would like to do with this project is concerned. On the few days I've been able to go "bogging" (weahter is also a factor), I've been driven out of the bog twice by surprise thunderstorms and once by gunfire. It is no fun trying to pipette pitcher fluid, do pH readings, etc. while crouching to avoid the projectiles of careless target shooters. As if the project itself isn't exciting enough...

Once in awhile I am able to use pitcher plants to explain the nitrogen cycle to the students. Somewhat expecting to be met with derision by the more "sophisticated", I continually find that the students are fascinated. My small CP collection (S. purpurea-both subspecies, S. flava, D. californica and D. muscipula) is not only decorative but also of considerable educational value.

I would like to offer two "cycles" of mine which I hope will help to explain the nitrogen cycle, not only in nature but also in the pitcher plant. Figure 1 is basically a new variation on an old theme; here dead microorganisms are considered part of the pool of decomposing organic matter. Also, where plant enzymes do the entire job of digesting insects, which is probably the case in Dionaea, is indicated by the dotted-line arrow, being a very minor part of the overall scheme. In Figure 2, which is more detailed and especially relevant to pitcher plants, commensal larvae (e.g. Wyeomyia smithii in S. purpurea) are shown to take some part in the activities within the pitcher; if they die in the pitcher they are then treated as "captured insects." The reason I indicated nitrogen fixation as being "not proven and unlikely" is because trace amounts of ammonia generally tend to inhibit nitrogen-fixation, at least of the Klebsiella or Azotobacter type. Plant leachates are indicated because they are highly important in providing nutrients for bacteria and fungi on almost any plant with a drop or film of water on it.

I put much emphasis on the fact that plants take in ammonia as well as nitrates, and certainly in carnivorous plants the intake of ammonia from insect digestion can be of considerable importance, possibly more so than intake of amino acids, depending on the species. According to a recent science yearbook, plants can absorb approximately 10% of their nitrogen requirement as ammonia through their leaves. Dionaea, however, which probably doesn't rely on bacteria for any part of the digestion process, most likely doesn't absorb ammonia from digestion, unless the prey is overly large and rots.

In the literature on carnivorous plant enzymes, many papers, old and new, have characterized digestive enzymes which were probably partially or totally contributed by bacteria. Here is an area in plant science that demands some intensive research by plant physiologists and microbiologists!

NEPENTHES AND THE PHOTOPERIOD

by J.A. Mazrimas

Healthy Nepenthes plants are relatively easy to grow providing that one supplies a few essential conditions. Usually you can receive a plant either rooted, or as a cutting that must be rooted and established in its growing container. Here are some rules that I follow to give large-pitchered plants:

WATER. I use plain tap water on my plants which is moderately hard, but I'm careful to use only warm water--about 60° F--or else I add hot water to it from the tap.

PROPAGATION. If you receive a cutting, it is a good idea to peel one-inch strips of epidermis from the end and dip it in Rootone (a hormone powder that accelerates root growth and usually contains a fungicide to prevent stem rot). Dipping the entire cutting in a solution of Benomyl or Benlate solution for a minute or two is also beneficial in preventing fungus and mold problems that may develop during the rooting process.

MEDIUM. I use only sphagnum moss because it is an ideal medium for retaining water and allowing good drainage as well as providing an acid medium. A mixture of coarse sand and peat with perlite will also suffice. The latter mixture requires water more often than the moss.

POT: I use only plastic pots or buckets with large size drain holes. It is important to use a large planting container for Nepenthes since the black wiry roots are rather extensive and seem to grow almost exclusively around the perimeter of the pot. Use a six-inch pot for new cuttings and an eight to ten-inch container for a rapidly growing year old plant. A plant 3-4 feet high must have over a six-inch pot in order for the roots to have room to grow. Well-established plants grow well in a ten-inch diameter plastic bucket with large drain holes cut into the sides.

ROOTING A CUTTING: Over the cutting, place a plastic bag which is

supported on stakes that are placed around the pot. Set the plant in a warm location in a well-lighted area. In about two weeks, take a peek to see how the plant is progressing but refrain from adding more water to the moss unless it looks very dry. Nepenthes root better in an airy, well-drained medium that is kept moist but not soggy. Replace the bag. In about 2-4 weeks you should observe new growth showing that rooting has initiated so that supplies of water can be increased.

FERTILIZER. Nepenthes plants respond very well to dilute amounts of fertilizer (either organic or inorganic) fed every six weeks to the roots during active growth (summer). This feeding does not limit the number or size of pitchers as is popularly believed. Don't over-fertilize.

HUMIDITY. Most Nepenthes will grow and form pitchers in ordinary greenhouses that maintain a relative humidity between 50 and 80%. If you do not have a greenhouse to grow Nepenthes, then I suggest construction of a simple rectangular box constructed out of 1" x 3" lumber and covered with 6 mil polyethylene sheeting. Standard fluorescent lighting should be installed with at least four 4-foot cool-white or Gro-lux lamps. A timer could be added for convenience.

TEMPERATURE. Usually, a night temperature of 65° F. is considered minimum and a daytime temperature of 70-85° F. is optimum but the lower range is desirable because the relative humidity remains higher.

LIGHT. In my opinion, this factor turns out to be the most important not only for growth but also for good pitcher production. Low light levels seem to produce weak growth and only a few pitchers. Medium light levels (about 40-50% full sunlight for 75% of the day) seems to promote not only the growth of stem and leaves but also good pitchers as well as many flower spikes. I also think that the length of photoperiod determines the onset of pitcher production during the coming season. In its native habitat for millions of years, Nepenthes geared itself to a constant flux of solar radiation throughout the year. The photoperiod doesn't vary more than 30 minutes in 12 hours between dry and wet seasons. However, as we proceed northward from the equator, the day length varies depending on the season. As we approach summer, the day length increases daily from about 9 hours in winter to as much as 14 hours at the 30° parallel and 16 hours at the 50° parallel in mid-July. The 30° parallel crosses the state of Florida while the 50° parallel crosses the U.S. - Canadian border. Here in California, onset of new pitchers takes place in June while in more northern states, new pitcher production should begin much earlier if the plants are grown under natural light. This is due, I believe, to the day length reaching the 12 hour level sooner than in the southern states. Pitcher production on new growth then ceases when day length falls below 12 hours. However, if you wish to have pitchers all year around, then you must grow the plants under artificial light, setting up a 16-18 hour light schedule. It may only be necessary to light the lower leaves of the plant while allowing the top to grow above the lights. The top growth still produces pitchers in my greenhouse despite the fact that the top portion might be 2-3 feet above the light fixtures.

SPECIAL NOTICES

KING'S PARK AND BOTANIC GARDEN (West Perth, Western Australis, 6005) which has been listed as a seed source in CPN in the past, wishes some clarification to be made. First of all, the Garden does not send plants to private individuals under any circumstances. Secondly, seeds are scarce due to wet seasons recently; in fact, there has been no Cephalotus seed for three years and will be none this year. They have an annual seed list in October of each year (there are no CP listed for 1973, so wait for the next issue of October, 1974), which you may purchase for 65¢ (surface, overseas), and seeds are $1.00 per packet, surface--air mail extra. DO NOT ORDER CP SEEDS WITHOUT CONSULTING THE UPCOMING GARDEN SEED LIST FOR 1974!

! SUBSCRIPTION RENEWAL NOTICE !

The time has again come for renewal of CPN. In order to conserve funds and effort, we do not send out bills, so please heed this notice to re-subscribe for Volume IV right now. Subscription is by the entire volume. This year, we have the subscription blank in the back of the newsletter and it is not paginated and there is no CPN material on the back of the blank, so you may remove and return the entire blank without disfiguring your CPN. This year we also have a poll attached to the blank in order that we can ascertain in what sort of direction CPN should go. The response to the newsletter has been and continues to be fantastic, so increase your satisfaction with CPN by completing the poll and mailing with your renewal check. PLEASE HAVE ALL RENEWALS IN BY FEBRUARY 1, 1975! We will remind you once more next issue about renewal, but this will be the only renewal blank and poll supplied.