general idea is to reduce the Latin name to one or two letters. Where subspecies, forms, and varieties are involved, an additional letter or two is added. Space will not allow me to list all of the varieties.

p	=	*purpurea*
pp	=	*purpurea ssp. purpurea*
pv	=	*purpurea ssp. venosa*
pvb	=	*purpurea ssp. venosa var. burkei*
f	=	*flava*
fc	=	*flava* "Coppertop"
frt	=	*flava* "Red Tube" or "Burgundy"
ft	=	*flava* "Typical"
fv	=	*flava* "Veined"
r	=	*rubra*
ra	=	*rubra ssp. alabamensis*
rg	=	*rubra ssp. gulfensis*
rj	=	*rubra ssp. jonesii*
rr	=	*rubra ssp. rubra*
rw	=	*rubra ssp. wherryi*
a	=	*alata*
an	=	*alata* "Nigrapurpurea"
l	=	*leucophylla* "Typical"
lr	=	*leucophylla* "Red and White"
lg	=	*leucophylla* "Green and White"
o	=	*oreophila*
osm	=	*oreophila* "Sand Mountain"
m	=	*minor*
mg	=	*minor* "Okee Giant"
ps	=	*psittacina*
psg	=	*psittacina* "Giant"

The Simple Hybrids

Many of these can be found in the wild. All are greatly influenced by the subspecies, forms, or varieties of the parents. The following are plants with rather unique characteristics.

S. purpurea x *flava*

This is probably the most popular hybrid, although it is not a particularly good insect catcher, and the pitchers can topple if they collect rainwater. The plump pitchers curve upright, the undulating hood highly influenced by its *S. purpurea* parent. The flowers are usually pale red.

S. purpurea x *leucophylla*

Similar to the above, but much more colorful in the hood, which can be ruffled and mottled with pinks, whites, and reds, and highly veined. Red flowers.

S. purpurea x *minor*

An often reddish plant with low-growing curved pitchers that all face inward, and a monklike hood overhanging the mouth. The flowers are a dark orange red.

S. purpurea x *psittacina*

Strange, dark red, ground-hugging pitchers, with an unusual hood that curls inward on either side.

S. flava x *leucophylla*

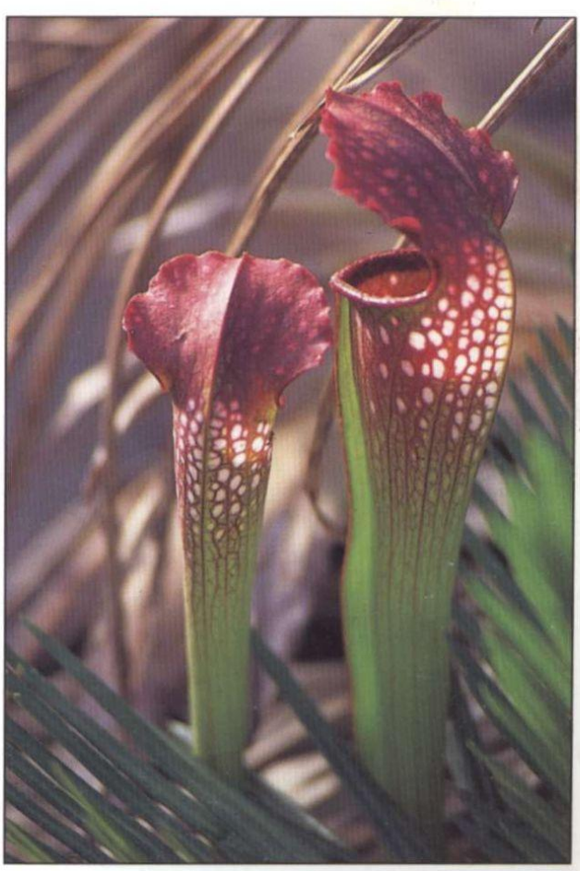
Very handsome trumpets, mottled with extra color in the hood, and with orange flowers. Excellent pitchers throughout the season.

S. leucophylla x *rubra*

Clumps of narrow, colorful pitchers with ruffled lids, heavily influenced by the subspecies of *S. rubra* involved. Many red flowers.

S. leucophylla x *minor*

A very popular cross, with an undulating, overhanging lid, heavily dappled in reds and whites. Orange flowers.



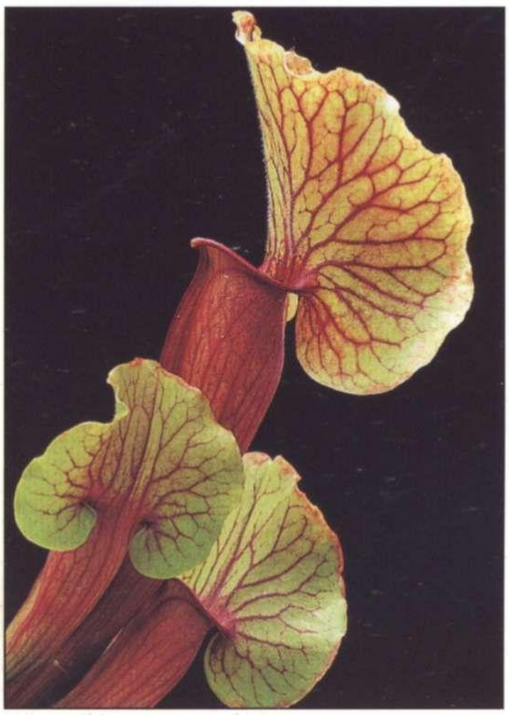
Sarracenia* x *excellens*, the cross between *S. minor* x *leucophylla

S. leucophylla x *psittacina*

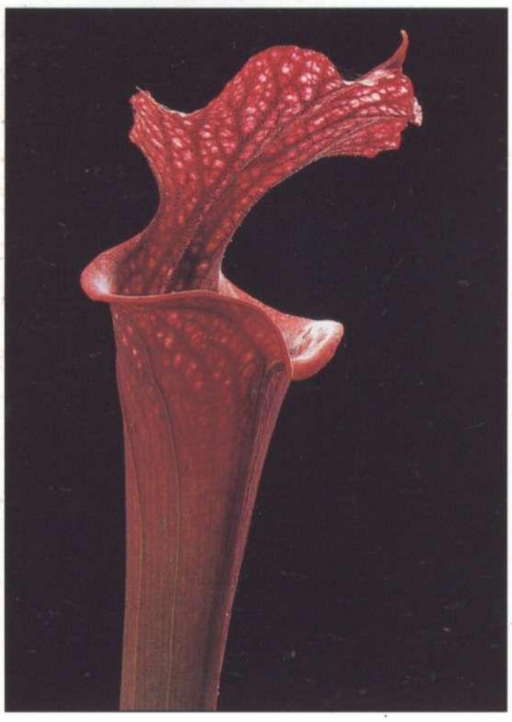
Extremely bizarre, the pitchers are curved with beaked heads. A poor insect catcher, but often very bright and colorful.

S. rubra x *flava*

These crosses usually produce handsome trumpets with rich red venation, and smallish, pale-red flowers.



Hybrids with *Sarracenia oreophila* are often extra vigorous and colorful. This is its cross with *S. purpurea* ssp. *venosa*.



A burgundy form of *Sarracenia* x *moorei*.

Here are some general guidelines concerning the simple hybrids.

Most crosses between the upright trumpet species (*S. flava, S. leucophylla, S. rubra, S. alata,* and *S. oreophila*) produce attractive, tall, and colorful pitchers.

Hybrids with *S. psittacina* can be very weird and low-growing, and are often rather unattractive, as well as poor insect catchers.

The trumpet varieties crossed with *S. minor* inherit the overhanging hood of that species, and can be rather handsome. Light windows can also be inherited.

For color, nothing beats the influence of *S. leucophylla.*

S. oreophila crosses are almost always extra vigorous and beautiful.

Keep in mind the seasonality of the parents. *S. flava, S. oreophila,* and *S. minor,* for example, produce their best pitchers early in the year. *S. leucophylla, S. rubra,* and *S. alata* are often best in later summer. Crosses between these two groups result in strong pitchers throughout the season. *S. purpurea* and *S. psittacina* hold their leaves through winter in fairly good shape, and can influence offspring.

Pay close attention to the forms and varieties of the parents, which can add much beauty compared to the typical species. Among the most outstanding are plants such as *S. oreophila* "Sand Mountain", *S. leucophylla* "Red and White," *S. purpurea* "Red Form"

and 'burkei', *S. minor* "Okee Giant," *S. alata* "Nigra purpurea," and *S. flava* "Red Tube."

When a hybrid is labeled F-2, this means it resulted from a hybrid parent that was self-pollinated, and extremes in variability can be expected.

The more cold-hardy species can produce cold-hardy hybrids: *S. purpurea* ssp. *purpurea, S. rubra* ssp. *jonessi,* and *S. oreophila* pass on cold-tolerance to their offspring.

Although the rules have recently changed, the plant producing the seed is usually listed first in hybrid equations. New laws allow them to be alphabetized.

Complex crosses

You get to use your imagination here! I will only suggest that when labeling or recording your plants, try to use brackets and parenthesis, and use codes as the formula lengthens.

Here is an example of the progress of such hybridization.

First cross: *S. purpurea* x *flava.*

Second cross: *S. (purpurea* x *flava)* x *leucophylla.*

Third cross: S. [(p x f) x l] x *minor.*

If this last cross was the first of its kind, then it would be given a fancy name, such as S. x 'Godzilla'. If carnivorous plants were grown under a system similar to that of orchid growers, S. x 'Godzilla' would then be registered with the society, and anyone later duplicating the cross would have to call it by that registered name. My belief is that eventually the ICPS will organize such a system, and records will be important in order to trace and record the history of complex hybrids and how they should be named. This will be a daunting task, and I offer my best wishes to anyone willing to tackle it. A computer will certainly come in handy!

Sarracenia (purpurea x flava) x flava

Cultivars

This is a mildly easier topic to discuss, but it can still be confusing and many misconceptions can occur.

Cultivar means "cultivated variety."

A cultivar can be any outstanding plant species or hybrid that is so desirable it should be forever propagated only vegetatively—through division or tissue culture—to preserve its genetic makeup and guarantee it is an exact duplicate or clone of the originally selected plant. One cannot propagate cultivars from seed!

Sarracenia (leucophylla* x *minor)* x *(purpurea* x *rubra)

Cultivars can and should be registered with the ICPS, documenting the plant with a photo, description and history, if known. Cultivars are also legitimate if they are published in a book or catalog, and not ICPS.

Cultivars should be given a fancy name, but not in Latin. The name should be preceded by the letters cv. to identify it as a cultivar, or the name should be put into single quotes. On labels or tags it is wise to add the cv. to indicate that the plant is a registered cultivar. Common varietal or nicknames are best in double quotes, as in *S. flava* "Coppertop."

Cultivars among *Sarracenia* are rare but are beginning to gain in popularity. One problem has been the reliance on division to propagate the plants, which can take decades to produce sizable quantities, and thus the plants were often outrageously expensive. However, recent advances in tissue culture has made a once-bleak future look brighter, and I expect many famous and sought-after cultivars will, by the turn of this century, become very affordable and popular.

***Sarracenia* x 'Judith Hindle'.**

Some *Sarracenia* cultivars

S. x *'Willissi'*: Of very confused ancestry, this plant was produced by Vietch and Sons nursery in England in the nineteenth century. A beauty, it has curved, upright pitchers with

a ruffled lid similar to a *S. purpurea* x *leucophylla* cross, but the pitchers are pink initially, turning a deep plum red.

The following seven cultivars were produced by Adrian Slack. Mr. Slack owned Marston Exotics nursery in England before an unfortunate illness caused his early retirement.

Sarracenia x 'Daniel Rudd'

One of Slack's favorites. The bright red flowers can remain in petal for three weeks. The pitchers are coppery chestnut with darker veins. S. [(p x f) x l] x l.

Sarracenia x 'Evendine'

A clone of Slack's cross of *S. leucophylla* x (*flava* x *purpurea*). The pitchers at first are golden green and veined, later turning dark red.

Sarracenia x 'Judy'

Is *S. minor* x (x *excellens*), with a highly domed lid and many light windows.

Sarracenia x 'Lynda Butt'

Of unpublished ancestry. The pitchers are tall and narrow, with a ruffled lid and mottling around the mouth.

Sarracenia x 'Marston Mill'

Slender, olive-colored pitchers, widening to a highly decorative mouth and hood. Its parentage is *S.* [*l* x (*p* x *f*)] x *f.*

Sarracenia x *excellens* 'Lochness'

Another vigorous clone of this common hybrid.

Sarracenia x *moorei* 'Marston Clone'

A vigorous cultivar of the popular hybrid, with pale orange flowers.

Of my own cultivars chosen at California Carnivores, the following are noteworthy.

Sarracenia oreophila 'Don Schnell'

A beautiful clone of the 'Sand Mountain' form of the endangered species.

Sarracenia x 'Abandoned Hope'

This monstrous plant is a clone of a particularly vigorous *S. purpurea* ssp. *venosa* var. *burkei* x *flava.*

***Sarracenia purpurea* 'Red Ruffles.' See its description under the section on the Purple Pitcher plant.**

Sarracenia x 'Judith Hindle'

One of the most beautiful cultivars yet produced, this plant was bred and grown by Alan Hindle, and chosen and named at California Carnivores. The compact pitchers have a wildly undulating hood, and start out green, dappled in whites and yellows. As they age, they transform to deep, dark red. Of the hundreds of CPs in my collection, this clone is probably the most popular. *S.* x 'Judith Hindle's' parents were two separate clones of S. (p x f) x l.

Sarracenia x 'Lamentations'

Of unknown origin, this hybrid has narrow, deeply maroon trumpets with upright, pointy lids.

Sarracenia (oreophila* "sand mountain" x *flava)* x *leucophylla.

Sarracenia x 'Extreme Unction'

Chosen from a cross of *S. m.* x [(*p* x *f*) x *f*], the plump pitchers are green, with a large domed lid netted scarlet, with cathedral-like windows along its back.

Larry Mellichamp of the University of North Carolina at Charlotte, with the assistance of Rob Gardner at UNC, Chapel Hill, have produced several distinctive cultivars. Among them are:

Sarracenia x 'Dixie Lace'

Hardy to –6°F, if not colder, this complex cross has compact curved pitchers to ten inches, heavily veined in red on a pale yellow background, with a canopy hood.

Sarracenia x 'Jambalaya'

The pitchers are greenish with red veining, with flared, fan-like ruffled heads tinted red.

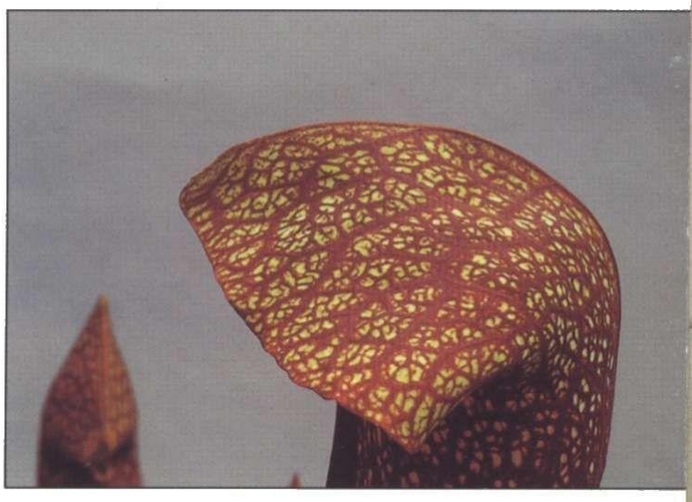
Sarracenia x 'Sultry Maid'

The narrow green pitchers are topped with a broad, flattened, wavy lid heavily mottled in green, white, and red.

***Sarracenia* x 'Sultry Maid'**

CULTIVATION

(See Parts One and Two for further details)



The ornamental hood of *Sarracenia* x 'Dixie Lace'

Soil recipe	*Sarracenia* thrive in a mix of one part peat to one part perlite; or one part peat to one part sand; or two parts peat, one part perlite, and one part sand. Long-fibered sphagnum is also excellent.
Containers	Plastic pots or glazed ceramics are best. They may be drained or undrained. Young plants do well in four-inch pots, mature plants in six- to eight-inch pots or larger.
Watering	Use the tray method for drained pots. Keep the soil permanently damp to very wet.
Climate	All, with one exception, are warm temperate, enjoying warm summers and chilly winters; tolerant of light frosts and brief freezes. *S. purpurea* ssp. *purpurea* require cold-temperate climates and can tolerate an extended deep freeze.
Light	Full to mostly sunny is best.
Dormancy	All require three to four months of winter dormancy, with reduced temperatures and photoperiod.

Outdoors	*Sarracenia* do well in temperate, warm-temperate, and Mediterranean-like climates. *S. purpurea* ssp. *purpurea* does best in temperate and cold-temperate climates. The southern species survive cold-temperate climates in bog gardens mulched in winter.
Bog gardens	*Sarracenia* are among the best for bog gardens. (See "Outdoors," above.) Mulch in colder zones.
Greenhouse	Excellent in cold houses, cool houses, and warm houses, and cold frames in warm-temperate climates. *S. purpurea* ssp. *purpurea* is best in cold houses.
Terrarium	Generally poor candidates due primarily to their size and dormancy requirements. However, good seasonal candidates are *S. purpurea, S. psittacina, S. rubra* and their hybrids, or young plants. Better under high-intensity lights. Dormancy must be respected.

Sarracenia flava

Windowsills	Good candidates for only the sunniest windows or solariums, but respect their winter dormancy. In order of best first: *S. purpurea* ssp. *venosa, S. psittacina, S. rubra, S. minor, S. flava, S. oreophila, S. alata.* The one requiring the most sun is *S. leucophylla.* All trumpet plants can be superb housefly catchers.
Feeding	Outdoors they are often gluttonous pigs, devouring ants, flies, wasps, beetles, and moths. Can usually be hand-fed crickets, sow bugs, or dried insects.

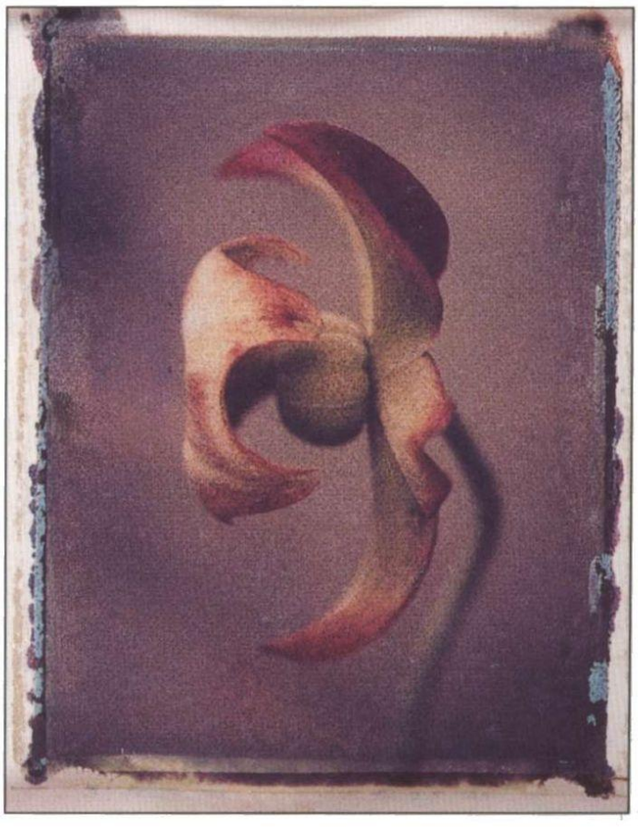
Fertilizers	Fertilizers for acid-loving plants are best applied foliarly.
Transplanting	Potted specimens should be divided and transplanted every three to five years, or when the growing points become crammed along the edge of the pot. This should only be done during dormancy.
Pests and diseases	Primary pests of American pitcher plants are aphids, scale, and mealybug. Orthene, Diazinon, and Malathion are the best controls. Seeds can be attacked by damp-off fungus. Treat with a fungicide.

PROPAGATION

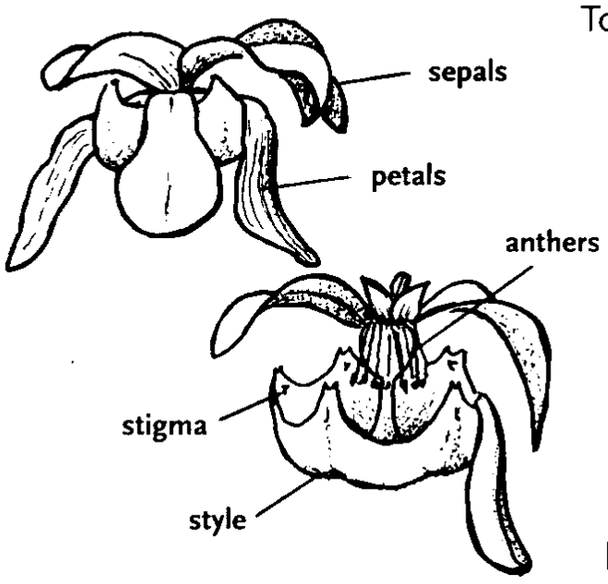
Seed

Sarracenia flowers are not only among the most beautiful in nature, they are cleverly designed to enhance cross-pollination. Bees are their most common pollinator. Carrying pollen from a previous flower, the bees can only enter over the female stigmas between the petals, where the pollen is deposited. Once inside, they become dusted with fresh pollen. To exit, they push through the petals, thus avoiding the stigmas and self-pollination.

When the flowers open, they will remain in petal for seven to ten days on average. By lifting a petal, you will see the male anthers on the inside ceiling of the flower. The anthers, when ripe, will release their yellow, powdery pollen onto the floor of the upside-down umbrella style. To self-pollinate, collect this with a small brush, and deposit the pollen onto each of the female stigmas. You will see the stigmas, five of them, as tiny bumplike hooks on the inside tips of each point of the umbrella style. Deposit a dab of pollen onto each one.



The seed pod of *Sarracenia*



The flower structure of *Sarracenia*

To cross-pollinate, carefully deposit the pollen onto the stigmas of another opened flower.

Be sure to label the flowers. It is best to repeat this procedure a few times for best seed set.

Pollen may be stored for several weeks, in the refrigerator, in packets of aluminum foil. It can be used on flowers that open later in the season.

When the petals drop off, the sepals and umbrella style remain, and gradually may lift upward, rather than remain nodding and upside down. The ovary, on the ceiling of the seed pod where the anthers were, will gradually swell over summer.

By autumn, the seed pod will turn brown and gradually crack open. The seed, up to several hundred, can be collected at this time. Each seed is brown to reddish tan, and about the size of a large pinhead. Separate the seed from the ovary, and store dry in a small paper envelope or an airtight plastic bag.

To germinate, the seed needs several weeks of chilly, damp stratification. It is usually best to sow the seed around February, onto its preferred soil mix or milled sphagnum. Do not bury the seed. Sow sparsely, and treat with a fungicide, as the seed is very susceptible to damp-off disease. Light frost is helpful during stratification.

After stratification, with warmer, partly sunny conditions, the seed will germinate. At the end of one growing season, the seedlings will have pitchers one to two inches tall. The plants will take, on average, about five years to reach maturity.

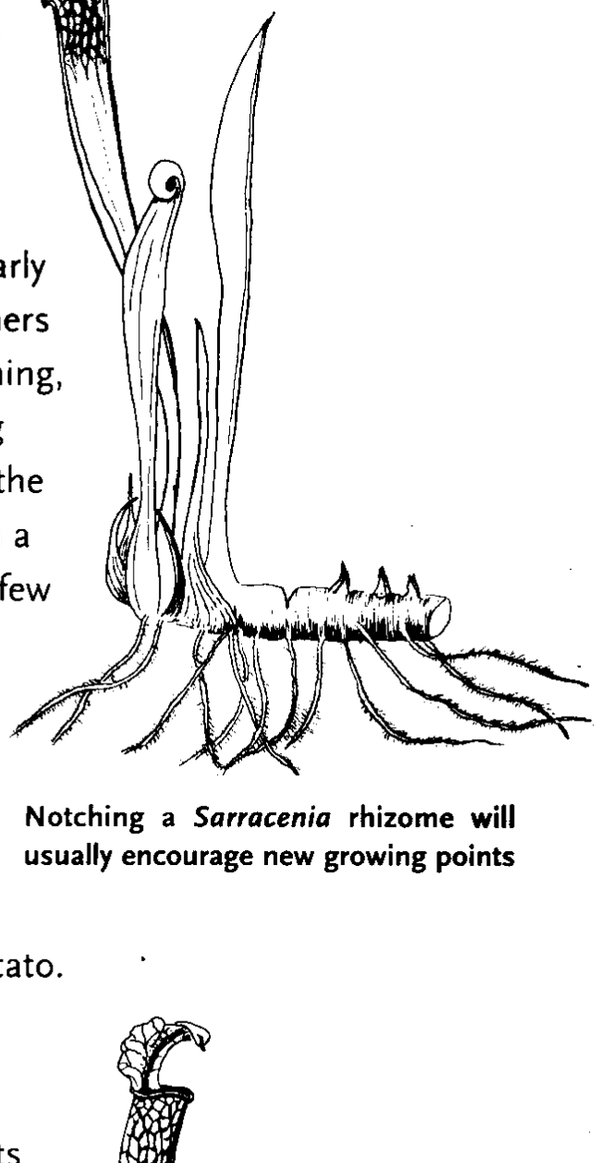
Division

Most mature *Sarracenia* readily produce offshoots and new growing points year after year. Some, such as *S. purpurea* and *S. psittacina,* are slow at this or never multiply, but others, such as *S. rubra,* may develop from one growing point to over fifty in a few short years. These clumps of plants can easily be divided.

This is best done during winter dormancy or early spring as the plants come back into growth. To divide a plant in summer or autumn will shock it, and it may not recuperate until the following year.

Remove the plant from its pot and wash away as much soil as possible. You will be able to see clearly the separate growing points from which the pitchers emerge. The rhizome is often gnarled and branching, the roots tough and wiry. By wiggling the growing points you can usually make out where they join the main rhizome. Snap these apart or cut them with a knife. Be sure the separated growing point has a few of its own roots.

If the divided plant had already begun growth, you may want to soak the divisions in a vitamin B-1 solution such as Superthrive to overcome shock.

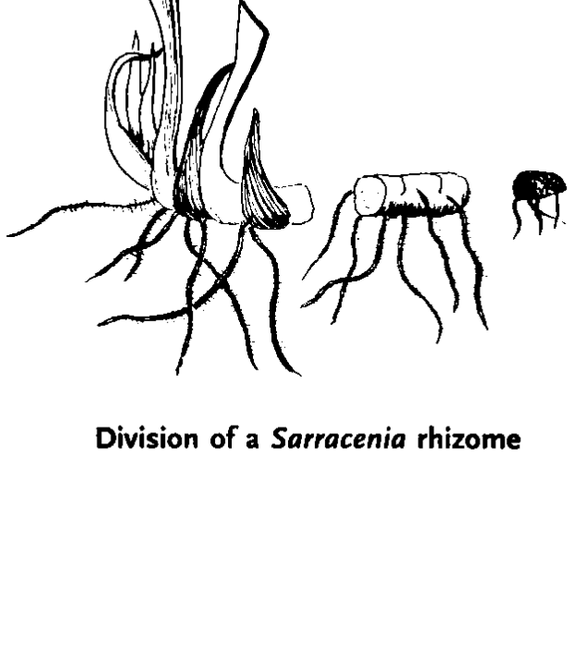


Notching a *Sarracenia* rhizome will usually encourage new growing points

A healthy rhizome is white inside, similar to a potato. Often, older parts of the rhizome are brown and dead, and should be trimmed away.

Long, branching rhizomes with few growing points may be cut further into pieces about two to three inches long, even if no growing points appear on that section. When potted up, these sections will produce offshoots.

New growing points can be instigated in potted *Sarracenia* when the rhizomes are long and old. Clear away some soil along the top of the rhizome to expose it. With a sharp knife, cut into the rhizome about halfway. Several cuts or notches may be made. New growing shoots will usually appear along these cuts. The following year the plant can then be divided.



Division of a *Sarracenia* rhizome

When repotting divisions make sure the rhizome pieces are planted horizontally with the roots downward, the growing points at the soil surface. Cut off any emerging flowers from newly divided *Sarracenia*, as they will exhaust the plant.

Tissue culture

Sarracenia can be introduced in vitro through sterilized seed. Newly emerging flower buds and leaves can also be successful, but often with great difficulty. New methods are being developed to enhance this process, and are looking promising. This will greatly affect the propagation of cultivars, which have generally been in short supply.