A Field Trip to Mendocino

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Our cars pulled up in a cloud of dust along side a narrow road in the middle of a flat pine forest. There were ten of us, all CP growers, and as we ambled out of the cars, tugged on our boots, and checked our cameras for the last time, we were awed at the silence of the woods around us. A few hawks circled overhead.

"This way," someone said.

We followed him down a sandy trail. We were struck by the desolate look of the forest around us. The widely spaced trees were no taller than ourselves, twisted and contorted, tortured by the environment they lived in. The soil was hard and crusty from the seasonal summer drought; a sandy mix that looked like peat and cement. Lichens covered the branches of the dwarf pines, and there were rhododendrons scattered here and there and a few huckleberries. We looked like a march of giant Paul Bunyons, our heads poking above the forest canopy, able to see a mile in any direction.

"Over here," said Joe Mazrimas, and we left the main trail and pushed through the branches and came to a clearing. The ground was suddenly oozing. He pointed to a bright green mound. *"Sphagnum,"* he said.

"And *Drosera rotundifolia,"* said Mike Morris, crouching. "Hundreds of them!" The plants were a striking form of the common sundew: compact, deep maroon, and thick leaved. They grew flat on a dry crust of black peat, their roots penetrating deep to the moisture below. A few feet away the peat was visibly wet and an abrupt mound of yellow-green sphagnum rose like a spongy dome over the barren soil. We huddled around with our magnifying lenses. Although it was the same round-leaved species, in the moss the sundew formed the more familiar long green petioles poking two inches into the air, the wide blades thick with red tentacles. A flower stalk branched to five points above the rosette.

Chuck Powell led us a few dozen feet to a shallow pool of acidic water. The small pond was only a few inches deep, and only tufts of sphagnum grew along the embankment of naked black peat. "Look at these *'rotundifolia',"* he said. "Aquatic." Scattered rosettes of the sundew, some over five inches across and deep red, floated upon the surface of the pond. Chuck dipped his hand into the pool and lifted the spoked leaves of a plant. "Practically rootless," he said. "They just float on the algae."

We heard a cry from behind a clump of tall sedge grass. Several people were huddled over something exciting and Allen Krever was taking photographs. It was a blaze of *Drosera binata multifida,* spidery and glistening, a clump almost two feet across.

"Look at this," called Geoff Wong. His finger pointed to an embankment where the puffed serpentine heads of *Darlingtonia* poked from a green waterfall of sphagnum. There were dozens of them, and scores of bright maroon seedlings matted the ground like writhing snakes.

There was a lot more to see, and soon our group was moving from this mound of sphagnum to that bed of peat, cameras clicking, and boots oozing into the muck.

We found clumps of hip high *Sarracenia,* and between the *rubra* and *minor* the bright lavender flowers of *Pinguicula esseriana* yawned into the air. Just across from a couple of venus flytraps next to a slow moving stream grew a few bold looking *Drosera anglica. Darlingtonia* shaded some flat glittering rosettes of *Drosera aliciae.* Scores of *Drosera capensis* grew a stone's throw from a small clump of *Heliamphora.*

Where were we, South Africa? The east coast of Australia? Or was this the Green Swamp of Venezuela?

Fig. 1 *Drosera rotundifolia* growing aquatically.

Fig. 2 *D. binata multifida* with mostly "T" type leaves.

ALL PHOTOS BY AUTHOR

Fig. 3 *D. rotundifolia* on drier peat substrate.

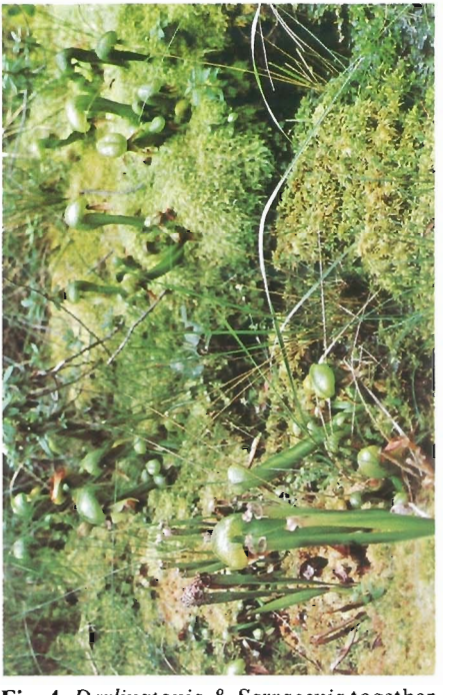

Fig. 4 *Darlingtonia & Sarracenia* together in Sphagnum.

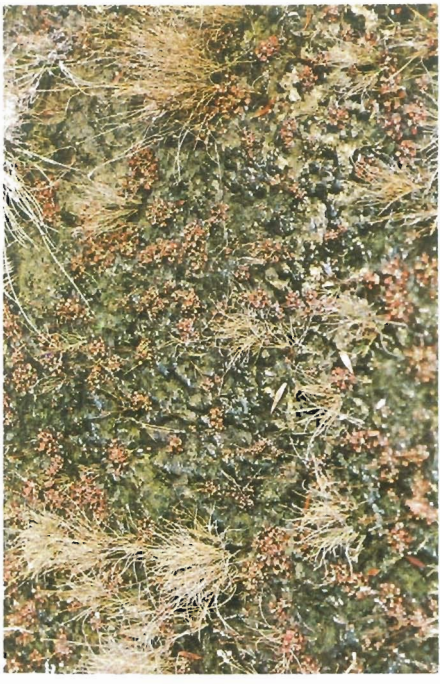

Fig. 5 *D. rotundifolia* on black peat.

Fig. 6 *D. capensis* in flower growing in sedge.

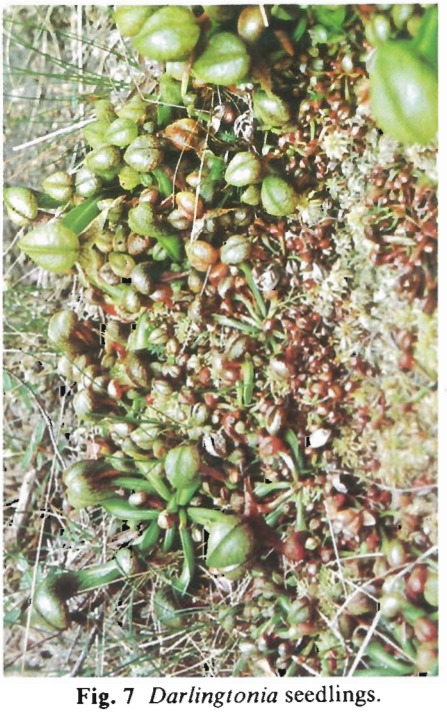

Fig. 7 *Darlingtonia* seedlings.

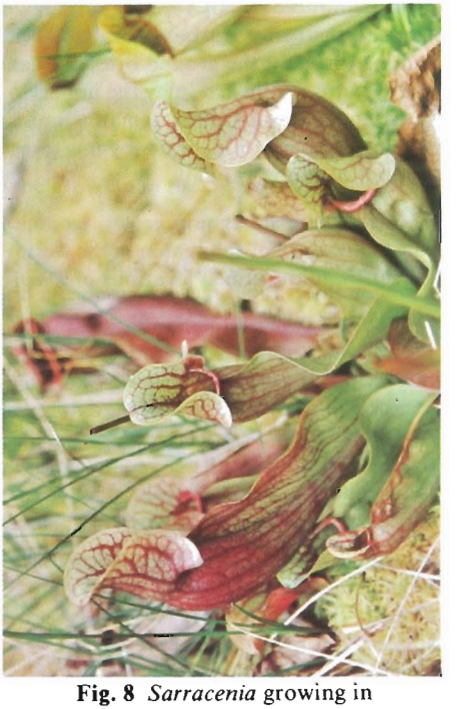

Fig. 8 *Sarracenia* growing in Mendocino bog.

The ten of us had agreed the previous August during the San Francisco Plant and Flower Show to meet two months later and almost two hundred miles north, in the small coastal lumber town of Fort Bragg, Mendocino County, California. This thirty mile strip of northern California coast, from the Navarro River in the south to Ten Mile River in the north, has attracted geologists and botanists the world over for decades. This is where the famed geological terraces are, and the mysterious pygmy forests of Mendocino.

Geologists now recognize this ancient coastline to be a prehistoric wonder, a monument to the changing level of the sea from glacial age to glacial age. Here, in the form of terraces going inland and uphill, are the remains of five Pleistocene beaches, each several hundred feet wide and about a hundred feet higher in elevation than the last. Each ancient beach or terrace was formed hundreds of thousands of years apart in some cases, and pushed even further above the sea level by the plate tectonics of the San Andreas fault, so that the first terrace above the present beach goes back almost 100,000 years, while the uppermost terrace, now some 600 feet above the ocean swells, is estimated to be around a million years old.

In our present era, each terrace plays host to its own ecosystem, from the dunes of the current beach to prairie grassland (first terrace) to redwood forest (second terrace) to Bishop Pine (third) and Douglas Fir (fourth). It is the uppermost, or fifth terrace, that most interests us. Here, on this million year old ridge some 700 feet above the sea, lie the ancient sand dunes that are now the habitat of a natural bonsai forest.

After countless millennia of winter rains, the soil here has been leached to become one of the poorest in the world. With a pH of about 3.0, the top layer of soil is an extreme podzol only a few dozen centimeters deep, underlain by an impenetrable layer of iron-cemented hardpan. Of the few plants adapted to this harsh environment, many have become naturally dwarfed, such as the Mendocino cypress, *Cupressus pygmaea,* and Bolander's Pine, *Pinus contorta ssp. bolanderi.* A fifty year old tree can be just 2½ feet tall with a trunk only a few centimeters thick.

It is in these pygmy forests that a few sphagnum bogs have been formed. Winter rains saturate the forest, forming pools of acid water from November until May. During the summer drought the ground dries out except in a few locations where underground pools and streams are locked in by the impervious ironstone. If the underground water supply is sufficient, the soil surface remains moist and sphagnum moss takes hold, forming small patchy peat bogs amid the dry pygmy forest, bogs that seem to shift over the decades with the amount of winter rainfall.

And where sphagnum grows, so does *Drosera rotundifolia.* This is the southernmost coastal location of sphagnum in the west. Bogs become more common hundreds of miles to the north, in the famed locations of *Darlingtonia.*

Joe Mazrimas hunted out these rare bogs of Mendocino County back in the late 1960s. During the 70s, he, Larry Logoteta and Ray Triplett chose one small section of an isolated bog in the southern extreme of the pygmy forests for experimental plant studies. Plant competition was negligible as the extensive mats of sphagnum played played host only to the common *D. rotundifolia,* which often didn't even colonize the moss in some locations. So they scattered seed and planted greenhouse specimens of various CP from around the world in this one bog, and the results were what the ten of us CP growers saw in October, 1987: a small botanical garden of world carnivorous plants.

Soil conditions aside, it is the mediterranean climate of Mendocino County that make the bogs so hospitable to a wide variety of plants. From late fall to late spring, the coast receives almost 40 inches of rain, with temperatures 38 to 65F (4 to 18C) and rare frost. In the summer, the drought is relieved by heavy coastal fog that mists the pygmy forests to the point of dripping, with temperatures 50° to 80° F (10° to 27° C).

Although many species of CP have been tried, it is interesting to note the survival record. One species introduced by seed has become most obviously naturalized, that being *Darlingtonia.* The pygmy forest bogs are more similar to the species' Oregon coast habitats than to the mountains of California. *Darlingtonia* grow thick, with seedling colonies spreading down slowly moving streams in sphagnum. A surprisingly prolific plant is *Drosera capensis,* often dying back to its roots after winter frosts only to reappear with a vengeance in spring. *Drosera capensis* can grow as a small, compact, bright red plant on a sunbathed mount of peat, to a large and green stalked plant in shallow, shaded pools of acidic water.

The various sarracenias have thrived, forming thick colonies along sphagnum stream beds, mostly proliferating by branching rhizomes. Although abundant flowering was evident, no seed was found in the few capsules examined, and there is no evidence of seedling growth as there is with *Darlingtonia.* The plants grow beautifully, though, with many robust species and hybrids.

Joe Mazrimas reports disappointment with *Dionaea.* Although thousands of seeds have been scattered over the years, only a half dozen or so have survived to an attractive maturity. Joe believes rodents may be devouring the bulblike rootstock of the flytraps. They survive best when hidden in sphagnum.

There is a small and handsome colony of *D. aliciae* apparently spreading through seed production, and a few *D. anglica* have survived the transition from their colder mountain habitats. Another failure is apparently *D. filiformis* and its forms. None could be found despite all the seed that had been scattered. A couple of highland *Nepenthes* plants also have not survived. Forms of *Drosera binata* have spread into large clumps but would need different clones nearby for seed production. The same is true for several Mexican pings found in the bog, although some may be producing viable seed. Their colorful flowers poke vigorously from the moss and everyone is surprised they haven't been lost to the giant and aptly named banana slug known to the area.

Two clumps of *Heliamphora heterodoxa* have recently been introduced, and are expected to do well since they enjoy a *Darlingtonia*-like habitat. Time will tell, and only a severe frost may endanger them.

On that weekend in October everyone seemed to get into the act. In stage two of the experimental plantings, seeds of largely winter-growing Droseras were scattered upon the dry peat mounds, sure to be wet come the winter rains. In a few years plants such as *D. macrantha, peltata, pauciflora* and *trinervia* may be growing in the pygmy forest as well.

But there was more to do in Mendocino than just bogging.

Bob Standley of Noyo River Laboratories, the tissue culture lab, showed off his own pet project at the Mendocino Botanical Gardens. Bob is a popular orchid and rhododendron grower in the area, with a large selection of CP in his Fort Bragg greenhouses as well. It looks like he may have convinced the directors of the attractive Botanical Gardens to turn their neglected lily pond into one of the largest outdoor CP bogs in cultivation. Everyone was enthusiastic over the 50x30 foot area as being ideal to grow a wide assortment of CP in a mild outdoor climate. There was a lot of work to be done, from draining to clearing to preparing, but already Bay Area growers were lining up donations of plants to put in the bog. In a couple of years the CP bog may be the hit of the Gardens.

Bob next took us to a rhododendron nursery owned by a friend. In a man-made pond on the property, giant *Utricularia* had made an appearance "out of nowhere." Joe Mazrimas guessed the species to be *U. vulgaris (macrorhiza).* The bladders turned from green to red to black, and the meter long stems were just beginning to form their winter turions.

See **MENDOCINO** on page 21

Book Review

Pietropaolo, James and Patricia Pietropaolo, 1986. Carnivorous Plants of the World. Timber Press, Portland, Oregon. 206 p. $25.00

Although known as diverse botanical entities for hundreds of years, serious interest in growing carnivorous plants as horticultural specimens extends to the middle of the 19th Century when explorers returned to the Old World with specimens of strange pitcher plants found in the various parts of the world: the United States, Venezuela, Borneo, and Australia. The "Golden Age" of carnivorous plants began about 1873, when Charles Darwin published *Insectivorous Plants.* He studied the trapping mechanisms of eight different types, including Venus' flytrap, sundews, butterworts, and bladderworts. Our southeastern United States' native pitcher plants *(Sarracenia* spp.) had not yet proved to be carnivorous, and thus they were not included in his book. Only after Joseph H. Mellichamp, M.D., of Bluffton, South Carolina published his observations in 1875 on the "attractive" nature of the sweet secretions and the "digestive" ability of the liquid inside the tubular leaves of the hooded pitcher plant *(Sarracenia minor)* did the notion become apparent that these plants might be carnivorous also (catching mostly ants, beetles, and moths). In the second edition (1893) of Darwin's book there was a brief mention of pitcher plants.

For botanists and others wishing to learn more about the behavior and the peculiarities of these intriguing plants by growing them, this modern book written by two long-time carnivorous plant growers is a most useful volume. Readers may be surprised to learn that there are over 15 genera and more than 550 species of carnivorous plants located throughout the world. This diversity is divided among many phyletic lines, from moderately-advanced to highly-advanced families. There is even a carnivorous monocot (a bromeliad, *Brocchinia reducta),* though it is not considered in the present book. Despite the diversity, carnivorous plants do seem to have in common the requirement for moist-to-wet substrates, and they are generally found in nutrient-poor habitats.

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The group saw other bogs in the pygmy forest area. Around one pond in a transition zone between redwoods and pygmies, a type of aquatic sphagnum grew, dying back to sheet moss as the pond shrank during summer. Surprisingly no *D. rotundifolia* or *Utricularia* grew there, and we debated back and forth as to why.

In another bog we found acidic pools with a more delicate *Utricularia* growing in it, with bright yellow flowers over the surface, probably *U. gibba.* We saw other bogs that were lush and wet in winter, with sphagnum three feet deep in areas, that became dry and dormant in the summer months. *Drosera rotundifolia* apparently survived drought years through seed.

That evening the group gathered in one of the hotel rooms and was entertained by the experience of veteran CP growers Joe Mazrimas and Larry Logoteta. Legends of the CP world were remembered, and plans for a possible northern California CP club were discussed.

The following day we ended our field trip with an afternoon at Bob Standley's greenhouses and lab. Although specializing in orchid and begonia culture, Bob passed around vials of *Heliamphora* and *Nepenthes* for all to see. We were awed by his flow tables of *Pinguicula* that grew to the size of dinner plates, and of the giant *N. truncata* and *spathulata* hanging from the rafters under glass.

It was a pleasant way to end a busy weekend, a field trip that seemed to take us all the way around the world.

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Front cover: *Darlingtonia californica* growing in the Mendocino bog with flowers of *Pinguicula ehlersae* visible in foreground. Photo by P. D'Amato. See article on page 15.
Rear cover: *Sarracenia leucophylla* growing in the Mendocino bog.

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