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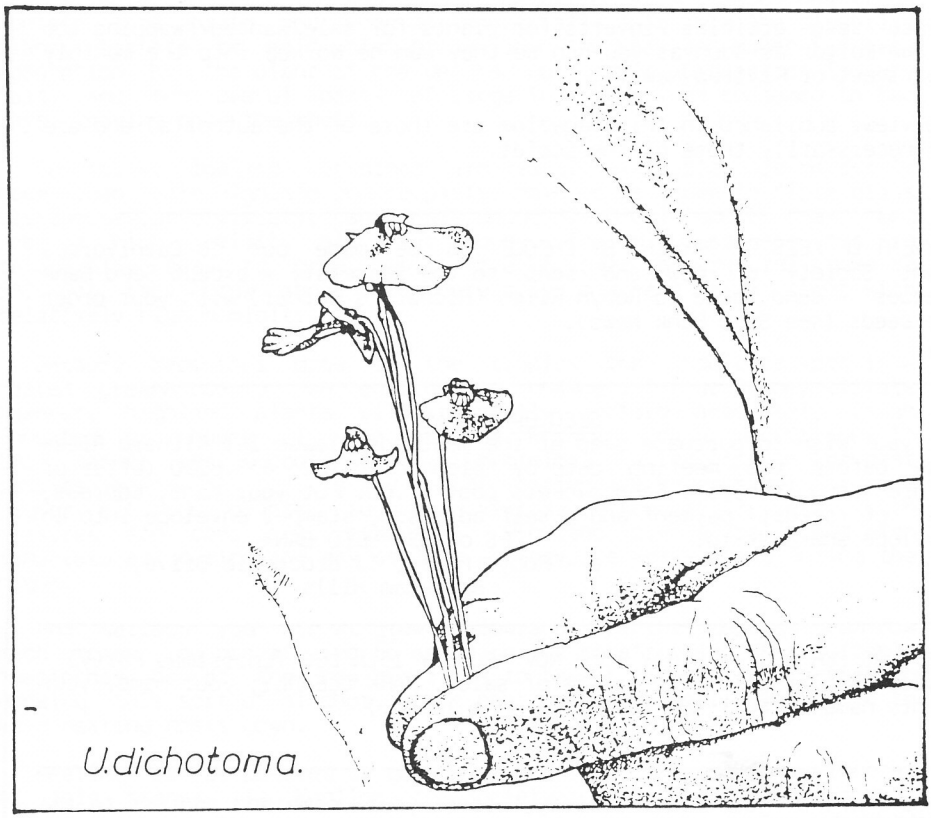

U.dichotoma.

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NEPENTHES CULTIVATION-By Ken Harper

The following notes on Nepenthes (the Tropical Pitcher Plants) were taken by me at various times during meetings, open days and talks with people connected with carniviorous plants (especially Ian English), as well as being based on personal experience.

There are over 75 species of Nepenthes found mainly growing in South East Asia but extending to Madagascar, India, New Caledonia and Cape York Peninsular in Australia. About two-thirds of these species are classed as highland as they grow above 1000 metres. The rest are classed as lowland (below 1000 metres above sea level) and grow naturally in hot, steamy conditions.

The Nepenthes is a vine and in the damp, humid jungle (in which it dwells naturally) it uses the tendrils at the ends of the leaves to wrap around other vegetation and support itself. In this manner some plants may grow in excess of 15 metres.The pitchers develop from the end of the tendrils and vary in shape, size and colour depending upon the species.

Insects are attracted by the secretions of the nectar glands which are situated on the lid and rim of the pitchers. All Nepenthes traps contain some fluid and when an insect falls into this the digestive glands secrete an acid which breaks down the prey and makes for easy absorption by the plant of the desired nutriments. Digesstion is very fast, and the useful parts of large insects may be consumed in two days, leaving only the shell.

Generally, lowland Nepenthes are readily available, are harder to grow than their highland counterparts, have to be grown in fibre-glass glasshouses(or similiar), can handle about 35-40°C in summer (max.) and need a high humidity all year round. The highland Nepenthes are relativally easy to grow, can survive in lower temperatures (down to 5°C. as they grow above 1000m naturally) and need bright light with relatively high humidity.

Because Nepenthes grow in the tropics they should be kept in a heated greenhouse or an environment chamber. In our Sydney climate however, highland plants will generally perform adequately in an unheated greenhouse (I have grown N. khasiana and N. macfarlanei in this manner very successfully), with minimal shading, though for best results means of cooling and humidification are necerssary; for some higher altitude plants, such as N.villosa, N.spectabilis, etc., such measures are considered essential. Highland plants can stand high temperatures during the day as long as they are well-cooled during the night.

How serious you are at growing lowland Nepenthes depends upon how much money you are willing to spend on the construction of a suitable "Nepenthes house" and how big it is to be. If you are really keen on growing this sort of pitcher, it is best to have a small glasshouse to keep heating costs down.

Heating can be powered by gas, electricity or the sun (experimental at this stage). Ian English, the Society's president, who has such a

glasshouse, uses a gas powered chicken brooder heater to maintain the 15°C minimum winter temperature which the lowland species need. Gas however, may leak and can be detrimental to the health of plants (and humans).

Electric heating is the best form of heating by far but is the most expensive. Keeping the humidity at about 70-90% can be very difficult, so a propagation misting system (with a water measuring element such as a leaf with blot paper, timer, wet and dry bulb thermometer, etc.) may have to be employed. For the normal grower however, the cheap and very effective method I use would be sufficient. I use aquariums filled with about 5cms. of water into which I place a submersible aquarium heater. The plants should sit above the water (as they rot easily if over-watered) and be covered by a lid (I use glass and on really hot days cover the outside with plastic). The water level should be checked frequently to keep heater immersed.

Over the last two years, I have been experimenting with growing Nepenthes in plastic domes (about 80cms. in diameter and about 80cms. high) made by Nikim Industries and available at most garden centres. I have had good success in growing Nepenthes alata, N.gracilis, Drosera prolifera, D.adelae and D.petiolaris in these domes. They are very cheap to purchase and the humidity and temperature levels attained suit ideally tropical and lowland C.P.s. The amount of air circulation can be adjusted by raising and lowering the zipper fastener of the of the dome. Trial and error has enabled me to determine the suitable levels for lighting, temperature and humidity. In other domes , I have successfully grown Sarracenia willisii x purpurea, S.rubra(jonesii heterophylla, jonesii yellow sport, wherryi), S.purpurea ssp. venosa, Cephalotus follicularis, Drosera filiformis var. tracyi and D. alicae.

A wide variety of potting mediums are used but the main requirement is that it should be open to allow good drainage. At present I am using equal parts orchid bark and Sarracenia mix (ie. 3 parts peatmoss, 1 part perlit and 1 part propagating sand). This has proved to be a successful mix for most, if not all, of the Nepenthes grown.

[The Royal Botanical Gardens in Sydney are currently experimenting with a mix of equal parts perlite and composted pine bark findings. Make sure if you want to try this that the pine bark is composted as otherwise it will contain poisonous resins.]

The use of fertilizers such as Fish Emulsion and Aquasol (fertilizers high in nitrogen) is neccerssary in growing Nepenthes. I apply fertilizer about once every two weeks in the growing season, and about once every month for the rest of the year. Use at about ¼ to ½ of the recomended strength. I have found that Osmocote produces smaller pitchers than other fertilizers. Zest and Thrive (containing nitrogen, phosphorus and potassium with no calcium) seem to give good results as well. Fertilizers do not seem to have any detrimental effects when used as outlined above (as was previously supposed).

Shading of 50-75% is recomended. Failure to produce pitchers can be attributed to lack of light and/or lack of humidity (which should be greater than 80%). Plants may be fertilized (preferably organically) from mid-spring through to autumn every six weeks using about 1/10 of the recommended strength. Cuttings may be taken in spring and summer to keep the parent plant compact and bushy.

Generally, it is necessary to simulate temperatures that the plants would experience in their natural environments until the plant is established, whereupon they can be expected to survive temperatures well outside these ranges. Lowland plants experience about 24-33°C and highland plants about 10-24°C. The ideal temperatures for each category would be somewhere in the middle of the range.

NEPENTHES-OUT DOORS STYLE

By Steve Clemesha

Nepenthes traditionally have been grown in houses that are uncomfortably hot and humid and often these suffer from a lack of light as well. About two thirds of the species are highland ones, not only favouring lower temperatures but also doing well under lower humidity. Many of them grow where there is a break in the forest canopy where extra light is available e.g. beside rivers and roads.

For the last two years I have been experimenting with growing Nepenthes in my bush house at Woolgoolga on the northern coast of N.S.W. This receives no protection from the weather except from 50% shade cloth. The area in which I live has a mild climate. The temperature will fall to 7°C about 5 to 15 times throughout the winter and does fall lower still on rare occasions. These cold nights are usually followed by warm, sunny days when the temperature rises to 16-19°C. Most winters we also get periods of dull weather with lots of rain. I have found this to be more stressful to Nepenthes that are intolerant to the cold than the colder nights with warm days as it causes marked leaf spotting. The worst winter period is late June and all of July. August may produce one or two cold snaps but nothing worse than what has happened in the two proceeding months.

Summers are mild and commonly temperatures reach the high 20's. Temperatures over 30°C are uncommon with those above 32°C occurring only once in several years. The humidity mostly ranges between 45 and 60% but is high enough to be uncomfortable in late summer.

My bush house receives full sun from sun-rise to mid afternoon. Possibly this quick warming up after a cold night helps my plants to survive through the winter. I water my plants with mains water through the hose and no attempt is made to heat up the water in winter.

The first Nepenthes I tried outside were large plants of highland species. They grew so well over winter that I moved all of my plants outside next spring. However, some of my lowland species and hybrids suffered over winter and so were moved back inside the glasshouse. Here they experienced the same night time temperatures but the sunny day temperatures are higher and they are protected from the wind and rain.

The benefits of growing my plants outside has been great and due mainly, I think, to the plants receiving 50% sunlight most of the day. possibly the better air movement helps as well.

The principal benefits of outdoor culture are;

1. Plants grow faster and stronger than they do in the glasshouse. They branch more freely and more readily produce strong, fast growing shoots from the base.

2. Leaves are shorter, broader and thicker than the glasshouse grown plants and hence less floppy. The internodes are also shorter.

3. Plants flower freely, when big enough. Some such as N.alata and N.ventricosa flower on all mature branches once a year in late spring while others such as N.maxima did not start flowering until January this year, but since then has flowered 4 times. One spike opened in late June and I pollinated it. I think that the seed pods are developing though so far have been much slower than the pods from its warmer weather flowers. Winter has done nothing to deter this plant from flowering as its latest spike emerged in late July and is developing normally. This clone had flowered in the glasshouse but no more than once a year and even then it missed some years. N.rokko has flowered twice, a few months apart.

The only disadvantage of outside culture is that some of the lowland species do not produce pitchers except in late summer when it is humid. These plants later turned out to be able to withstand the winter.

I have over 20 highland species of Nepenthes and everyone goes through winter in good condition. Growth in that season is slow and in some plants, especially the small ones, the 2 or 3 winter leaves are smaller than those that grow in other seasons.

Some lowland species grow just as well as highland species and stay attractive through the winter, producing good pitchers. These are; N.thorallii, N.merrilliana, N.truncata and N.petiolata. I suspect that N.globamphora will prove to be winter hardy too but my small seedlings of it were not moved outside until early August.

Species that are not successful outside but do well in the glasshouse are; N.gracilis, N.ampullaria, N.rafflesiana, N.mirabilis and N.albomarginata. The last two will grow outside if placed in a warm corner and are protected from wind and rain. N.bicalcarata started to go black at the first cold snap in May and has spent most of the winter in a friend's heated glasshouse to recover.

Highland hybrids and hybrids between lowland and highland species all seem to winter outside without trouble. Complex hybrids seem to be hardier than the species theywere bred from. N.x wrigleyana and N.x wrigleyana var. Kosobe do well outside all winter. Their leaves remain in good condition as do the pitchers. N.x henryana, N.x williamsii and N.x chelsonii all survive winter outside but the pitchers all die and the leaves become spotted. They grow rapidly and recover quickly.

It is evident from the behaviour of my plants that most of the highland species and the lowland species from the Phillipines are capable of survivng colder winters than I experienced here. I think that it would be worth while for growers in other regions to try some plants outside for the frost free months of the year.

CARNIVOROUS BULBS by Robert Gibson

When you hear the word "BULB" what do you think about?

For many people the word conjures up images of daffodils, tulips, hyacinths, freesias and other colourful spring flowers. But what is a "bulb"?

By definition, a bulb is a fleshy underground storage organ derived from the modified base of the stem, as is found in the daffodil and the lilium. However, general usage of the word "bulb" also covers all of the other types of plants which produce underground storage organs to which they might retreat in times of stress [this is not correct botanically though].

Thus the term also covers CORMS (eg.freesias), TUBERS (potatoes, dahlias), TUBEROUS ROOTS (daylilies), RHIZOMES (bearded iris, agapanthus) and true BULBS.

Many carnivorous plants therefore fall into the category of bulbs for they form rhizomes, tubers, turions, tuberous roots and hibernacula; although none produce true bulbs. It is through these devices that such carnivorous plants are able to survive extremes of climate.

However there are two main differences between carnivorous bulbs and the general garden varieties. These are:-

1.Carnivorous plants use their leaves for photosynthesis and and in the capture and subsequent absorpion of insects, for the plants own benefit; whereas garden bulbs merely use their leaves for photosynthesis.

2.Carnivorous plants are dicotyledons, ie. they produce two seed leaves, whilst garden variety bulbs are generally monocoyledons, ie. they produce only one one seed leaf.

Sarracenia, Darlingtonia, Heliamphora and Dionea all produce rhizomes to which all but Heliamphora may retreat during winter. In form they are like a bearded iris, but are much more interesting. The rhizome, a swollen, creeping underground stem stores food and enlarges anually. Leaves and roots generally form on opposite sides of the rhizome. At the base of each leaf a node grows which may later grow and form an offshoot. By this means a single plant can form into its own clump.

Darlingtonia, along with its rhizome, also produces stolons (underground stems) which upon emerging from the soil surface develop into individual plants which take a while to become independent.

Both the rhizome and stolon offsets from the genera produce genetically identical plants to the parents. This is particularly important in Sarracenia where outstanding cultivars and hybrids can be distributed world-wide and remain totally true to type. Seed on the other hand produces genetically different plants, all with individual characteristics.

The bulb-like nature of these general is evident, especially in the commonly grown Sarracenia. This generally produces its flowers and earliest pitchers at the end of its growing season but it only displays them about 5 months later at the beginning of the next growing season.

Sarracenia is also propogated by cutting half-way through the rhizome which forces the nodes to shoot.

Dionea produces a very fleshy rhizome from which offsets develop. In the northern hemisphere this species has been sold as a bulb (Adrian Slack, 'Carnivorous Plants', page 222).

Many Drosera and Utricularia species produce tubers (storage organs for food and water). By means of these tubers, the plants are able to survive the seasonal or occassional droughts that they are exposed to. The tuberous Drosera species are concentrated in south west Western Australia whereas the tuberous Utricularia are concentrated in Central America. Tuberous Drosera and Utricularia Menziesii from Western Australia are subject to a Mediterranian climate with cool, wet winters and dry, hot summers. The four outlying tuberous species are generally found in a more humid climate. However all of them are dormant during summer, and during each growing season they exhaust their tuber and must replace it if they are to survive. They differ from rhizomatous plants in that none of the above-ground portion of the plant is pre-formed.

Most of the tuberous species form climbing to self-supporting herbs, with exceptionally small leaves, which include the tallest species in the genus. A few species form ground-hugging rosettes.

They generally flower after they have produced all their leaves, although D.whittakerii and D.zonaria occassionally flower before they have produced leaves. In the rosetted sundews the leaves enlarge noticeably after flowering. The rainbow sundews terminate growth with flowering as do liliums.

Some tuberous rosetted species produce rhizoids which later develop into daughter tubers. It is by this means that the shy flowering D.erythrorhiza is propagated in cultivation, and how D.whittakerii and D.erythrorhiza forms are most rapidly propagated. Occassionally the rainbow sundews produce offsets, in contrast to U.menziessi which produces many daughter tubers each season.

The tuber-forming Utricularia of Central America are generally epiphytic, clinging to moss and detritis on trees and rock surfaces. They are reknown for their spectacular flowers which include the largest in the genus. Although the climate allows for year round growth, droughts do occur and are made more pronounced by the free-draining soil in which the plants grow. The tubers are therefore important in storing water, rather than food.

Tuberous roots are produced by many fine drosera species as well as Byblis giantea. These large, seldom branching roots, act as a food reserve, a fact easily demonstrated in that D.binata, D.hamiltonii, D. regia, D.capensis, D.aliceae and B.gigantea are readily propagated by root cuttings. Many of these species cease growing or produce smaller

leaves, in either summer or mid-winter until more favourable conditions prevail.

Although I have not seen or grown D.cistiflora and the other winter growing South African sundews, I assume that they must also have a similar root system.

Many species of Drosera and Pinguicula form hibernacula or winter resting buds. These are very similar in structure to true bulbs, at least in Drosera. Within the centre of hibernacula is the dormant growing point surrounded by small glandular leaves in an arrested stage of growth. The outer layer consists of non-carnivorous modified short leaves which are wrapped tightly around the bud protecting it from severe cold.

The hibernacula forms in early to mid-autumn, at which time the leaves and roots slowly start to die away. It opens out in later winter to early spring.

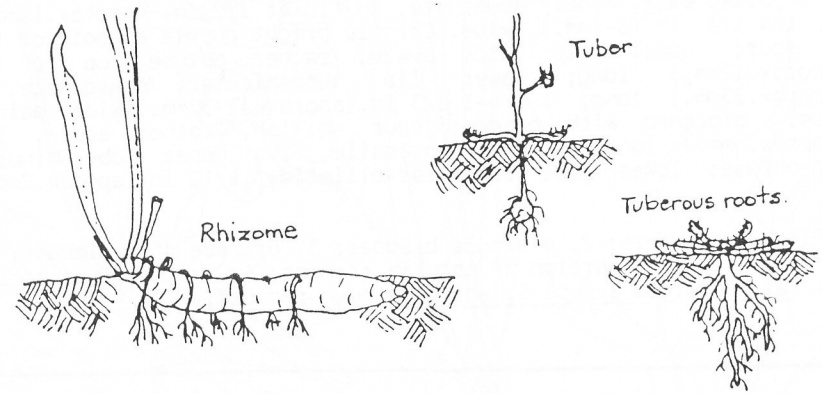
The hibernacula of Pinguicula assist in the dispersal of the plant in its native habitat in that during the winter the hibernacula is often shifted around by the elements. Although some losses occur, the plants always persist.

The very versatile Utricularia also produce turions in many temperate aquatic species; these are the equivalent to underwater hibernacula. They form at each growing point as the weather becomes cooler. Once they have been released from the rotting remains of summer growth they, in many species, sink to the bottom of the pond or stream until spring when they recommence growth.

In cold climates Aldrovanda also produces turions.

As you see most of the plants in a typical carnivorous plant collection have bulk-like properties which enable them to form large plants, to keep them alive during extremes of climate, and which are utilised for propagation and transportation of the species.

It's a shame, in a way, that carnivorous plants are not commonly recognised as bulbs. For it would be good to see Sarracenia cultivars, tuberous Drosera, Byblis gigantea and Dionea amongst the daffodils and liliums on the bulk rack at your local nursery.

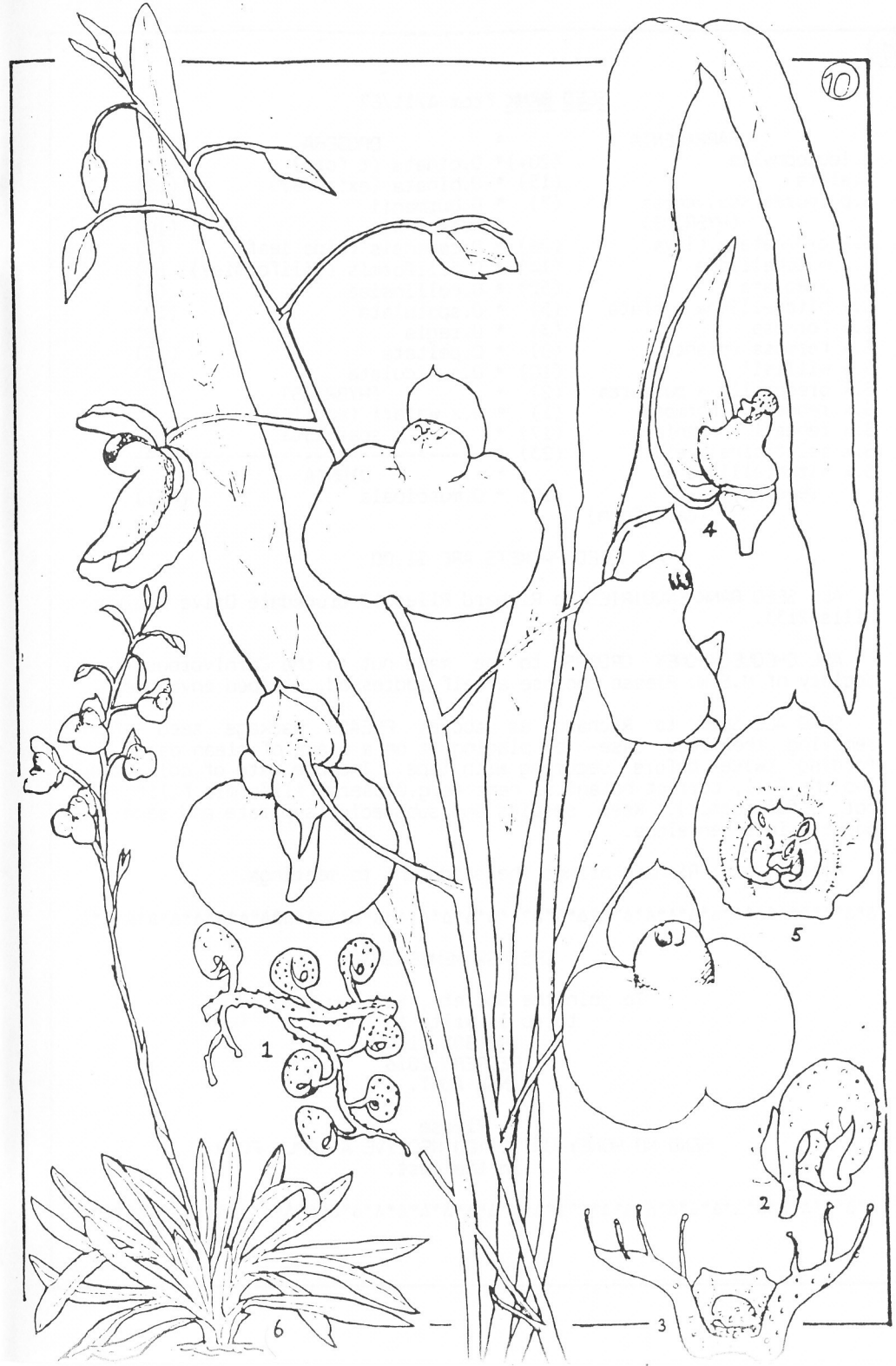


TAB.8516.(Kew Bulletin;Sept.1913)
UTRICULARIA longifolia.
Brazil.
Lentibulariacaea.
Utricularia, Linn., benth. et hook.f. Gen.Plant.vol.ii.p.987.

The Bladderwort here depicted is one that was first discovered in 1840 in Brazil by Professor G. Gardner, who found it growing in moist localities on Mt.Pedra Bonita near Tejuco in the state of Minas Geraes. It appears to have been introduced to English (Botanical) gardens some forty years later, and since then has been fairly common in English collections. The plant has been in continuous cultivation at Kew for about thirty years, and has during this time flowered several times, but has never flowered here so satisfactorily as it does at Cambridge, where it grows well in a tropical house under the conditions suitable for Nepenthes. The material from which our figure has been prepared was obtained from a Cambridge plant and was communicated by Mr. R.I.Lynch. Especial attention has been called to the extraordinary plasticity of the leaves of this species in the "Gardeners Chronicle," vol. iii. ser.3,p.360, fig 54, by Mr. Watson and in "Flora" volxlvii. n.s., p.293,t.14, fig.3, by Professor Goebel. Under favourable conditions the leaves may grow out into bladder-bearing stolons and rhizoids. This phenomenon is not infrequent in the genus Utricularia, but in U.longifolia it is unusually striking on account of the size of the leaves.

DESCRIPTION.-Herb, perrenial, densely tufted; stolons about 1/20 in. (approx. 1mm) thick, numerous, and associated near the surface of the soil with slender filiform copiously branched bladder-bearing rhizoids. Bladders shortly pedicelled, obovoid-globose, the mouth minute and directed downwards, 1/24 in.(approx.1mm.) long; upper lip of bladder 2-fid (bifid) with the sparingly glandular-ciliate lobes incurved above the mouth, lower lip obsolete. Leaves lorate or linear-lanceolate, rather obtuse, very gradually narrowed towards the base into a distinct petiole, up to 12 in.(approx.30cm.) long, 1/3-1/2 in.(approx.7-12mm.) wide, bright green, glabrous. Scape slender, including the infloresence up to 2 ft.(approx.60cm.) long, beset low down with a few subulate, sterile bracts. Flowers 10 or fewer, laxly arranged, bracts subulate,slender, 1/5 in.(approx.3mm.) long, bracteoles like the bracts, but less than half as long;pedicels filiform, up to 3/4 in.(approx.18mm.) long. Sepals nearly equal, ovate from a broad base, finely acuminate, in flower 1/2 in. (approx.12mm.) long, 1/4-1/3 in.(6-7mm.) wide. Corolla bright purple except for the pale spur; upper lip wide ovate, rather obtuse, up to 1/2 in.(approx.12mm.) long; lower lip suborbicular, emarginate, 1 in.(approx.25mm.) long; 1 1/4-1 1/3 in.(approx.31-32mm.) wide; palate gibbous, blotched with orange; spur whitish, rather acute, 3/4 in.(approx.6mm.) long. Stigma subsessile, its upper lobe minute, oblong-obtuse; lower lobe orbicular-elliptic, 1/12 in.(approx.2mm.) wide.

Fig.1, bladders; 2, a single bladder; 3, oriface of a bladder; 4, sepal and pistil; 5, portion of corolla stamens; 6, sketch of an entire plant:- all enlarged except 6, which is much reduced.



SEED BANK from 4/11/87

SARRACENIA

S.leucophylla	(20+)
S.alata	(15)
S.purpurea ssp.venosa	(7)
(HYBRIDS)	
S.x exornata x flava	(36)
S.x mitchelliana	(14)
S.x areolata	(52)
S.x mitchelliana x alata	(5)
S.x formosa	(3)
S.x formosa (giant)	(8)
S.x willisii	(10)
S.x oreophylla x purpurea	(2)
S.x rehderi x formosa	(1)
S.x rehderi x swaniana	(17)
S.x psitticina x alata	(23)
S.x mitchielliana x leucophylla (dark form)	(12)

DROSERA

D.binata (t form)	(38)
D.binata (extrema?)	(12)
D.burmanii	(13)
D.capensis	(10)
D.capensis (wide leaf)	(3)
D.filiformis (filiformis?)	(5)
D.collinsiae	(3)
D.spatulata	(19)
D.regia	(3)
D.peltata	(15)
D.auriculata	(12)
(HYBRIDS)	
D.x watari (anglica x spatulata)	(5)

DIONEA

D.muscipala	(45+)

ALL SEED PACKETS ARE $1.00

ALL SEED BANK ENQUIRIES to Richard Riles 13 Brucedale Drive Baulkham Hills 2153.

ALL CHEQUES/MONEY ORDERS to be made out to the Carnivorous Plant Society of N.S.W. Please enclose a self addressed, stamped envelope.

SEND ALL SEED to Richard as above. PLEASE package seed -after removing the seed case- by placing it on a piece of clean paper and folding twice before securing with tape . Include date of collection and the full, correct botanical name (e.g.Drosera filiformis filiformis not D.filiformis). Keep species and subspecies separate and send all packets in an envelope.

Please Note:-Richard brings the seed bank to meetings.

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