lose their dewy appearance after digesting only one victim. This is in contrast to D. capensis, for instance, which remains dewy indefinitely and catches four or more victims in each trap before waning. In fact, the friend who went with me this last time remarked that it seems incredible they chose to grow on such truly barren hillsides. Mine has taken about a year to adapt to being well taken care of with moss and plenty of moisture and only now seems to be adapting to the comforts of captivity. It is truly a very wild and difficult plant and I don't even know what color its flowers are as I've never seen one in bloom. This drought is said to be the worst in ten years. I'll be happy to see the rains bringing the forests here back to life."

LARRY DEBUHR writes: "I received a grant from the National Science Foundation to travel to southwestern Australia to study adaptive radiation of Drosera. At the same time, I will be able to observe Cephalotus as well as Utricularia and Polypompholyx. I will be leaving in July and returning in November or December of this year."

CARNIVOROUS PLANTS HERE AND THERE...One of the TV networks recently presented The Helstrom Chronicle, a dramatized version of how insects will one day inherit the earth. Featured near the beginning was some excellent cinematography and fair commentary of Darlingtonia californica, Drosera rotundifolia and Dionaea. Watch the first twenty minutes or so during summer reruns...

SHORT NOTES

GROWING DIONAEA AND THE AMERICAN DROSERAS

by the Co-Editors

Drawing by David Kutt

Both genera require just about the same conditions, and any differences between the two, or among species of Drosera, will be noted as we go along.

Soil. The first preference, of course, is native soil, usually acid southeastern coastal plain soil. Notable exceptions are the northern or mountain bog Droseras (D. anglica and D. rotundifolia), these doing better in sphagnum. When using sphagnum, it is better for it to be alive and one of the smaller slower growing species that tends to form a tuft. Coarser species suitable for Sarracenias will overwhelm the little plants. The second soil preference would be an artificial approximation of the coastal plain soils made by mixing one part of dried, milled brown sphagnum or peat (no fertilizer added) with four parts of washed, fine white quartz sand. Wet this mixture thoroughly and let age for two to three weeks to stabilize micro-organism activity. The third choice for all of the plants is the small variety of sphagnum mentioned above. When planting, put the Dionaea bulbs in to the crown and the Droseras to the rosette.

Water. During the active growing season (see Dormancy below) keep the soil constantly moist but generally not sodden. Drosera intermedia is one exception, preferring conditions so wet that it is often found growing in mats across the surface of acid waters. Use water low in chlorine and salts. When watering, it is better not to allow excess water on the plant surfaces, but to water slowly on the soil so it absorbs as you do so. Placing the pot in a tray of water if you have to be away for awhile is all right, but if done for too long a period, salts will tend to concentrate near the surface, and we have found that blue-green algae are encouraged on the soil surface.

Humidity. The higher, the better, ALL OTHER FACTORS BEING EQUAL. In very humid regions of the country during the summer (Great Lakes area, Southeast, Northwest Coastal), the plants could be kept outdoors where they will catch insects as a bonus. In drier areas or if more controlled conditions are preferred, some sort of terrarium setup should be used, assuming you do not have access to a greenhouse. Remember when using a closed terrarium, do not allow it to become overheated by placing in direct sunlight for any protracted period. Sometimes high humidity in combination with too low light level and low temperatures will encourage fungi and algae, so we repeat that all factors should be kept in balance.

Light. About 40-50% sunlight all day is best for maximum coloration, growth and health, provided humidity and moisture can be maintained and overheating prevented. You will, of course, have to adjust the light factor with others depending on what your plants are housed in. Good results are also obtained with any of the new growth intensity fluorescent light setups. Plants grow best when two four-foot lamps (Gro-lux W/S) are on sixteen hours and are fixed six to ten inches above surface of pots.

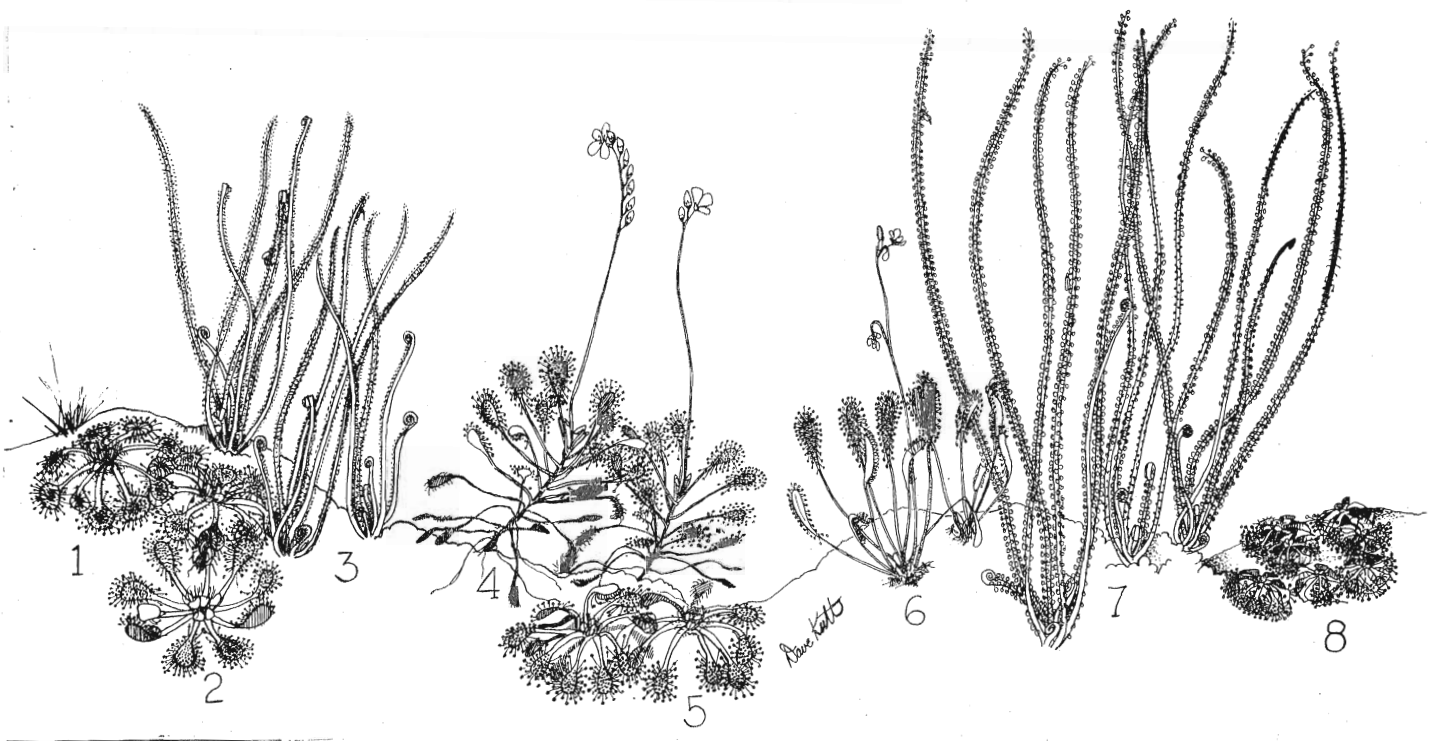
Temperature. This should be kept ideally at 65-85° F. during the active growing season. If temperatures drop, hold back on the water; if they rise, make sure there is adequate water to prevent wilt and drying and that humidity is kept high. Actually, most of the plants (except the bog Droseras listed before) can take temperatures up to 100° F. as they do in nature for brief periods as long as soil moisture and humidity is maintained. But plants in culture need more pampering.

Dormancy. Neglect of this factor is probably the most frequent reason for plant loss by the new grower. Both genera require a period of dormancy which is conveniently coincident with winter in the United States. Fluorescent light growers must make artificial compensations. To try to "force" the plants at this stage in their annual cycle is to invite disappointment and rot. During dormancy, the plants require cool temperatures, reduced light with shortened photoperiod, and reduced watering so the soil is just damp. As long as the roots do not freeze, both genera can take temperatures down below freezing (to varying degrees), as evidenced by the many Droseras native to northern reaches and the survival and multiplication of Dionaea transplants in New Jersey and Pennsylvania. If your plants are potted or tubbed, be cautious of exposing them to too low a temperature below freezing since containerized plants above ground are more likely to suffer severe root freeze. As a maximum temperature to achieve full dormancy, we would suggest 40° F. generally; as a general minimum to prevent freeze damage (and this also depends on mass of container, two-inch pot vs. two-foot tub), 25° F. In very cold regions of the country (mountains, Kentucky north), wintering plants can be stored in a cellar or protected area in their pots, an area that does not get too far below 30° F. but that also does not warm too much.

During dormancy, most leaves of Dionaea will blacken and die back except (in warmer regions) for the central rosette of widened winter leaves with small traps. This is normal and typical trap formation will resume in the spring. In the outdoor cooler regions, all leaves may die back for the winter. If you wish to grow Dionaea and American Drosera during winter, we suggest that you use plants that were previously induced into dormancy by refrigeration for a period of six to eight weeks. But in breaking this dormancy, you must use artificial light to supply the long photoperiod required for normal growth.

An interesting feature of Droseras is that all except D. capillaris and D. leucantha (brevifolia) form compact winter buds (hibernacula) at ground level. Thus, during dormancy, the two species above will have inactive winter rosettes while the others appear to have died, but close inspection will disclose the winter bud. Drosera filiformis filiformis (northern form) has moist, brown hairs covering the bud and they look for all the world as if they are blackening and rotting. But careful probing among the hairs will disclose bright green leaf buds. Often, as winter bud formation occurs the plants may divide and multiple buds are formed and you are rewarded with a cluster of plants in the spring.

The primary dormancy breaker of these genera seems to be lengthening photoperiod with concomitant rising temperatures. So you can pretty well follow the calendar and signs of spring in deciding when to place your plants back into active growth conditions. Fluorescent light growers should increase photoperiod first, then slowly increase temperatures, then give more water.



1. D. rotundifolia
2. D. anglica
3. D. filiformis fil.
4. D. intermedia
5. D. capillaris
6. D. linearis
7. D. filiformis tracyi
8. D. leucantha(brevifolia)

Anthers mature before stigmata (protandry) in the same flower and frequently shed all their pollen, unless the air is quite still. Therefore, cross fertilization gives more certain results. One can pick out individual anther heads if he has excellent eyes and superb patience, but the easiest method is to simply press two flowers of two different plants face-to-face with a slight circular motion to effect cross contact of anthers and stigmata. By the way, during flowering Dionaea becomes a little "ragged"-looking with poor trap and leaf formation. This is normal and good traps will grow after flowering is completed, or you may simply clip the flower scape if you are not interested in the flower or seed.

Many Droseras are self-pollinable and in fact do so as they close at the end of their one day of life if a pollinator has not done the job earlier. But to be safe, it is best to use the method described for Dionaea.

Seed matures for both genera in six to eight weeks and is about the size and color as poppy seed in Dionaea, and almost dustlike in Droseras. Since this is summer maturing seed as opposed to autumn maturing seed, a cold pregermination period is not required. Seed is best sown immediately (unless stored under refrigeration) since it will germinate best at this point and will rapidly lose viability when stored under ordinary conditions.

Leaf cuttings. All of the Droseras can with ease, and Dionaea with some difficulty, be propagated by this means. Select fully emerged but preferably fresh spring leaves and clip them off at the petiole base. Dionaea leaves should be peeled back down to the bulb. Press the leaves onto the surface of moist live sphagnum so that total contact is made (check daily, buckling tends to occur the first few days), cover the container with plastic or glass and place in warm shade. In a few weeks, you will note young plant buds, usually many to a leaf. Let these grow until a good root system is under way and the mother leaf is nearly decomposed, then transplant.

COMMENTARY

by E. T. Wherry

(Dr. Wherry has sent us several interesting comments which we have combined into a short note--Ed.)

Nerve-like signals in plants. In the November, 1973, issue of Bioscience one of the "Biology Briefs" on page 672 is thus headed: "Stephen E. Williams, plant physiologist and instructor in biology at the N.Y. State College of Agriculture and Life Science, Cornell, reports finding that the tentacle-tip of a sundew contains cells which transmit nerve-like signals from one point to another. However, the signal in the sundew proved to travel as much as 10,000 times slower than in animal systems."

The value of the prey to carnivorous plants. In a book on Rare Wild Flowers of North America by Leonard Wiley a common misconception is written up in attractive fashion. Under Darlingtonia californica we read: "A popular fallacy is that these plants depend completely upon the insects they capture for their sustenance. Insects are no more important to Darlingtonia than orange marmalade is to you. Like all other chlorophyll-bearing plants, it gets most of its nourishment from the soil and air." And similar remarks are made under Dionaea muscipula.

The chlorophyll of higher green plants actually enables them to assimilate only carbon (dioxide) from the air. All other elements must be absorbed through the roots from the soil. Carnivorous plants grow in soil so sterile that the essential elements nitrogen, phosphorus and potassium, to say nothing of trace elements, are inadequately available to their roots. They accordingly obtain these elements from their prey.

Two bladderwort surprises. The recent note on a range extension of Pigmy Bladderwort (CPN II, p. 59), Utricularia olivacea, brought back memories. In September, 1959, Mrs. Ruth McVaugh Allen, a local botanical artist, sent me for identification sketches of a tiny bladderwort which had been discovered floating just under the surface of the "Goose Pond" southwest of Egg Harbor, New Jersey, by Frank and Robert Hirst, keen amateur botanists of Pleasantville. Unexpectedly it proved to correspond to Utricularia olivacea which was thus far known in the U.S. only from Sanford, Florida. Mrs. Allen wrote this up for Bartonia, and it was published in No. 29, dated December 16, 1959. Her illustrations seem to have been the first detailed ones made of this plant; they are reproduced on the cover of this CPN. Intermediate stations were subsequently discovered in North Carolina, but extreme range disjunction seems still represented. Carnivorous plant enthusiasts may well be on the lookout for it in intervening Coastal plain ponds.

The Inverted Bladderwort, Utricularia resupinata, is so rare in New Jersey that new stations are considered worth recording. Early one spring I was exploring the margins of the Big Cypress Swamp on southern Florida, and while looking down to make sure I was not stepping on a water moccasin, I noticed a profusion of tiny lavender flowers. They turned out to belong to this species--here so common that scores were crushed by every footstep.