fill its pot with leaves. When this happens flowering often decreases or stops, so I carefully cut out a deep hunk of soil and inoculate a fresh pot of growing medium with it—the rest goes in the mail to other growers. Seed from my plants has never germinated.

These plants are certainly not very impressive in or out of flower but their delicate beauty makes them well worth growing. I group my diminutive *Utricularia* species in a single tray so while individually they are easily overlooked, together there is always at least one plant flowering.

I would like to thank Peter Taylor and Don Schnell for previewing this and the other installments of this series, and for their helpful comments and criticisms. However, any inaccuracies or opinions expressed in these articles are fully my own.

Figure 2 *U. lateriflora*: A near floral pair. Even the bracteoles can be longer than the pedicels of *Australes* species.

Focusing on U. gibba—The "U" stands for Ubiquitous!

Barry Meyers-Rice, Steward Observatory
University of Arizona, Tucson, AZ 85721
email: bmeyersrice@as.arizona.edu

A reason I enjoy growing *Utricularia* is that so many are extremely tolerant of differing cultural conditions and forgiving of mistakes and neglect. But ask me about growing aquatic species and I become edgy. After a few months or years, whatever aquatics I try to grow invariably wane and finally die. But there is a class of aquatic *Utricularia* which are easy to grow and are not so sensitive—the affixed aquatics. While these plants grow in water, they must be in contact with a substrate of soil to prosper. The lovely species
U. gibba is such a plant.

The genus *Utricularia* is broken into two subgenera, *Polypompholyx* and *Utricularia*. In the latter subgenus are thirty-three sections and the largest (section *Utricularia*) contains thirty-four species including *U. gibba*. This section contains most of the familiar yellow flowered aquatics such as *U. macrorhiza*, *U. vulgaris*, and *U. australis*. Fortunately *U. gibba* is easily distinguished from most of these other species so identifying it is rarely a problem. I'll start this discussion of *U. gibba* by describing its form and habit so you can identify it yourself. Then I'll summarize how *U. gibba* has been confused with other plants in the past and lastly I'll include cultural tips. Describing any plant requires the use of some jargon and if you are confused by my usage refer to my *U. calycifida* article (CPN 21:1) and parts of CPN 20:1-2.

U. gibba grows in water only several centimeters deep. Examine a clump and you will see it consists mostly of green stolons which branch and intertwine to form a loose mat. This network commingles with the oozy muck of the pond bottom and anchors the plant underwater. Plants that grow like this are called affixed aquatics. Each stolon is several centimeters or more long and 0.2—1 mm thick. The stolons are terete (round in cross section). Rhizoids (small root like organs) may be visible hanging from the stolons especially near peduncle bases. They are only a few centimeters long.

Leaves are attached to the stolons at about 1 centimeter intervals and are small, only 0.5—1.5 cm long (Figure 1). Each consists of a pair of green hair like segments attached to the stolon in a V-shape. Sometimes each segment branches so a leaf has four to eight tips. Viewed under a microscope, each leaf may be seen to bear occasional lateral teeth, each tipped with a little distinct spike (or setula, plural setulae). The tip of each leaf segment is also setulose. Setulose leaves are a common feature of species from section *Utricularia*. Bladders are moderate sized (1—2.5 mm long) and are found only on leaf segments (usually not more than a few per leaf). Under a microscope each is bare of appendages except some long bristles near the trap's opening.

Some clones of this plant yield few flowers, while others (the ones I retain in my collection!) produce many. Peduncles are usually 2—8 cm tall, less than one mm thick, and terete. They do not twine or branch. Up to two basifixed scales about 1 mm long may reside on each peduncle. These scales have an interesting shape—if you detached and flattened one it would be semicircular or almost rectangular. Each peduncle usually bears two to six flowers (but may have anywhere between one and twelve) arranged in a very loose spiral above the water level. The pedicels are 0.2—3 cm long, terete, and green like the peduncle. Bracts (one at each pedicel base) are shaped like the scales. *U. gibba* does not have bracteoles. Taylor tells us that submerged cleistogamous flowers can develop on short peduncles. I've never observed them but they might just be eluding me in the stolon mat.

The calyx lobes (the two sepals) are 1—3 mm long, the upper lobe being slightly larger than the lower. Both are approximately round or ovate with rounded tips and smooth margins. The corolla (Figure 2) is typically large (2—2.5 cm long) and dwarfs the calyx but Taylor informs us that the flowers of some clones are as tiny as 4 mm long. Something that distinguishes *U. gibba* from most species of *Utricularia* is that the corolla upper lip is usually larger than the lower lip. The upper lip is circular or rounded-ovate and often clearly three-lobed. It is curved into a bowl-shape—like a clam shell—and is held vertical. The lower lip is also rounded in outline and has a prominent inflated palate bulge. The specific epithet *gibba* means bulge and refers to this. The long, straight spur is cylindrical or conical and is pressed close against the underside of the lower lip. The lower lip is either flat or may drape downward on either side of the spur. The spur often pokes out from under the lower lip. Its tip may be bifid. The entire corolla is yellow, often with red or brownish veins on the inflated palate bulge—standard coloration for most species in section *Utricularia*. The flower is odorless and lasts for several days to a few weeks before withering. For me, the whole effect of the flower is that of a baby bonnet—the upper corolla lip marks the baby's hood and the lower lip and spur represent the jowels and protruding nose of the sadly unattractive infant.

Like the CPer's CP weed *U. subulata*, this species has an enormous range. It grows on every continent of the world (except Antarctica) and is limited only in preferring warm climates. It occurs in most of the U.S.A., even Hawaii, except the plains and rocky mountain states (as usual it is not found in my own CP-deficient state of Arizona). It flourishes in all kinds of freshwater wetlands and Taylor even observed it growing as a semi-epiphyte. While it much prefers to grow in shallows it can occur as a free floating aquatic but rarely flowers in this condition. I have seen it on

Vancouver Island, Canada, growing in this form. In more suitable habitats *U. gibba* flowers during the warm time of the year, or year-round in tropical regions.

U. gibba is mentioned by Taylor as being one of the several most variable species in the genus—not too surprising considering its large range. The chief variation is in the size of the flower. Since Linnaeus first included the species in his *Species Plantarum* in 1753 more than sixty varieties of *U. gibba* have received temporary species status, four times even in genera other than *Utricularia*. During his career Taylor recognized several of these putative species but by the time he dealt with the group in his monograph he consolidated them all into *U. gibba*. I recommend you read the discussions of *U. gibba* and *U. striata* in his monograph for the details of his arguments if you are interested. The essence of his reasoning is that while some forms of *U. gibba* have large flowers and others bear small flowers, a continuum of plants with intermediate corolla sizes also exist and these plants blur the distinction between proposed species or even subspecies within the species *U. gibba*. The widely cited species *U. exoleta* and *U. obtusa* are both absorbed by Taylor's treatment into *U. gibba*. An excellent field photograph of *U. gibba* is on the back cover of CPN 21:3, where a typographical error identifies the plants as a *Drosera*.

The history of *U. gibba* in the U.S.A. is particularly confused. Biologists have tried to recognize a complex of three species they called *'U. gibba,' 'U. biflora,'* and *'U. fibrosa'*—all with similar flowers. The main difference between *'U. gibba'* and *'U. biflora'* was considered to be the size of the lower corolla lip. For example, an old key in CPN 2:4:p66 by Kondo describes the lower lip of *'U. biflora'* as 8—10 mm long and that of *'U. gibba'* as only 5—6 mm long. Also the name *'U. gibba'* was applied to specimens which had short, blunt spurs, while *'U. biflora'* was used for plants with longer, more slender ones. But many intermediate cases indicated these divisions were artificial. Lastly, it was thought *'U. gibba'* usually had fewer terminal leaf tips than *'U. biflora.'* Again this was found to be unreliable and poorly correlated to flower size. So *'U. biflora'* and *'U. gibba'* were combined into the species we know today as *U. gibba*. And how does *'U. fibrosa'* fit into this? Looking into the old literature, Taylor deduced two things. First, the original description of *'U. fibrosa'* by Walter was actually an account of *U. gibba*, so *'U. fibrosa* Walter' is a synonym of that species. Second, Taylor found that in the intervening years biologists mistakenly began calling a different species *'U. fibrosa,'* thinking it was the plant Walter described. This additional species had been described already under the name *U. striata*, a name Taylor adopted in his monograph. So in summary, sometimes the name *'U. fibrosa'* refers to *U. gibba* and other times it refers to *U. striata*. The easiest way to tell them apart is that *U. striata* produces two types of leaves—its leaves are dimorphic. One type of leaf is part of a stoloniferous and subterranean network much like *U. gibba* and the other type of leaf is foxtail-like and floats freely in the water. I observed fine specimens of this species in Lake Oswego, New Jersey, and in my ignorance reported it in CPN 18:3:p70 as *'U. fibrosa.'* Excellent drawings of *U. gibba* and *U. striata* are in the dicot volume of *Aquatic and Wetland Plants of Southeastern U.S.* by Godfrey and Wooten. In this work *U. gibba* is portrayed as *U. biflora*, Figure 323, and *U. striata* as *U. fibrosa*, Figure 315d. So there it stands—time to make annotations in the margins of the *Utricularia* sections of your reference books! And when in the midst of *Utricularia* confusion in the field or greenhouse, it is reassuring to your ego to know that professional botanists have been just as baffled.

For a quick reference, if you are in the field in North America and you find a yellow flowered aquatic *Utricularia* with a very large upper corolla lip (and no floats as in *U. inflata* or *U. radiata*), examine the leafy parts very carefully to see if there is only one kind of leaf. If the leaves are dimorphic, with some being big feathery foxtail-like leaves, then you have *U. minor*, *U. striata*, or *U. foliosa*. Also if possible, see if you

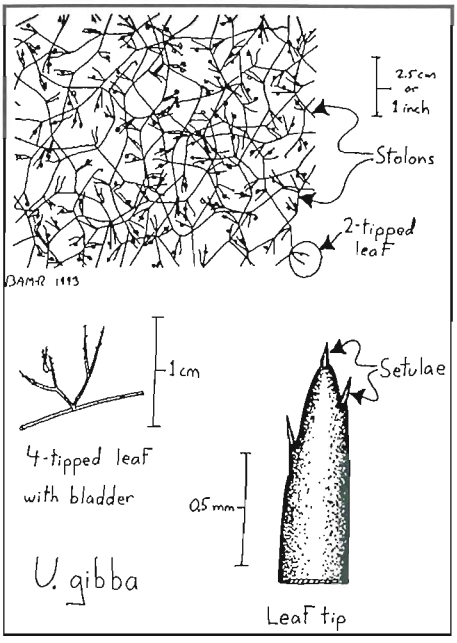

Figure 1: *U. gibba*—Vegetative features.

Figure 2: *U. gibba*—Chasmogamous flowers of a Florida clone

can find any ripe seed capsules opening. Do they open by a vertical spit that divides the capsule into two equal halves? If so, chances are you're looking at *U. gibba*. But for a good key, certainly more complete than the information in this paragraph, look to CPN 20:1-2.

As I mentioned above, affixed aquatics are infinitely easier to cultivate than suspended aquatics. Suspended plants are much more sensitive to the chemical balance and temperature of the water. Also algae overwhelm the plants and treatments for it often kill the *Utricularia*. In contrast, my technique for affixed aquatics is easy and nearly trouble free. For a growing container, you need a sturdy undrained pot or tub at least 7—10 cm deep and about 15 cm or larger in diameter. In this container lay 2—3 cm of pre moistened peat moss, peat-sand, or *Sphagnum*. Add a top dressing of a few centimeters of washed sand. The sand layer weighs down the peat so the water stays clear. Also since sand is lighter colored than peat it absorbs less sunlight and the water will stay cooler. Carefully add enough pure water to submerge the sand a few centimeters. If your clone of *U. gibba* is sturdy it may be planted immediately but I usually prepare a new tub a few days before I need it. This is to let the chemistry of the water equilibrate before introducing the plants.

Planting the *Utricularia* is trivial. Make a depression in the sand layer and wedge the plant into it. Then anchor it with sand, allowing some parts to still get light for photosynthesis. Thereafter keep the water table a few to several cm above the top of the sand. The plant will grow rapidly, making some stolons that wind through the sand and peat layers and others that float freely in the water. If you insist on growing the plant in deeper water or as a suspended aquatic it will not flower. When adding water take care not to disturb the sand layer or else you may allow mucky black peat to bubble up and dirty the water. The plant prefers full sun and can survive temperatures between 0—40C (32—104F) but you should try to emulate the climate of your specific clone's geographical home. I usually repot in early spring because after a winter of

slowed growth algae start to clog the *U. gibba* and irritate me. To repot I pull out the mass of *Utricularia* and replant a portion in a new container using the method I described above. The remainder is sent to other growers. By summer the tub is dense with growth and a profuse display of flowers. Strangely, my most floriferous clone never produces seed but clones which rarely flower often do produce seed.

I never fertilize *U. gibba* because it would probably result in an algae bloom. If you live near a very pure pond, you may want to take a few spoonfuls of pond water and add it to your *U. gibba*. The natural fauna will help feed your plant's traps, and may help graze the algae. But beware, it could also introduce pests such as snails which might eat the *Utricularia*! The only pest I have ever had on this plant are aphids attacking flower peduncles but removing the few infested inflorescence eliminated the problem immediately.

I am a reasonable person, so when I show newcomers my greenhouse I understand when they get a chuckle from seeing the tubs of my aquatic plants. One friend summed it up well when he said, "You're growing mud!" That is when I show them a container of *U. gibba*. While the other aquatics may not be doing much except looking mucky, *U. gibba* is almost always putting on a great display of lovely blossoms. It is a gratifying plant—grow it!

SARRACENIA CONSERVATION CONFERENCE

Report by Don Schnell (Rt. 1, Box 145C, Pulaski, VA 24301)

On 22-23 September 1993 a special conference called to discuss aspects of conservation, horticulture and trade of the genus *Sarracenia was* held at the Atlanta Botanical Garden. The conference was hosted by Ron Determann, supervisor of the Fuqua Conservatory, and Madeleine Groves of the Fauna and Flora Preservation Society (British). The conference was moderated by Ron Determann who did an excellent job of conducting lines of thought and gently bringing discussions back from tangents. About 40 invited people attended, a rather phenomenal number considering that there was no financial underwriting by the conference for travel, room, etc. The conference in effect centered on the southeastern states, and particularly the Gulf coast.

A written proceedings will be distributed to conferees in the near future, and supposedly will also be available to anyone inquiring. I will let readers know about this as soon as I hear more. In the mean time, I thought it would be useful to briefly summarize some of what I took away from the conference as well an my views on it. What I will present is certainly not complete since we spent about 12 hours in session. Further, what I have selected is of course inevitably colored by what struck me. Selectivity for these two reasons must necessarily be subjective to some degree.

The backgrounds of attendees were quite varied. We had professional botanists, hobbyists, commercial interests, a paper company, National Forest folks, field people from the Fish and Wildlife Service, TRAFFIC/WWF, state departments of natural resources, and so on. A very interesting cross section indeed. In addition to people from the US, there were attendees from Great Britain and Netherlands. The conference philosophy was a freewheeling informal brainstorming session in which topics were introduced by Ron and opened for comment.

During the round of introductions we were each asked to speak of our interests and quite independently several of us voiced a conclusion right at the beginning that the best hope for sarracenias was immediate preservation of large blocks of land containing good ecosystem, with "hydrology" secure, and with sound and continuous management. During the conference it was proposed by one conferee that a Pitcher Plant