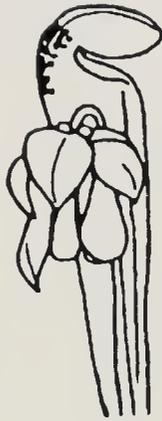


CARNIVOROUS PLANT NEWSLETTER

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CARNIVOROUS PLANT NEWSLETTER

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Front cover: *Pinguicula alpina*. Photo by Jurg Steiger of plants from Switzerland.

Rear Cover: *Nepenthes pervillei*. Photo by J. Bogner near Sans Souci, Mahe, Seychelles.

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Views expressed in this publication are those of the authors, not necessarily the editorial staff.

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ICPS Seedbank

C/O Thomas J. Johnson, P.O. Box 12281, Glendale, CA 91224-0981

11/07/93 Update

- Byblis liniflora* (11)
B. liniflora 'West Aus.' (6)
Capsella bursa-pastoris (6)
Dionea muscipula
Droso. lusitanicum (4)
Drosera aliciae
D. anglica (2)
D. anglica Gold Lake Bog, OR
D. anglica Wash. State (1)
D. auriculata Molcoa, NSW (1)
D. binata (5)
D. binata - Northland, NZ (3)
D. binata - Hauraki Pl, NZ (1)
D. brevifolia (4)
D. burkeana (5)
D. burmannii (7)
D. burmannii W. Aust. (4)
D. capensis
D. capensis 'alba' (12)
D. capensis 'Narrow Leaf' (9)
D. capillaris "Giant'-Florida" (2)
D. capillaris (5) & *alba* (5)
D. capillaris 'pink' (4)
D. collinsae (2)
D. dielsiana (16)
D. esmeraldae (10)
D. filiformis filiformis (12)
D. filiformis tracyi (5)
D. indica (2)
D. indica 'rd plt, pk flwr'
D. indica 'rd plt, orange flwr'
D. indica 'grn plt, pk flwr'
D. intermedia
D. intermedia 'Carolina Giant'
D. intermedia 'Tropical'
D. intermedia Cuba (3)
D. intermedia Brazil (3), Giant (5)
D. intermedia "Brunswick, N.C."
D. intermedia 'Pine Barrens' (9)
D. intermedia 'Walker Lk, Ont.' (3)
D. lasiantha (8)
D. natalensis (12)
D. natalensis red flr (4) & pink (1)
D. peltata 'green rosette' Molcoa, NSW
D. neesii ssp. *neesii*
D. neesii ssp. *borealis* (15)
D. nitidula leucostigma (1)
D. pulchella (2)
D. rotundifolia
D. rotundifolia CT (1)
D. rotundifolia 'Bruce Penn, CAN' (4)
D. rotundifolia 'Haines, AL'
D. rotundifolia 'Mendocino County, CA' (6)
D. sessilifolia (8) (ID ???)
D. spathulata (8)
D. spathulata 'aihmi Prefect, Japan'
D. spathulata Kansai (2)
D. spathulata Kanto (2)
D. spathulata 'hairy sepals' Gympie, QLD (7)
D. spathulata 'NSW, Aust.' (1) & Victoria (1)
D. sp. 'Magaliesburg' (12)
D. venusta (6)
Sarracenia alata (4)
S. alata 'Vernon Parish, LA' (3)
S. alata *Nigrapurpurea*
S. flava
S. flava *typica*, small flower, NC (1)
S. flava 'veined neck' (4)
S. leucophylla (7)
S. minor
S. oreophila (5)
S. psittacina yellow/orange flower mix
S. purpurea
S. purpurea purpurea (6)
S. purpurea purpurea f. *heterophylla* (3)
S. purpurea venosa v. *burkei* (4)
S. purpurea venosa East. NC (15)
S. rubra
S. rubra gulfensis (3)
S. X (*alata X psitacina*) *X alata* (?) (1)
S. X minor X leucophylla (pubescent) (1)
S. X oreophile X rubra (1)
S. X (*flava* red *X leuco*) *X itself* (5)
U. calycifida (1)
Utricularia chrysantha
Pinguicula grandiflora (3)
P. grandiflora f. *pallida* (1)
P. lusitanica (1)
P. pachuca (1)
P. primuliflora (1)
P. X sethos X itself (1)
N. khasiana (M) *X alata* (F) (5)

News and Views

Aaron Putnam (HC85 Box 9821, Eagle River, AK 99577, USA, Tel. (907) 696-5606

I have enjoyed being a member of the I.C.P.S. for three years (I'm 12 now) and would like to share my experiences while looking for C.P.'s in Montana and Alaska. In the fall of 1992 my Dad was doing archaeology in Southeast Alaska on Prince of Wales Island. During my travels throughout *Montana*, I found several *D. rotundifolia*'s in the Rattlesnake Wilderness Area and lots of *U. minor* at Lolo Lake in the Bitterroot River valley. I looked for *D. anglica* and its' subspecies *D. longifolia*, but failed in to find any.

The day my dad came back from Prince of Wales I., I had no Idea what was in store for me. He brought back specimens of *D. anglica*, *D. rotundifolia*, *D. x obovata*, *P. vulgaris*, and *P. vulgaris s.s.p microceras*!

A year later we moved to Alaska, and while traveling the Alcan Highway I found a very long *D. anglica* before we arrived at Liard Hot Springs, where we found even more species of C.P.'s.. We saw *D. anglica*, *D. rotundifolia*, *D. x obovata*, *P. vulgaris*, *P. villosa*, *U. intermedia*, and *U. minor*. All of the Bladderworts were below the "Hanging Gardens" in which the all of the Sundews and Butterworts grew.

When finally reached Eagle River, we rested for a winter and started looking again in June. I didn't find too much in the way of C.P.'s this year though, I found some nice *D. rotundifolia*'s, and I am now watching a *U. vulgaris* eat some fresh water brine shrimp in its' new tank in my room.

This year my dad once again did some archeology in Prince of Wales I. and brought C.P.s for our newly built outdoor bog, where they are accompanied by two *S. purpurea*'s from Farmington, Maine, where I lived for six years. Finding such incredible C.P.s in Alaska has made moving a lot easier to cope with. The vast and largely unexamined wetlands of this remarkable State may hold some real surprises. I would love to hear from anyone who is interested in these C.P.s. I enjoy learning about C.P.s from other parts of the world and am particularly interested in *Nepenthes* sp..

Jeff Gold (1592 Union Street, #290, San Francisco, California 94123
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Status of the TEPUIS organization.

When I founded the nonprofit organization TEPUIS in 1990, I intended to do my best to protect and study the environment. My longtime fascination with the carnivorous plants of Venezuela inspired me to sell most of my furniture and move out of my home in San Francisco so that I could spend several years in Venezuela studying, photographing, collecting, and propagating through tissue culture the many carnivorous plants of the region.

I gained the support of several prominent botanists and then, only after receiving the verbal consent of the Venezuelan government, I solicited contributions from those interested in studying or propagating Venezuelan carnivorous plants. I was able to obtain all of the necessary permits from the Venezuelan government. Our first expedition was a major success.

Upon returning to Venezuela several months later, at which time I intended to make Venezuela my new home, I found out that an influential organization of elite Venezuelan pseudo-scientists had accused me of collecting rare and endangered species of orchids. They probably made these false allegations because I did not use their chartered helicopter service to get to the tepuis (I chartered my own flights at 1/10 the cost). Nonetheless this became a major news story in the national Venezuelan newspaper during the period of time I was out of the country.

Unfortunately, I was not made aware of the fate allegations until it was too late

and the information had already reached prominent botanists in Venezuela, and others around the world. I tried to explain myself, but, by that time, it seemed too late. Rumors were faxed around the globe, my permits were suspended, and my TEPUIS membership list was confiscated by the Venezuelan government.

Despite months of correspondence with the Venezuelan government, I have been unable to reaffirm my organization's credibility. As time goes on, I hope to renew my ties with the Venezuelan government in order to, resume the careful research, collection, and propagation of Venezuelan carnivorous plants as I had originally intended.

Most of the money donated to TEPUIS went toward our first successful expedition to Roraima and the Gran Sabana, as well as toward a frustrating second expedition that ended with a helicopter trip to Ilu-tepui being brought to an end midflight after surveillance from a Venezuelan National Guard helicopter.

TEPUIS members may request a refund of the unfulfilled portion of any obligations. Please do so in writing, letting me know how much money you feel should be refunded in regard to the amount of service we have been able to provide to you thus far.

All TEPUIS contributions were spent in their entirety on our first two expeditions, and the subsequent work I engaged in to try to restore our permits. Nonetheless, I will honor requests for refunds by paying them from my own personal savings. Anyone that does not wish to request a refund, can rest assured that I will continue to correspond, for years if necessary, in order to once again obtain the necessary permits. I still intend to fulfill my promise to study, collect and propagate the Venezuelan carnivorous plant species.

As a show of faith of my dedication to studying and preserving the carnivorous plant species of the world, I am herewith donating \$1,000 to ICPS, \$200 to my local Carnivorous Plant chapter, and, in the name of ICPS, \$2,000 to the Nature Conservancy.

I have numerous photographs from the tepuis that I hope to have published in future issues of CPN. I was so shaken by the incidents that occurred in Venezuela a few years ago that I have been unable to even look at my own photos until recently.

As can be witnessed in the pages of several issues of CPN, almost anyone can go into Venezuela unannounced and travel to the tepuis. I doubt most of the people you've read about in CPN have obtained permits to travel to the regions they have, or to collect the plants and seeds that they have collected. I learned the hard way why they probably had not.

Randy Lamb (P.O. Box 6112, Whitehorse, Yukon Territory Y1A 5L7 CANADA)

I have some bad news regarding the experimental CP bog we had going in the Pacific Northwest - or should I say past CP bog. The locality of this floating Sphagnum bog in a reservoir lake within a protected [supposedly] watershed area near an existing ecological reserve failed to preserve it. Ultimately it was learned that the land was privately owned and was to be developed into a golf course/town house resort in the near future. By the time we had learned of the bogs demise and attempted to recover our several years of invested CP - it was too late. Since this news broke I have not seen the CP bog, which was located in Josephine Lake on Bowen Island near Vancouver, British Columbia but Doug Fung has and he reported that the bog no longer exists. What a waste.

The Genus *Heliamphora*

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Of all the insectivorous plants in cultivation, the genus *Heliamphora* is still, perhaps, the rarest and least understood. Differentiating species has been confusing in the past because of the wide variation in the appearance of the plants growing under different conditions. In this article, I will present a simplified key for species identification as well as some background and cultivation information.

Introduction

The first description of *Heliamphora* was given by the English botanist George Bentham, who described *Heliamphora nutans* in 1840.(1) The name *Heliamphora* was derived from Greek, meaning "marsh pitcher." (2) Since then, *H. macdonaldae*, *H. tatei*, and *H. tyleri* were described in 1931 (3), *H. minor* in 1939, *H. heterodoxa* in 1951, and finally *H. ionasii* and *H. neblinae* in 1978.(4) Subsequent reviews of the species by Maguire(5), Steyermark,(4), and most recently, Steyermark and Berry(6) have revised the genus into 5 distinct species with a number of subspecies. I had an opportunity to spend time at the Herbario Nacional of Venezuela (VEN) in Caracas studying their extensive herbarium collection of *Heliamphora* specimens, and the following is a condensation of my own observations, and the previously written treatises on the genus.

Species

- In studying field, home grown, and herbarium specimens, it quickly became clear that leaf shape and size is unreliable in species identification. *H. minor* has been reported to grow over 30 cm tall, whereas I have seen *H. heterodoxa* with nutans-shaped leaves and *H. ionasii* only 8 cm tall as a full-grown adult plant with narrow tubular leaves. Because of this, the most reliable method of differentiating species is probably based on the flower. Secondary leaf characteristics can then be used to confirm the identification.

The most recent review of Steyermark and Berry has classified *Heliamphora* into 5 species: 1) *minor*, 2) *nutans*, 3) *heterodoxa*, 4) *tatei* complex, and 5) *ionasii*. Table 1 summarizes my key to identification of these plants. Basically, the genera is divided into 2 groups based on the size of the flower anthers. Anthers larger than 4.5mm are considered large and comprise the species of *H. heterodoxa* and *H. tatei*. *H. nutans*, *H. minor*, and *H. ionasii* all have small anthers in the range of 2.5-4.0 mm. Next, the presence or absence of hair on the flower pedicel will help to further differentiate species. *H. nutans* and *H. heterodoxa* do not have hair present on the pedicel, even when the most distal part of the pedicel is examined under magnification. (20-30x magnification may be needed to see some of the fine hairs, which may only be present just at the junction of the flower with the stem). Finally, the number of anthers present and secondary characteristics mentioned in the key will help to confirm the plant's identification. Table 2 summarizes secondary characteristics which can be used to help confirm a determination, or when flowers are not available for examination. Note that the information in Tables 1 and 2 apply only to mature, adult plants. Juvenile plants cannot be identified with any certainty.

Using this key, all of the herbarium plants with flowers could be quickly and easily identified, with the exception of plants originating from the Chimanta Massif mountain range in southeastern Venezuela, where plants share traits of both *H. minor* and *H. heterodoxa*. *H. minor* from this area typically grow quite large (like *heterodoxa*),



Figure 1. Typical Venezuelan Tepuis - Mt. Roraima on right, Mt. Kukenan on left. In the Gran Sabana, Bolivar State, Venezuela.



Figure 2. *H. nutans* in habitat, Mt. Roraima, southern ridge, 7000'.



Figure 3. Lowland *H. heterodoxa* in habitat, Gran Sabana - 4000'.



Figure 4. Author examining *H. ionasii* from 1st tier below the summit, Mt. Ilu. Fog in background is common.

while *heterodoxa* often show an uncharacteristic presence of pedicel hair. To investigate this further, I marked all the known locations of *Heliamphora* on a map. I found that only *H. minor* and *heterodoxa* have any ranges with significant overlap. The two species also share broad habitat tolerances, growing at both ground (4000') and mountain (7000 - 8000') elevations. I feel that this suggests that the mixed characteristics of plants from this area may be due to natural hybridization. A number of growers have now bred hybrids from these species, and it will be interesting to observe what traits are carried by the offspring to see if my hypothesis is supported.

Growing Conditions in Nature

I have seen all the species except for the *tatei* group in their natural habitat in Venezuela. Both *H. minor* and *H. heterodoxa* have been located in the Gran Sabana at elevations as low as 4000'. Temperatures at that level range from the 70-90 degrees during the day to about 50 - 70 degrees at night. These lowland *heliamphora*, however, always grew in areas of seeping ground water, and it is quite likely that the actual growing climate they experience is cooler because of the spring water. The majority of the plants grow at the higher altitudes and cooler conditions on top of the tepuis. A tepui (pronounced tey-PU-ee) is one of the flat, tabletop mountains formed by the unique sandstone geography of Venezuela. Most of the tepuis are at a height of 6000-8000', and probably average temperatures of 60-80 degrees Fahrenheit during the day, and 48-60 degrees at night. The plants are always found in areas of high rain and mist. On a typical day when I was present, it would not be uncommon for it to rain all night long and over half of the day on the tepui top, and I was there during dry season! There is little water reserve on the top of the mountain, and the soil tends to drain and dry quickly without the frequent rains. Although Dr. Paul Berry reported to me that he has observed the tepuis go dry for days, the tops of the mountains typically sit shrouded in clouds, and tend to remain wet year round. Ground-level plants were found only in marshes that appeared to remain wet throughout the year.

The tops of many tepuis are bare sandstone. The natural weathering of the rock creates a pink, sandy soil which would be quickly washed away if small, quick-growing plants like *Xyris decussata*, a grasslike plant, were not present to help retain the soil. The decaying leaves of the *Xyris*, and their fine roots retaining the soil underneath it usually form the substrate in which the *heliamphora* grow. The pitcher plants usually place only a small number of roots into the organic media to anchor themselves, and to help provide water during rare dry spells. Roots often extend several feet down when the organic layer is deep. A large rhizome is formed as the plant adds new pitchers over time. Many of the species send out runners similar to *Darlingtonia* and *Sarracenia* to the extent that a single large plant with its offshoots may occupy several square feet.

Dry season in southern Venezuela extends from October-November to March, with the months of January and February usually the driest. *Heliamphora* will usually start blooming near the end of dry season, usually in January and February. Plants set seed in approximately 1-2 months. It was interesting to observe that on any flower spike, the first flowers to open rarely developed seed, and the second or third flower always developed the largest seed pods. Plants appear to have their stigma mature before their pollen is released, so self-fertilization is unusual. This concurs with the observations made by Schnell in his homegrown plants(7). I did not observe the flowers being pollinated. Renner states that bumblebees and carpenter bees are the primary pollinators of *H. tatei* var. *neblinae* (8), although I did not observe them on my trips on the Roraima-chain plants. Maguire stated that "birds are the most commonly observed pollinators (on the tepuis) (9). I did observe one hummingbird

flying around a group of *heliamphora* on Mt. Ilu.

Examination of the contents of traps on the surface of the Roraimachain tepuis revealed a paucity of insects. Most were filled only with rain water. Indeed, in general, there were few insects seen on these tepuis. Plants found in the Gran Sabana had a much higher insect load, and mosquitoes were found breeding in some of the pitchers.

Examination of the Roraimachain plants show that they grow very slowly, adding only about 3-4 leaves per year on mature plants. This may be from a combination of low temperatures, the harshness of the growing conditions, and the relative lack of nutrients, even from insectivorous prey. This also points out the fragility of their environment. A few hikers passing through a *heliamphora* bog may cause damage requiring an entire year to recover!

Plants appeared to grow well in a wide range of conditions ranging from full sun exposure to heavily shaded rock crevices. As might be expected, plants that received a lot of sun exposure in general had more intense coloration and smaller size. The largest plants were always found in very damp areas with diminished sun light and protection from wind exposure. A fourfold difference in size for the same plants growing in different condition extremes was common.

Growing Heliamphoras at Home

Despite the rarity of the plants, *Heliamphora* are no more difficult to grow than *Cephalotus* and survive under similar conditions. The main error most people make is not providing a cool and humid enough climate. Maximum temperatures should be limited to 85 degrees Fahrenheit, with temperatures around 75 degrees much more desirable. Night time temperatures drops do not appear to be necessary (as it is with most highland *Nepenthes*). Although *H. heterodoxa* has been observed to survive 17 degrees Fahrenheit (10) (regrowing from the rhizome), it would probably be prudent to limit night cooling to 45-50 degrees. As with all carnivorous plants, I have always used only demineralized water to grow *Heliamphora*, so I don't know if they are tolerant to most tap waters. Until they become more readily available, I would recommend using only demineralized water to limit pH changes of the soil. *Heliamphora* should be kept under high-humidity, and greenhouse plants will benefit from frequent misting to simulate their natural environment. I use a cool-mist room humidifier which I purchased at a drug store to continually fog my plants.

The organic material in which I saw them growing in nature is probably best approximated by sphagnum moss, or a combination of leaf mold, chopped sphagnum and sand. I've always grown my plants in pure New Zealand-type sphagnum with good success, although I've seen several other combinations including the peat/perlite/sand-type soils work successfully for other people.

Cliff Dodd's article in CPN (11) described a technique of growing *Heliamphora* indoors under fluorescent lights I know this method has worked well for a number of CP growers, and readers should study this as a practical guide for successful indoor cultivation.

Patience is important when starting to grow *heliamphora*. They are naturally slow growing, and larger plants will often take 6-12 months to recover after replanting if the rhizome or leaves are damaged. Small plants are much more tolerant of being transplanted.

Plants are easily replicated by rhizome divisions, and a few people have successfully produced seed, also. Several carnivorous plant breeders also have them in tissue culture which should allow the plants to become widely available in the future at reasonable prices. The effort is definitely worth it, as this is among the most beautiful of all carnivorous plants!



Figure 5 - *H.ionasii*, "deep red form", from first tier, Mt.Illu. Note fine fuzz inside pitchers, quite marked on this form.

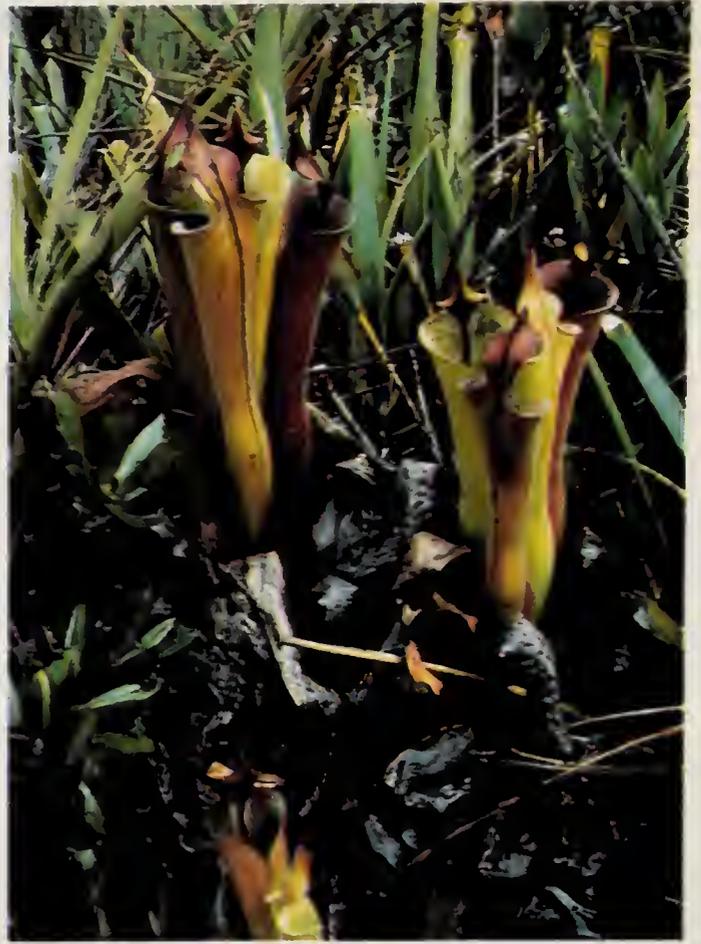


Figure 6 - *H.tatei* var. *neblinae* in habitat.

Acknowledgments

I am grateful to the Herbario Nacional of Venezuela for allowing me to have access to their herbarium collection, and for allowing me to photograph specimens for use in this article. Special thanks, also, to Dr. Paul Berry who furnished photographs of *H. tatei* from the wild, and to Mr. Tim Metcalf, Dr. Don Schnell, and Dr. Berry for their kind editorial assistance on this article.

References

- 1) Bentham *Heliampora* Trans. Linn. Soc. 18:432 1840.
- 2) Mellichamp: The Correct Common Name for the *Heliampora*, Carnivorous Plant Newsletter, Vol. 8, No. 3, pg. 88, Sept. 1979.
- 3) Gleason: Botanical Results of the Tyler-Duida Expedition, Bulletin of the Torrey Botanical Club, Vol. 58, No. 5, May 1931.
- 4) Steyermark: Flora of Venezuelan Guayana - I, Ann. Missouri Bot. Garden, 71 :297-340, 1984.
- 5) Maguire: The Botany of the Guayana Highland - Part X: *Sarraceniaceae*, Memoirs of the New York Bot. Gardens, Vol. 29, pp 36-62, June 1978.
- 6) Steyermark, and Berry, *Sarraceniaceae*, in Flora of the Venezuelan Guayana. in press.
- 7) Schnell, More about the Sunshine Pitchers, Garden Journal, 24:146-147, October 1974.
- 8) Renner: Floral biological observations on *Heliampora tatei* (Sarraceniaceae) and other plants from Cerro de la Neblina in Venezuela, Plant Systematics and Evolution, 163:21 -29, 1989.
- 9) Maguire: On the flora of the Guayana Highland, Biotropica 2:85-100, 1970.
- 10) Personal communication from Peter D'Amato
- 11) Dodd: A practical Method for Cultivation of *Heliampora* spp, Carnivorous Plant Newsletter, Vol 17:2, pp 48-50, June 1988.

Table 1: Identification Key for *Heliampora*

- 1 A) Anthers <4.5mm long.....2
B) Anthers >4.5mm long.....4
- 2 A) Flower pedicel pubescent.....3
B) Flower pedicel glabrous.....*H. nutans**
- 3 A) Anthers number less than 15. Plants usually dwarfed, typically 5-15 cm tall.
a) Pubescent zone present inside pitcher, typically 1/3 or less of pitcher height.....*H. minor*
i) Pubescent zone absent inside pitcher.....*H. minor* f. *laevis*.
B) Anthers number 15 or more.....*H. ionasii**
- 4 A) Flower pedicel glabrous, anthers typically number less than 15 and never over 16, stems not branched.....*H. heterodoxa*
a) Pitcher appendage minimally developed.....*H. heterodoxa* var. *exappendiculata*
i) Upper inner surface of pitcher glabrous....*H. heterodoxa* var. *exappendiculata* f. *glabella*
b) Pitcher appendage well developed.....*H. heterodoxa* var. *heterodoxa**
i) Upper inner surface of pitcher glabrous.....*H. heterodoxa* var. *heterodoxa* f. *glabella*
B) Flower pedicel pubescent, anthers number more than 15, with occasional stem branching.....*H. tatei*
a) Upper interior portion of pitcher glabrous above pubescent ring, or if hairs are present, are of uniform length.....*H. tatei* var. *tatei*
i) Inner pitcher glabrous.....*H. tatei* var. *tatei* f. *macdonaldae*
ii) Inner pitcher hairs uniform in length
0.8 - 2.0 mm long.....*H. tatei* var. *tatei* f. *tyleri*
b) Upper interior portion of pitcher hairs tapered in length from 0.2 - 1.0 mm long at top, to more elongated hairs 1-1.5 mm long at pubescent ring.....*H. tatei* var. *neblinae**
i) Outside pitcher glabrous.....*H. tatei* var. *neblinae* f. *parva*

* Anthocyanin-free forms of these plants have been identified in nature, as well as the typical red and green forms.

MULTI VITRO CARNIVOROUS PLANTS

Since 1986, Multi Vitro is multiplying carnivorous plants through tissue culture. We have about 20 species ready for sale. Please write us for a free pricelist.

We sell wholesale as well as single plants. Species: *Dionaea*,, *Sarracenia alata*, *leucophylla*, *purpurea*, *flava*, *flava* X *leuco*, *Heliampora nutans*, *Pinguicula agnata*, *moranensis*, *esseriana*, *gypsicola*, X *weser*; *Drosera binata*, *capensis*, *hilaris*, *indica alicea*, *Cephalotus*.

MULTI VITRO; Zandse voetpad 9; 6851 DR Huissen; Holland.

Table 2: Summary of Typical Characteristics for the genus *Heliamphora*

<u>Characteristic</u>	<u>minor</u>	<u>nutans</u>	<u>heterodoxa</u>	<u>tatei group</u>	<u>ionasii</u>
Pitcher length (cm)	5-31	5-29	12-42	12-50	12-50
Lower hairy zone length inside pitcher	2- 8	6-8.5	7-18	9-1 5	4.5-1 9
Ratio of hairy zone to total pitcher length	<3/8	1/3-3/8	3/8-1/2	3 /8- 1/2	>3/8
Pediceal pubescence	present	absent	absent	present	present
Anther length (mm)	3-4.5	3-4	4.5-8.5	5-8	3.5-4
Number of Anthers	10-14	10-14	7-16	15-20	15-20
Number flowers per scape	1-5	2-4	2-7	2-4	2-10

List of Figures

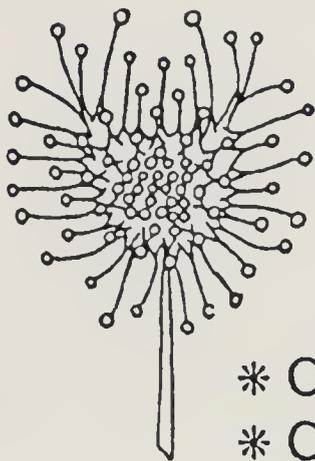
1. Typical Venezuelan Tepuis - Mt. Roraima on right, Mt. Kukenan on left. In the Gran Sabana, Bolivar State, Venezuela.
2. *H. nutans* in habitat, Mt. Roraima, southern ridge, 7000'.
3. Lowland *H. heterodoxa* in habitat, Gran Sabana - 4000'.
4. Author examining *H. ionasii* from 1st tier below the summit, Mt. Ilu. Fog in background is common.
5. *H. ionasii*, "deep red form", from first tier, Mt. Ilu. Note fine fuzz inside pitchers, quite marked on this form.
6. *H. tatei* var. *neblinae* in habitat.

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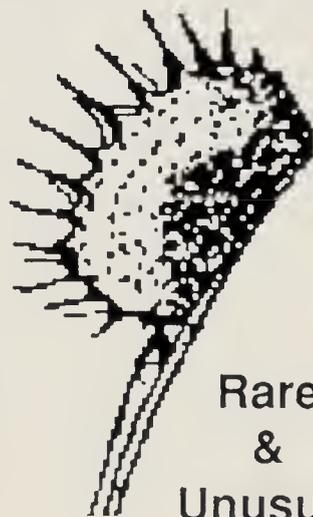
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The Identity of Drosera 'Regan's Ford', the Yellow-flowered Pygmy Sundew.

Martin Cheek
Royal Botanic Gardens, Kew
Richmond, Surrey TW9 3AE, U.K.

Unique amongst the many species of pygmy sundew endemic to South Western Australia is one with bright yellow and white flowers. White, pink, black and orange-red are known in flowers among the pygmy species, but yellow is unusual indeed. Steve Rose (1977) first described the plant in this very journal, amongst a catalogue of twenty of his discoveries, many of which, as he believed then, have proved to be new species and forms although they were omitted from the Flora of Australia account (Marchant *et al.* 1982).

"Yellow-flowered *Drosera* from Regans Ford (Gingin). This plant was found four years ago and remains unnamed today, but it grows in deep yellow-white sand sometimes with *D. paleacea* but never together. It has an early dormancy and sports a nice pale-bright yellow flower" (Rose, 1977).

Rose's yellow-flowered pygmy became distributed under the cultivar name 'Regan's Ford', but in the twenty years since it was discovered, has had another five names given it!

1. *Drosera* 'Reagan's Ford' is simply an erroneous orthographic variant of 'Regan's Ford' that occurred in horticultural catalogues and was taken up by e.g. Slack (1986: 54,56).

2. *Drosera pycnoblata* Diels was the name attributed to this plant by Kondo & Kondo (1983: 64). This identification is understandable given the close resemblance between the two species, but already, by 1986, Slack *loc. cit.* was arguing again for the

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distinctness of Drosera 'Regan's Ford'(sic).

3. Drosera rechingeri Strid was the name attributed in error by Lowrie (1989: 154-157) to Drosera 'Regan's Ford'. Drosera rechingeri is a very different, unrelated species of pygmy which in that same work, Lowrie gives the name D. coolamon Marchant nom. nud.. The latter name has no legitimate standing according to the International Code of Botanical Nomenclature (Greuter et al. 1988, hereinafter referred to as the Code) though has common horticultural usage.

4. Drosera chrysochila Schlauer was the new name given 'Regan's Ford' by Jan Schlauer in an excellent paper (Schlauer 1992) after realising Lowrie's error, although I (Cheek, 1990) remained ignorant. Schlauer only proceeded after publication early in 1992 (Marchant & Lowrie 1992) of a paper validating the many nomina nuda (naked or illegitimate names) that had appeared in Lowrie's books, when it was realised that there was no reference made to the 'D. rechingeri' mistake.

5. Almost simultaneously with Schlauer, Lowrie (in Lowrie & Carlquist, 1992), who had evidently been apprised of his error, published another new name in a U.S. journal, renaming 'Regan's Ford' as D. citrina Lowrie & Carlquist.

A plant can have only one correct botanical name according to the Code, so which is correct for Drosera 'Regan's Ford'? Since both D. chrysochila and D. citrina are fully legitimate according to the Code, the correct name must be chosen from among them solely by priority. That is, which was published first?

At Kew, Der Palmengarten (D. chrysochila) was received on 19th October 1992, and Phytologia (D. citrina) on the 11th November the former seemed to be the winner as the correct name. Normally this would be the end of the matter, but the dates were close together. I decided to check further. In early December 1992, I faxed other botanical libraries. Missouri Botanical Garden does not date stamp its journals but thought it had received Der Palmengarten in mid-November 1992, and Phytologia in late October (Constance Wolff in litt.): reversing the priority! The Smithsonian (Ruth Shallert in litt.) had had a mix up with subscriptions and hadn't received either, neither had the library of the Royal Botanic Gardens, Sydney in Australia. But Berlin (Prof. Dr. Lack in litt.) had received both journals on broadly similar dates to those of Kew: Phytologia on 23rd November; Der Palmengarten October 15th. Clearly the U.S. library was getting the U.S. journal first, the European libraries the European journal first and nothing had reached Australia. The matter was unresolved. The dates of publication were so close that it seemed wise to check further still. I contacted the publishers concerned to find out when they had posted off their journals. Dr. Zizka (in litt. 14th December) replied that this number of his journal, Der Palmengarten, was first sold on 12th October 1992. Michael Warnock (in litt. 16th December 1992) replied that his journal, Phytologia was sent out on 7th October 1992. So, after waiting nearly twenty years after its discovery by Rose in Western Australia in 1973, Drosera 'Regan's Ford' received two legitimate botanical names in Europe and North America within only five days of each other. Only by the slender margin of being published five days earlier does D. citrina have priority over D. chrysochila and become the correct name for D. 'Regan's Ford'.

The correct name, synonymy and a short description of the plant follow.

D. citrina Lowrie & Carlquist, *Phytologia* 73(2): 99 (7 October 1992). Type: Regan's Ford, S.W. Western Australia, *Lowrie* 83/011 (PERTH, holotype; RSA, isotype).

Drosera 'Regan's Ford' Hort., *Rose in Carn. Pl. Newsl.* 6(1): 11 (1977).

Drosera 'Reagan's Ford' Hort., Slack, *Insect-eating Plants.* (1986: 55 & 57).

D. pycnoblasta sensu Kondo & Kondo in *Carniv. Pl. Wrld. Col.* (1983: 64) non Diels in *Bot. Jahrb. Syst.* 35: 207 (1904). *D. rechingeri sensu* Lowrie in *Carnivorous Plants of Australia* volume 2 1989: 154) non Strid, *Pl. Syst. Evol.* 155: 343-345 (1987).

D. chrysochila Schlauer, *Der Palmengarten* 3/92: 190 (12 October 1992). Type ex cult. Hennern, *Schlauer* 536, (FRP, holotype).

Short-lived perennial. Stem inconspicuous. Leaf-rosette to 1.5 cm across. Stipule bud almost spherical c. 5 x 5 mm, with a short apical tuft of hairs, c. 0.5 mm long, slightly shaggy. Leaf-blade shortly elliptic, c. 1.5 x 1.2 mm. Leaf-stalk c. 5 x 0.3-1 mm, margin with stalked glandular hairs. Flowering stem solitary or 2, to 4 cm, minutely glandular-hairy, densely so amongst the flowers, with up to 12 flowers. Flower stalks to 3 mm, erect in fruit. Sepals with sparse long-stalked glands. Petals 4-5 mm long, bright lemon-yellow, basal half white. Styles 3, threadlike, white.

Western Australia, S.W., only known from vicinity of Regan's Ford, Gingin.

Drosera citrina is one of the many predominantly apomictic (Cheek, in press) pygmy sundews that seems highly localized in distribution and thus vulnerable to habitat destruction. Collection for horticultural purposes does not seem to be a threat since like all pygmies, it is so readily propagated by gemmae.

The numerous pygmy sundews of south-west Western Australia fall cleanly into two groups as far as flower colour is concerned: Group 1 species have orange-red petals usually with black markings or black stamens/styles such as in *D. miniata* Diels, *D. platystigma* Lehm. and *D. sewelliae* Diels. Group 2 species are those with white to pink flowers - sometimes with petals wholly white or wholly pink, but very often white with pink markings or both white and pink-petalled variants in the same species e.g. *D. dichrosepala* Turcz. White and pink do not occur in the Group 1 species and orange-red and black never in the flowers of Group 2 species. Presumably two different pollinators or groups of pollinators are involved. Perhaps *D. citrina* falls into a third group. Group 2 colouration is the norm throughout the genus, though the pink often deepens into purple. Group 1 flower colouration is otherwise unknown apart from the isolated *D. glanduligera* Lehm. also West Australian and probably the link between the pygmies and the rest of the genus. Yellow is very rarely seen in *Drosera*, but it is interesting to note that the monotypic, Mediterranean

Drosophyllum Link, undoubtedly the closest relative of *Drosera*, has bright yellow flowers.

Now that the world's *Drosera* species are largely delineated, it is time look more closely at the reproductive biology and find out what visits the often showy flowers of this fascinating group.

Literature cited

Cheek, M. (1990). A new pygmy *Drosera* from Western Australia and a note on the status of sect. *Bryastrum* and sect. *Lamprolepis*. *Phytologia* 68(2): 85-89.

Cheek, M. (in press). Notes on hybrids in *Drosera*. The Kew Magazine (incorporating Curtis's Botanical Magazine) 10(3).

Greuter, W. et al. (1988). The International Code of Botanical Nomenclature. Koeltz, Germany.

Kondo, K. & Kondo, M. (1983). Carnivorous Plants of the World in Colour. Ienohikari Association, Tokyo.

Lowrie, A. (1989). Carnivorous Plants of Australia. Volume 2. Univ. Western Australia Press.

Lowrie, A. & Carlquist, S. (1992). Eight new taxa of *Drosera* from Australia. *Phytologia* 73(2): 98-116

Marchant, N., H.I. Aston & A.S. George (1982). Droseraceae in Flora of Australia 8:9-66.

Marchant, N. & Lowrie, A. (1992). New names and new combinations in 35 taxa of Western Australian tuberous and pygmy *Drosera*. *Kew Bull.* 47(2): 315-328.

Rose, S. (1977). Seeking the pygmy Sundews. *Carn. Pl. Newsl.* 6(1): 10-11.

Schlauer, J. (1992). *Drosera chrysochila* spec. nov., ein neuer Sonnentau aus Westaustralien. *Der Palmengarten* 3/92: 188-191

Slack (1986). Insect-Eating Plants. Alpha Books. London.

Strid, A. (1987). New species of *Beaufortia* and *Chamaelaucium* (Myrtaceae), *Drosera* (Droseraceae) and *Pultenaea* (Fabaceae) from S.W. Australia. *Pl. Syst. Evol.* 155: 343-345

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- *YAROSIS (TRUNCALATA X. MARGTARETEA (BEDNAR/BRAMBLETT)

* indicates unpublished Nursery & Cultivar Names

Literature Review

Conran, J. G. and A. Lowrie. 1993. *Byblis liniflora* ssp. *occidentalis* (Byblidaceae): A new subspecies from northwestern Australia. *Aust. Syst. Bot.* 6:175-179.

This plant occurs in the western part of the range of the species along western Australia's northern coast, hence the epithet. Previously referred to informally as aff. 'Kununurra', it is herein described as the above named subspecies. The plants are characterized by a somewhat taller habit, more flowers on a plant, prominently serrated petal margins, a deeper magenta petal color and prominent yellow color of the underside of the petal. The subspecies seems to grow in drier conditions than ssp. *liniflora*, and even where the ranges overlap somewhat, they do not appear to grow together as determined so far. The paper contains a rangemap, key and photo of the holotype herbarium sheet.

Determann, Ron. 1993. Bog plant conservation: The Atlanta Botanical Garden. *Tipularia* 8:6-8.

This a recounting of the Garden's efforts in conservation and particularly plant and site recovery. CP aspects are discussed in an article elsewhere in this issue, but at this point we should mention that other species such as the rare *Helonias bullata* which is endangered in Georgia and occurs in only one site, are also being raised from seed in the Garden with the ultimate aim of re-entry into nature when sites are recovered.

Folkerts, George and Debbie. 1993. Southeastern pitcher plant bogs: A natural history sketch. *Tipularia* 8:10-16.

This is an excellent summary article on the history and nature of pitcher plant bogs with particular concentration on the Gulf coastal plain. CP plant, insect and other animal associates are mentioned. The usual pressures on the bogs are listed, including the almost hysterical anti-fire factor that was so prevalent until recently. Fire is a key factor in maintaining these bogs by destroying competing weedy vegetation. At this point, the authors conclude that throughout both the Gulf and Atlantic coastal plains, only 3% of the original pitcher plant bogland remains, which is indeed tragic. The article has five black and white photos by the authors.

Frank, Lisa. 1993. Vanishing pitcher plants: Drawings by Marcia R. Cohen. *Tipularia* 8:2-5.

Marcia Cohen is a professor at the Atlanta College of Art and has completed a portfolio of very fine sarracenia drawings in color and large format. This article is largely a recounting of her interests and experiences. *Sarracenia oreophila* is featured in color on the cover, and there are three additional black and white printings in the article in addition to one of the artist hard at work. The artist did the drawings at the suggestion of Ron Determann who advised her horticulturally while they were in progress. Marcia worked from plants in the field, including several stays in two tents in the Okefenokee— One tent to sleep in and a taller one to set up her equipment. She also checked points with the plants in the Atlanta Botanical Garden collection. I had the pleasure of meeting Marcia at the Garden in September, 1993 where her drawings are on display. They are most striking in their original large format and the plants seem to leap off the canvas.

Russell, Gail. 1993. Can pitcher plants still be found? *Tipularia* 8: 17.

The author, with the help of several state authorities, tries to compile a list of locations where the public can still view natural pitcher plant stands in Georgia. She mentions that this was a difficult job since good locations that are readily accessible are practically non-existent in the state. This reviewer can sympathize with the author. CP enthusiasts regularly write me to ask for an itinerary of locations in the southeast for a tour. Growing weary of hauling out the files and picking locations each time such a request arrived, I developed a general itinerary covering non-endangered sarracenias in an arc of the southeastern coastal plain which I kept on disk and would print and send out to everyone requesting such. These were generally well-known locations immediately accessible to paved roads since I did not wish to take responsibility for leading folks back into areas on the roads and tracks I take four-wheeling, and I was not certain I wished to popularize any of these latter locations which are the last best remaining. This past summer (1993), I happened to drive by many of these locations in my universal tour and was shocked with barely being able to recognize them in their severe decline. This decline is such that my entire canned tour on disk is already extinct after only two years? I am not really surprised given the rate of downfall of good CP areas. I will not redo another itinerary—The shelf life is too short.

von Schmeling, Henning. 1993. Bog collecting pressures. *Tipularia* 8:9.

This brief half page article mentions efforts under way at the Chattahoochee Nature Center near Roswell, GA where the author is horticulturist, to propagate large numbers of CP through tissue culture in hopes of selling them, particularly abroad to relieve pressure on collecting from the wild to export plants. This is a noble undertaking, but it is already in place if all foreign importers would use it. Bob Hanrahan is capable alone of supplying the entire world demand for live CP from his CP farm in south Alabama. Also, the large Netherlands firm Cresco has a pretty good lock on the European market with its propagated plants in huge greenhouse ranges.

* Readers of the preceding five literature reviews above will note that they all came from the same issue of a journal called TIPULARIA which is an annual publication of the Georgia Botanical Society. Since this issue is rather pregnant with bog and CP articles, readers who want their own copies may send \$10.00 US to Sally Emory, 7575 Rico Rd., Palmetto, GA 30268, asking for a copy of the 1993 annual issue.*

Earley, Lawrence S. 1993. Life in deathtrap. *Wildlife in North Carolina*. 57:2-3.

This is a good summary of the various organisms that inhabit traps of sarracenias successfully. It is illustrated by some nice drawings by David Williams. Besides the familiar activities of *Exyra* spp., mosquito larvae (*S. purpurea*), rhizome borer (*Papaipema appasionata*), and the wasp that builds alternate layers of nesting cut grass pieces in the tube where it lays its eggs alongside of paralyzed insects for the larvae to use as food, are all mentioned.

Nelson, EC. 1993. White-blossomed *Pinguicula grandiflora* Lam. (Lentibulariaceae) in The Burren, County Clare, Ireland. *Watsonia* 19: 273-275.

The author describes a single plant of the species with a white flower and green sepals among a stand of the usual purple flowered members of the species, and names it forma *chionopetra* (chion=snow (white flower); petra=rock (habitat)). The author also reviews the history of color variants, f. *pallida* having a purple throat in the flower, and ssp. *rosea* with a purple calyx and pink throat. A subvar. *albescens* mentioned in 1909 could be the same as f. *chionopetra*, but was not legitimately described. The author found his plant in a remarkable natural area in Ireland known as The Burren.

Stolzenburg, William. 1993. Busting plant poachers. *Nature Conservancy* 43:16-23.

This article in the Nature Conservancy's bimonthly magazine features efforts against plant poachers. The article mentions that most illegal activities against threatened and endangered species have been directed toward animals, but at last there seems to be an interest developing in plants among wildlife officers at various levels. Previously dismissed with a wave of the hand as being more interested in checking fishing and hunting licenses, wildlife officers have now swung in a botanical direction in some areas. Mentioning cacti and a few native orchids briefly, the great part of the article concentrates on CP, particularly *Dionaea* in southeastern North Carolina, and particularly in the Holly Shelter qamelands and Green Swamp sanctuary.

For those not familiar with North Carolina, there are ninety- some state reserves set up across the state ranging from a few hundred to many thousands of acres known as gamelands. As the name suggests, these regulated sites are intended mainly as public hunting preserves. There is management to encourage game primarily, and incidentally some interesting plant species may benefit. Roads into the qamelands are mostly gated and opened only during specific hunting seasons. Holly Shelter is 48,795 acres in Pender County, right in the middle of *Dionaea* country, or what is left of it.

The article features a rather colorful group of wildlife officers (black belts in marshal arts, ex-marines, run and work out every day, etc.) who look very protectively on Holly Shelter in particular. One large color photo features a sergeant peering

menacingly out from behind a tree, watching and waiting.

"Flytrappers" as *Dionaea* poachers are known, have grown in numbers and audacity over the years. A tolerated cottage industry of minor collectors in the past (wildlife officers "used to have fun with those old boys") to numerous, very serious mass collectors interested in big numbers; and indeed an industrious collector can make \$250 easily in one morning, but he had better not try it in Holly Shelter! In spite of gates, officers still catch poachers with fair regularity, or grimace at their holes. Modern poachers are armed, are also exmarines (nearby Camp LeJeune seems to be feeding the employment needs of the area), and use military tactics such as fatigues, night collecting, and flattening on the ground when they hear traffic approach.

What is left of the Green Swamp on a lot of mesic real estate along Rt. 211 is also closely watched by a different team. A pair of poachers came tooling out a dirt road on bicycles one morning into the arms of wildlife officers who discovered several thousand *Dionaea* stuffed into their shirts! Talk about bulking up.

The article also features Ron Gagliardo in his greenhouse with large numbers of *Dionaea* he has propagated by tissue culture as a commercial alternative. The plants are magnificent.

Due mainly to short-sighted habitat destruction, the more aggressive modern collecting poses a real danger to *Dionaea* numbers now, as those of us who have been roaming this part of the country for several decades can attest to. It is becoming more and more difficult to find accessible stands of the flytrap of the size we saw easily and commonly just twenty years ago.

Stolzenberg, William. 1993. Magic mesas—Venezuela's tepuys. *Nature Conservancy*. 43:10-15.

This article is in the bimonthly bulletin issued by the Nature Conservancy. The peculiar spelling of tepuy (compared to the more familiar tepui) is not explained. The article opens with a breath taking full color aerial view of an unnamed tepui. Apparently nearly the entire system of tepuis is part of a huge park called Canaima. There are five additional photos, but no CP. The director of the park is profiled, and he has his work cut out for him since over 2500 people climbed Roraima in 1992 alone! Mention is made of increased burning of the surrounding lowland forests by increasing populations of natives. This is resulting in erosion which is silting streams and wreaking havoc with the country's hydroelectric system. Other sources have also indicated that as the Gran Sabana below the tepuis is deforested, the source of massive transpiration and evaporation water that feeds the daily rains which supply water to the biologically amazing tepui summits is threatened.

Zauner, Phyllis. 1993. Fatal attraction. *American Horticulturist* 72: 22-27.

Carlock, Marty. 1993. Wooing pitchers. *American Horticulturist* 72: 2831.

CP are favored with an unusual back to back pair of articles in a popular gardening magazine, the October, 1993 issue of *American Horticulturist*. The first is the expected summary of all CP for those who have either never heard of these plants or have only a nodding acquaintance. However, the article is well written for this audience and reasonably accurate with a minimum of dramatics. There are seven full color photos of various CP across the spectrum, and I was particularly impressed by a fine photo of *Pinguicula grandiflora*. Some legitimate commercial sources are also listed at the end of the article, as is the policy for this magazine. *California Carnivores* and CPN are also mentioned.

The second article concerns our old friend, fellow physician and pathologist George Newman of New Hampshire. There is a nice photo of him in one of his greenhouses, and five additional color photos of CP including a near two page spread of *Sarracenia oreophila* in the field. The article is a good profile of George's history with CP, his experiences and his growing methods and philosophy regarding field botany, propagation and CP in general.

Hangings Swamps and Valley-Floor Swamps: Carnivorous Plant Habitats

Robert Gibson, P.O. Box 287, Penrith, N.S.W., 2750, AUSTRALIA

Hangings swamps and valley-floor swamps occur in the upper Blue Mountains of New South Wales, Australia and support the majority of local carnivorous plant species, plus many interesting non-carnivorous plants. They play a very important role in the hydrology of the area due to their water storage capacity, and are an interesting geomorphic feature. In this article I will describe both habitats and present a model on their formation.

The morphology of the area is that of an elevated, greatly dissected plateau which rises to the west to a maximum elevation of 1111 meters above sea-level. A concomitant increase in rainfall occurs from east to west, which peaks at just under 1500 mm per annum in parts of the upper Blue Mountains.

The geology of the upper Blue Mountains plays a fundamental role in determining its' land forms. The lithology consists of Triassic Narabeen Sandstone, a heterogeneous pebbly silicious sandstone, with shale lenses which contain a significant amount of iron. This is overlain by the more homogenous Hawkesbury sandstone which outcrops more extensively in the lower Blue Mountains. These units dip shallowly and thicken to the east, the importance of which will be discussed further on.

The sandstones are porous, but contain impervious shale layers and lenses, and iron-indurated sandstone which deflect ground water. These occur abundantly and extensively within the Narabeen Sandstone and include the extensive Wentworth Falls claystone member. Rain water which percolates into this sandstone moves down until it encounters an impervious layer; it will then flow downslope which in the majority of cases is to the east due to the dip of the units. The ground water reaches the surface where the impervious layers outcrop, and form soaks and springs. Due to the volume of sandstone, high rainfall, and slow percolation rates, the rocks of the Blue Mountains hold a significant volume of water the slow release of which maintains many streams in times of drought. Often the soaks and springs are vegetated by wetland vegetation or flow into a wetland which further regulates the flow of water.

Swamps in the Blue Mountains are easy to locate due to the predominance of low, herbaceous plants which contrast markedly with the surrounding Eucalyptus-dominated woodland. The change in vegetation types can be dramatic, especially on the upslope boundary of swamps. Despite the rain of seeds onto swamps, Eucalyptus, and most other woodland species, are unable to establish themselves in the saturated substrate.

HANGING SWAMPS

Swamps which occur on the sides of valleys, often on appreciable slopes, are called "hanging swamps", or alternatively "valley-side swamps" (Holland, 1974), as shown in Figure 1.(A). Although they may be readily seen from the main roads through the mountains, access to them is not always easy. The principal behind them is simple - water-loving, predominantly herbaceous vegetation colonizes a soak or a spring and

the area downslope where near-surface water occurs. Thin peat and sand soils develop in these swamps and bare rock commonly occurs. Plants requiring aerated soil are unable to become established in the area.

The upslope margin of the hanging swamp is often a sharp vegetation boundary. The lower section and sides often merge into the surrounding woodland. These swamps range in size from meters to decameters and many are wider than long.

VALLEY-FLOOR SWAMPS

Valley-floor swamps are an unusual land form which occur at the heads of valleys. The streams of these valleys typically occur within an entrenched second inner valley, producing a valley-in-valley feature. They form on undulating, sub horizontal sandstone basement with a gently concave profile at the head of the outer valley. Water enters the hanging swamp from creeks, soaks or the hanging swamps often occurring on the surrounding rockwalls (Fig. 1. (B)). They are large features, up to several hundred meters long and wide.

Valley floor swamps are areas of deposition and accumulate a sand and peat soil of typically 1.2 to 1.5. m depth. Carbon-14 dating of a number of swamps in the Blue Mountains has yielded ages of 17 050 +/- 600 years and 4 100 +/- 100 years (Holland, 1974). The older age corresponds to the termination of a period of major bedrock erosion in the region. The younger age indicates that there is a limit to the amount of deposition which can occur. Once the weight-limit has been exceeded, some (or all) of the swamp material slumps downslope, re-exposing bedrock which then is slowly recolonised (Baker et al., 1984).

The recolonization of wet, bare rock indicates how valley floor swamps initially form. Initially isolated, water-loving, often herbaceous, plants colonize concave crevices in the wet sandstone and slowly form and accumulate leaf litter with sand. The material trapped by these pioneering plants holds water and provides more space for more plants. A positive feedback is set up in which water-loving plants literally form their own swamp. The sandstone at the lip of the swamp becomes indurated with iron oxides, whereas bedrock corrosion occurs at the back to produce a concave bedrock base (Holland, 1974). The swamp is held together by the matted root system of plants and because of its flat surface it is able to dissipate flood energy and resist erosion. The accumulated soil stores a considerable volume of water which is continually released and maintains stream flow.

Both hanging swamps and valley-floor swamps provide a range of different environments which include slow-moving acidic water, saturated peat, to well-drained peaty creek banks. Most locally native carnivorous plants occur in them and include *Drosera auriculata*, *D. binata* var *dichotoma*, *D. peltata* var. "red-rosette/ white-petal", *D. pygmaea*, *D. spatulata*, *Utricularia lateriflora* and *U. uniflora*.

These swamps are interesting places to explore not only for the carnivorous plants which they contain but also because of how they form.

REFERENCES

Baker, Margaret; Corrington, Robin and Dark, Jill. 1984. Native Plants of the Upper Blue Mountains. Three Sisters Productions.

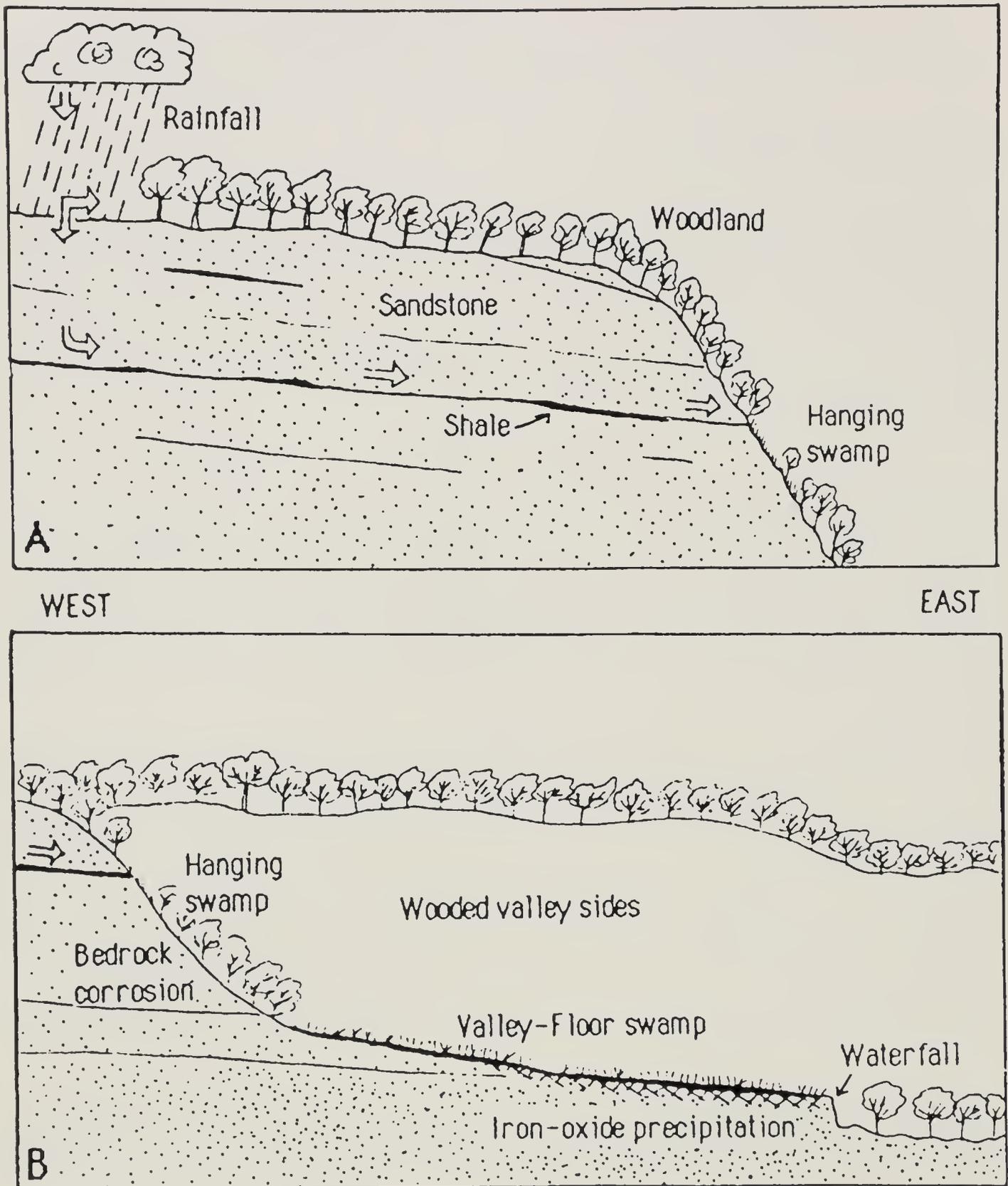


Figure 1. Cross-section and model of: (A), a typical hanging swamp and, (B), a typical valley-floor swamp, in the upper Blue Mountains. Hanging swamps occur on the sides of valleys where emergent ground water maintains wetland vegetation. This water was rainwater which had infiltrated and percolated through porous sandstone, then encountered, and followed the dip-slope of an impervious (shale) layer to its' outcrop. Valley-floor swamps occur at the head of valley-in-valley systems. They are significant areas of deposition which maintain their base-level by iron-oxide induration of the underlying sandstone. They are enlarged by bedrock corrosion of the headwall.

CARNIVOROUS PLANT AND CONSERVATION ACTIVITIES AT THE FUQUA CONSERVATORY, ATLANTA, GEORGIA

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In September, 1993, I was among a group of people invited to the Atlanta Botanical Garden to discuss aspects of conserving sarracenias. While there, I spent some time visiting with Ron Determann who is supervisor of the Fuqua Conservatory at the Garden. This was my sixth visit there since the Conservatory construction was undertaken. In a very few years, I am very impressed with the rapid maturity of the Garden.

The CP display in the public portion of the Conservatory is in excellent condition. I believe this garden has surpassed Longwood in nepenthes. The terrarium displays in the cupola are rotated regularly and are in fine condition. Incidentally, several of these terraria are kept in reserve for Ron to carry them in a Garden van to schools for CP talks. Readers of several issues ago will recall the rather large bog adjacent to a pond out back of the Conservatory. It, too is growing well and looks for all the world very similar to native habitat. It will be burned over this autumn, just as in good management of a natural CP area.

Adjacent to the bog area are two large planters about 0.5 meter across in which are growing masses of *Dionaea* and *Drosera filiformis* specifically for children to touch—a touching garden to parallel the familiar petting zoo.

Ron took some of us into the propagation greenhouses adjacent to the main conservatory to discuss recent recovery and conservation activities at the Garden, largely guided by Ron and working with various state and other conservation officials. He has had phenomenal success with collecting a few seedpods from the field in sensitive areas and growing these to hundreds and even thousands of seedlings and nearly mature plants. He recently found locations for *Sarracenia rubra* in Taylor County, Georgia, and even purchased a parcel of land to protect one of the locations. The plants look most like *ssp. gulfensis* thus far. He has also relocated the same species at Fort Benning, a military reservation in extreme southwest Georgia. These, too, are growing by the traysful.

A recently acquired site (by the Nature Conservancy) of *S. rubra ssp. jonesii* in North Carolina was also visited by Ron and with permission of the conservators he collected a few seedpods and has these plants growing as well. The pitcher plant seedlings have extended out into raised beds just outside the rear door of the prop houses. While at the North Carolina site and also in northern Georgia, he collected seedpods of *S. purpurea*. These are maturing nicely and should go out into recovered boggy sites in northern Georgia this autumn. Ron needs the room.

All of this propagation being done so well, is directed toward recovery plans at the locations in which seeds were collected. In all honesty, the North Carolina *jonesii* location, one of the best remaining bogs with this *ssp.* remaining, has not fared well since just before preservation and has gone down at an alarming rate. If the problem is seen in time and the site recovered, then plants raised from seed from the site can be replaced. This is the basis for a fascinating but controversial whole new field of renovation or recovery of natural areas. Some very respected scientists take the conservative attitude that it would be the lesser of evils to let a plant go extinct than to maintain it in artificial circumstances or to even place it back into a recovered site which still amounts to artificial manipulation in their eyes. I can see their viewpoint and respect it since our knowledge of how wetlands operate is not yet complete and any manipulation takes on an artificial aspect. On the other hand, with conservative manipulation and a bit of luck on replacing important plants, especially those cultured from material originally from the site, can be very worthwhile. I think it is worth

trying.

Ron and his team along with US Fish and Wildlife and Georgia natural resources officials have had good luck so far in replenishing *S. purpurea* in a northern Georgia mountain bog. These will continue to be watched and managed accordingly.

The Atlanta Botanical Garden is reaching beyond what many perceive to be the rather passive activity of many gardens in collecting and growing plants for public view and amusement or taxonomic studies. While these aspects are important, Atlanta's outreach into actively participating in regional conservation and field experiments with recovery are indeed commendable.

The Garden is open daily and is easy to find if you follow road signs as you pass through the city on I-75/I-85. Check a good Georgia state map and you will find Piedmont Park in the center of the city where the Garden is located. Hours from October through March are 9 AM - 6 PM (closed Mondays). The hours are longer after March (to 7 PM). There is a modest admission charge.

***Sarracenia purpurea* ssp. *purpurea* f. *heterophylla* (Eaton) Fernald in Nova Scotia**

by

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On 8/6/90 I had an opportunity to visit an historic location for *Sarracenia purpurea* ssp. *purpurea* f. *heterophylla* in Nova Scotia. I was vacationing in the area and had a little time to visit some pitcher plant bogs but was not able to do the kind of extensive bog searching I would have liked to have done due to time constraints. Nevertheless I made it a point to visit a lake mentioned by previous authors as containing this interesting form of *S. purpurea* ssp. *purpurea*. Unfortunately, for security reasons I can not be more specific on locality or bibliographic data, an unfortunate requirement these days.

The lake is probably of glacial origin and covers approximately five acres near the top of a ridge. The site is characterized by boggy, ericaceous, sphagnum borders typical of northern pitcher plant bogs. *Utricularia cornuta*, *Drosera intermedia* and *D. rotundifolia* were local in suitable exposed organic soils, shallow lake margins and rotting logs. *Sarracenia purpurea* ssp. *purpurea* was initially not evident but after working my way around the lake large numbers of this species, ranging in color from red to red veined, were found as well as numerous *Sarracenia purpurea* ssp. *purpurea* f. *heterophylla*. *S. purpurea* ssp. *purpurea* f. *heterophylla* was immediately identified (Fig. 1) by the pure green leaves, sepals and growth point of plants found in the open sunshine.

Some clumps of *S. purpurea* ssp. *purpurea* f. *heterophylla* measured up to five feet across!. These large clumps appeared to be the result of both seed and vegetative reproduction. The pitchers were not as densely packed in the individual clumps as in some clones of *S. purpurea* ssp. *venosa* I have seen in the southeastern U.S. In cases where vegetative reproduction was suspected growth points were evenly spread out and there was room between pitchers to see the sphagnum moss. In cultivation I have seen *S. purpurea* ssp. *purpurea* f. *heterophylla* propagate vegetatively in this almost stoloniferous manner. As the original plant grows, divides and spreads horizontally space opens up between the different growth points. The original rootstock slowly dies off leaving plants separated from one another which may appear to have originated from seed reproduction.

Upon leaving the site and driving up the road toward the top of the hill I was

somewhat shocked to see several clumps of *Sarracenia purpurea* ssp. *purpurea* f. *heterophylla* growing on the light colored, clayey, rocky soil above the road embankment. Seepage was not directly evident but I presume some kind of moisture regime was at work to sustain such an odd occurrence of this pitcher plant out of the bog proper.

In northern latitudes, such as Nova Scotia, lower evaporation rates, cooler temperatures and ample rainfall can allow wetland plants to grow in situations that might be unfavorable to survival in hotter climates. Fred Case has shown me slides of *S. purpurea* ssp. *purpurea* actually growing on the uppermost slopes of a large hill in gravel. The plants are able to survive because of low temperature reducing evaporation of rainfall. Thus even rock soil on a hill can support *Sarracenia* in the appropriate environmental conditions.

This is one of the few sites known in Nova Scotia for *Sarracenia purpurea* ssp. *purpurea* f. *heterophylla* so I do ask the reader to respect the site if they should succeed in locating it.

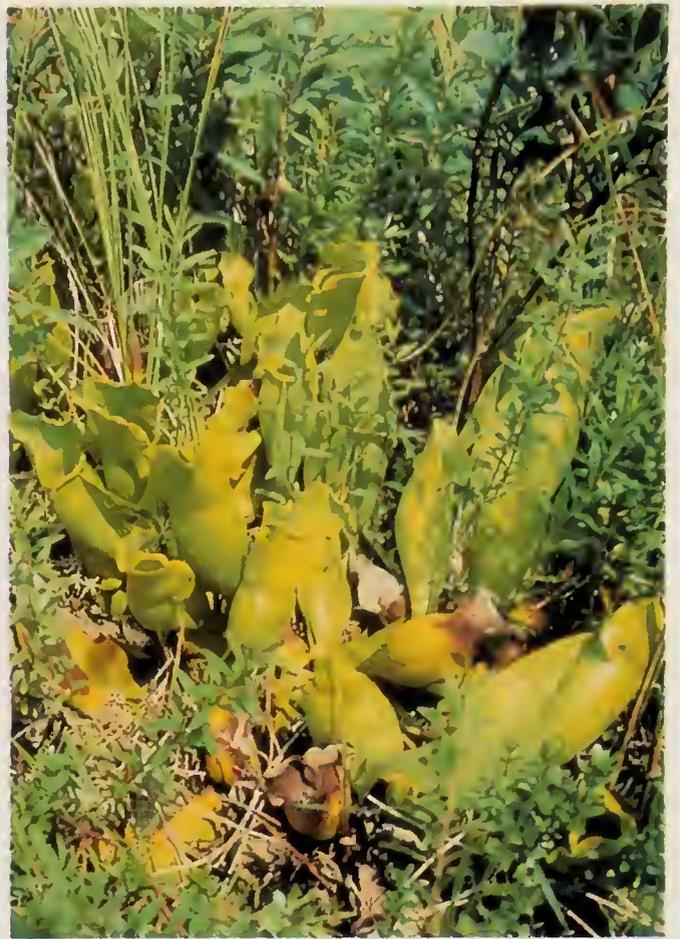


Figure one - Clumps of *S. purpurea* ssp. *purpurea* f. *heterophylla* on boggy borders of lake.



SLIDE 1 - *S. leucophylla* 'Tarnok'



SLIDE 2 - Large clone of this cultivar.

A New Cultivar of *Sarracenia leucophylla* Raf.

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During numerous field trips over the last two years to a variety of Gulf Coast carnivorous plant sites, it has come to our attention that an outstanding monstrose form of *Sarracenia leucophylla* Raf. merits recognition.

Sarracenia leucophylla 'Tarnok'

Pitcher colour, size and shape are typical for this species. The flower exhibits a proliferation of tepals (undifferentiated petals and sepals) arranged in whorls. The outermost whorls of tepals display less mutation than the innermost whorls. The innermost whorls, which are normally represented by the style umbrella and stamens, are highly mutated, often fused with separate ovaries and have deeply incised v-shaped stigmatic clefts. The stigmatic lobe is often missing or is found attached to reduced or modified tepals which resemble filamentous stalks. The tepals are green in colour at the base, gradually changing to a deep red/maroon and are persistent throughout the growing season.

Etymology: Named in honour of Mr. Coleman Tarnok who discovered this cultivar

This cultivar was found 20 years ago by Coleman Tarnok in the Perdido region of Baldwin County, southeastern Alabama, U.S.A. He has since returned to this site, but has been unable to locate any similar specimens.

Mr. Tarnok placed this specimen in his carnivorous plant bog which he began creating on his land in Mississippi 20 years ago. Originally, this site contained only bay and *Sarracenia alata* Wood. With the aid of winter burns, adjustments to the drainage, and the good fortune in having superb soil for the cultivation of carnivorous plants, he has created a naturalistic and diverse paradise for this cultivar to thrive in (See plates 1 & 2 on previous page).

Other plant species found in and around the bog include: *Rhododendron viscosum* (L.) Torr.; *Drosera filiformis* var. *tracyi* (Macfar.) Diels.; *D. capillaris* Poir.; *D. brevifolia* Pursh.; *D. intermedia* hayne; *Dionaea muscipula* Ellis ex L.; *Sarracenia flava* L.; *S. minor* Walt.; *S. purpurea* ssp. *venosa*; *S. rubra* ssp. *wherryi* (Case & Case) *S. leucophylla* Raf.; *S. alata*; *Platanthera integra* (Nutt.) Gray ex Beck; *P. ciliaris* (L.) Lindl.; *P. blephariglottis* (Willd) Lindl.; *P. blephariglottis* var. *conspicua*; *Calopogon pallidus* Chapm.; *C. tuberosus* (L.) BSP.; *C. barbatus* (Walt.) Ames; *Pogonia ophioglossoides* (L.) Ker-Gawl.

Mr. Tarnok and his son Richard Tarnok must be commended for their horticultural knowledge and skills and their dedication to sharing this information with interested parties.

This cultivar is an ideal candidate for introduction into horticulture and micro propagation and is at present under cultivation at Atlanta Botanical Garden, Georgia, U.S.A.

CPs in Campos Rupestres

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Near the end of the 1991/92 summer vacation, only 2 from around 8 possible trips I'd planned to the interior Brazil had worked out. I decided to stop depending on trips organized by others and go somewhere on my own before I started my second year of Biology at the University of São Paulo. So on February 21, I took a bus and left for the state of Minas Gerais, where I stayed until March 8. The main reason for this trip was to see campo rupestre vegetation, found mainly in the Espinhaco Range in the states of M. Gerais and Bahia (roughly from 1100 to 2100m in altitude), being famous for its incredible diversity of plant species. I'd been hearing about campos rupestres from my botany teachers ever since I'd started university in 1991 and decided I had to visit the 2 most famous campo rupestre areas: the city of Diamantina and the Serra do Cipó (Cipó Range). Campos rupestres consist of low plants growing in harsh conditions in sand mixed with rocky fragments. But this is a generalization, since they're really a reunion of micro-habitats, like a mosaic. These differences are mainly due to soil composition and humidity. The Espinhaco Range is mostly a quartzite formation, but is actually quite a geological mosaic. The soil on these highlands varies from pure sand to bare rock, all draining very fast after rainfalls and soon drying out. But at the same time, water is very abundant, seeping from all sides and forming multitudes of streams. Thus, not only does the soil change all the time, being more or less rocky or sandy, but it also alternates between wet and dry. It's difficult to define campos rupestres. I wanted to photograph "typical" campo rupestre, but I couldn't make up my mind on what that was!

I took the opportunity that I was in M. Gerais to return to the Caraça Natural Park (3rd time!). I felt it would be a crime to go to M. Gerais and not pass by Caraça! I found out on this trip why I like Caraça so much: contrasts! As I mentioned in my 1st article, Caraça is in a transition zone between coastal rain forests and cerrado (Brazilian savanna). But there's a 3rd kind of vegetation: campo rupestre (which I only heard of for the 1st time after my 2nd trip to Caraça)! I hadn't known that this was what grew on the Caraça Range peaks, where I'd found *D. graminifolia*, *G. violacea*, *U. reniformis*, and others. Adding to these biologic contrasts, are the geographic contrasts. Altitudes vary from around 750 to 2100m. Green valleys are surrounded by tall mountains glistening in the sunlight with water running down the rocky, grey peaks high above, and farther down forming loads of waterfalls. Other than being unbelievably cold, the water is a brownish-red, but transparent, color and absolutely clean. Some say this color is due to the high quantities of iron present in the highlands of M. Gerais, but I've also heard that it's due to the extreme acidity of the water, a result of decomposing organic matter. I'm not sure which is true, but I've seen that the waterways of the Venezuelan tepuis also have this strange color. So if anyone knows for sure what makes the water be like this, please tell me.

Luckily, I had excellent weather during my 2 weeks in M. Gerais, with only a few rainy days. A rarity in the summer! In each of the 3 places, I walked from 10 to 25 cm every day! Campos rupestres are great for hikes, due to the rocky landscape, low vegetation, abundance of fresh water, and best of all, CPs grow like weeds!! At the S. Cipó and Diamantina I got tired of having to remove everything from my backpack (camera, CP collecting material, herbarium equipment, etc.) every few steps as I found new CPs! Though CPs are weeds in campos rupestres, they're restricted by factors which I couldn't identify. Each specie grew in a variety of wet habitats, only rarely in specific ones. What perplexed me was that though most were apparently not too picky in regards to habitats, they'd be absent from areas which seemed to be just as good and contained other CPs which, at other sites, grew alongside the absent specie! Very



Figure 1 - *Drosera graminifolia* photo by Fernando Rivadavia



Figure 2 - *Utricularia purpureocaerulea* photo by Fernando Rivadavia

confusing! At Caraça, campos rupestres occur mostly above 1700m, and this confusion is also observed. In the valley, from 1200m to 1500m, CPs either grow in marshes or in campo rupestre-like habitats next to waterfalls, streams, and on humid, rocky mountainsides. So here is a description of the CPs found on this trip and their habitats (altitudes are approximated):

D. CHRYSOLEPIS - believed to be endemic to the S. Cipó area, until recent collections proved it also grows at various sites in southern Bahia, around 500 km north from the S. Cipó (leaving us with a large gap in its range). Typical plants have stems reaching 4 cm in length, but a stemless form has recently been found at the S Cipó. I expected to see the more common, stemmed form, which is also more spectacular due to its large habit. Strangely enough, I only found stemless plants, growing at 1300-1400m, in very wet, sandy-marshy areas. The reddish leaves were up to 14 cm long, 3.5 cm of which were lamina.

D. COMMUNIS - found in all 3 places (Diamantina, S. Cipó! and Caraça) with leaves reaching 2 cm in length, growing preferably in marshes among grasses, between 1200-1450m. *D. communis* flowers all year long and the lilac to light-lilac flowers are borne on delicate scapes up to 25cm tall. Depending on the amount of sunlight, they assume 2 different forms. When not heavily shaded by grasses, the reddish-green leaves are semi-erect and plants are up to 5 cm tall (resembling *D. intermedia*). Under thick grasses, the green leaves are prostrate and the lamina rounder (resembling *D. capillaris*). At Caraça I found marsh which only had white-flowered plants, the 1st I ever saw.

D. GRAMINIFOLIA - I visited my well-known colony at Caraça, on Mt. Carapuca, where they grow at 1750-1850m (not 1900m like I said in my 1st article). I found another colony growing on a neighboring peak at 1850m, also in sandy soil or orange sphagnum. At Caraça they flower from January to March. The hairy, sticky peduncles reach 42 cm in height, opening as many as 6 pink flowers around 1.5 cm across simultaneously on branched scapes. Old plants have stems a few cm long covered with the dead leaves. Few plants were found at Diamantina, growing in sandy soil around

1200m, with filiform leaves up to 15cm long (10 cm less than at Caraça). None were flowering but one of these flowered in cultivation in May and later on in August again, the flowers being dark-pink. Flower color may not be constant, but a characteristic which clearly differentiates plants from the 2 locations is that the ones at Caraça are mostly greenish while the ones from Diamantina and other sites in the specie's northern range are more attractive, being reddish. Though the Cipó Range is located between Caraça and Diamantina, *D. graminifolia* has never been found there.

D. MONTANA - very common and extremely variable in all 3 places, occurring in various habitats, from 1200 to 1500m. Plants reached 4cm in diameter in marshy areas and sometimes only 1 cm in drier areas. *D. montana* is a truly polymorphic specie and there's been much discussion regarding the classification of the various forms. I was able to identify 4 varieties: *D. montana* var *hirtella*, var *tomentosa*, var *montana*, and what I believe is a new variety. All of them seem to prefer flowering in the autumn and winter, though they can be found in flower all year long. I found var *montana* flowering at all 3 places. The pink-lilac flowers were around 1 cm across borne on scapes up to 25cm high. The main difference between the various forms is in the peduncles which usually have glandular hairs and/or non-glandular hairs in varying amounts. var. *hirtella*'s scapes are covered with long, white hairs. Gland-tipped hairs are found on the top half of var. *tomentosa*'s scapes, while normal hairs dominate the lower half (there being a gradual transition). var. *montana* usually only has glandular hairs. The ones I believe to be a new variety have delicate scapes thickly covered with glandular hairs and the seeds are shaped differently from those of other forms. I've observed other differences, but am not sure these are always true. Apparently, var. *hirtella* grows in sunny, boggy habitats, having larger leaves, wider petioles, and being more deeply colored. seems to prefer shadier habitats and is only slightly reddish. var. *montana* grows in a variety of habitats, usually in humid, sandy areas. It's the most widespread and variable of these 4 varieties and still causes much confusion. This 4th variety I've temporarily named *D. montana* var. "Dewy scape", due to the appearance of its peduncle. It's been found in the states of Minas Gerais and Parana. The leaves are narrower, the plants smaller, and they prefer sunny, sandy, but not too humid habitats, usually being nicely colored like var *montana*. Though what convinces me that these should be separated from the others are the rounder seeds. I'm trying to hybridize the forms, hoping to get some answers to this wide variation. I think all 4 varieties grew at Diamantina and S. Cipó. At Caraça I've found var. *tomentosa* at 1300m and a larger form of var. *tomentosa* at 1400m. var. *montana* had only been found between 1250m-1350m, but on this 3rd trip I found thousands thriving at 1750-1850m in a campo rupestre (almost next to *D. graminifolia*).

D. SP "CAMPO RUPESTRE" - gave this temporary name to a specie I discovered growing in campos rupestres at Diamantina and Cipó Range, from 1250-1450m. It's quite common, often growing alongside *D. montana*. It has flat, orangish rosettes up to 3 cm across, resembling *D. spathulata*. The peduncles are the most distinctive characteristic. First of all, they're totally orangish-red in color and covered with deep-red hairs. Second, they start out growing horizontally for a few centimeters and then grow vertically, up to a total length of around 30 cm. The flowers are pink-lilac like *D. montana*, maybe a bit darker. I believe this is the true *D. hirtella* described by Saint-Hilaire over 150 years ago. The reason why it has caused such confusion among botanists is that it loses important characteristics (like color) after herborization and ends up looking like an intermediate form between *D. montana* and *D. communis*. I'd seen this specie at my university's herbarium and had noticed it was different from both species. It is widespread in Brazil, growing in Minas Gerais, Bahia, and Goiás.

GENLISEA AUREA - I only saw *G. aurea* in the S. Cipó (though it has been collected at Diamantina and Caraça too), forming large rosettes up to 5 cm in diameter, thick with hundreds of strap-shaped, mucilage-covered leaves up to 2 cm long. The glandular scapes on a few plants were up to 30 cm tall bearing large, yellow flowers (though winter is the flowering season). They grew in marshy areas from 1350-1450m

usually with *D. chrysolepis*, *D. montana* var. *hirtella*, and *U. nana*.

G. FILIFORMIS as observed at Diamantina and the S. Cipó growing in marshy areas and in sandy soil, from 1200-1450m.. The leaves were up to 2 cm in length while the peduncles reached 11 cm in height, bearing yellow flowers, sometimes slightly pinkish.

G. PYGMAEA - also found in Diamantina plus S. Cipó, growing in sandy soil from 1200-1400m. The leaves were covered with mucilage, like *G. aurea*, and reached 2 cm in length. The glandular-haired scapes reached 12cm in height, bearing yellow flowers.

G. REPENS - found in marshy (mushy) ground in the S. Cipó; at around 1450m with leaves reaching 2.5 cm in length and having scapes up to 8 cm long with yellow flowers. It might've been seen at Diamantina too, but I confused then with *G. filiformis*.

G. VIOLACEA - was quite abundant in Diamantina, S. Cipó, and Caraça (where I discovered new sites). Flowers were up to 1.5 cm and wide, with different color patterns in each of the 3 places, varying from violet or purple to light-lilac, with stronger streaks around a yellow blotch on the lower lip. Leaves reached 1.5 cm in length and peduncles 25cm in height. At Caraça they grew among sphagnum and other mosses, from 1250-1850m (being most common at higher altitudes). At Diamantina, they also grew among mosses, but were most common in sandy soil, from 1200-1400m. At the S. Cipó, I only found them in barely humid sandy soil, from 1400-1450m.

UTRICULARIA AMETHYSTINA - also common in all 3 places, growing in various different habitats from 1200-1400m at Diamantina, 1300-1450m at the S. Cipó, and 1250-1850m at Caraça. The flowers were violet with a yellow-orangish blotch on lower lip at Diamantina. At Caraça and the S. Cipó, they were purplish with some white around a yellow blotch. The flower scapes were up to 18 cm long at Diamantina, 31 cm at the S. Cipó, and 10 cm at Caraça (though in cultivation, the latter has produced scapes over 25cm tall).

U. HISPIDA - found at Diamantina and Caraça, growing among grasses in marshy areas, from 1200-1300m. Peduncles reached 70 cm (Diamantina) and 80 cm (Caraça), bearing light-yellow to dirty-white flowers. The filiform leaves were shorter than the scapes.

U. LACINIATA - the pretty, violet flowers with 1 or 2 orangish-yellow marks on the lower lip (one above the other) are single on top of scapes up to 10 cm tall. They grew around 1400m at the S. Cipó and between 1400-1850m at Caraça, usually in open, sandy soil at campos rupestres. I only discovered it was *U. laciniata* when I arrived home in S. Paulo. I'd found similar plants at Diamantina, and thought the plants from all 3 places were *U. purpureocaerulea*, since they didn't have the lobed lower lip shown for *U. laciniata* in Taylor's monograph (with a few exceptions at Caraça). It turns out that only the ones from Diamantina were *U. purpureocaerulea*, which had entire, and not fimbriate tiny scales on the peduncle base. I saw *U. laciniata* on Mt. Carapuça on my 2nd Caraça trip, but though it was the same as one I'd seen earlier on that trip, which I later discovered was *U. parthenopipes*.

U. NANA - often present in very humid, sandy soil at Diamantina and S. Cipó from 1200-1350m, with single, yellow flowers on peduncles reaching 4cm in height.

U. NEOTTIOIDES - can only be found growing on rocks submerged in cold, acid streams. Found at all 3 places, from 1200-1450m. Peduncles reached 25cm in length and the flowers are cream-colored.

U. NERVOSA - was found in sandy soil and in a marsh at Diamantina at 1200-1250m, with yellow flowers on scapes up to 39 cm tall.

U. PARTHENOPIPES - grows semi-shaded in sandy soil on rocky mountainsides, from 1300-1350m at Caraça. Peduncles reached 7.5 cm in height and held single light-lilac flowers with an orange-yellow spot on the lower lip. This confirms the specie's apparent "jump" from southern Bahia all the way to Caraça, which Taylor was unsure of in his monograph.

U. PRAELONGA - found growing among grasses in marshes from 1200-1350m at Caraças and the S. Cipó. Has bright yellow flowers on scapes up to 82 cm long and

filiform leaves shorter than these.

U. PUBESCENS - grows on shaded stream banks in sandy soil, from 1250-1350m at Caraça, sometimes underwater. Distributed along the top half of peduncles up to 15cm in height are violet flowers with 2 yellow marks on the lower lip (one above the other).

U. PURPUREOCAERULEA - grows abundantly around Diamantina mostly in pure sand, at 1200-1400m. Peduncles were up to 12cm in height bearing single, lilac-purple flowers with a yellow spot on lower lip. Hard to believe it's been collected such few times, as Taylor says in his monograph.

U. RENIFORMIS - only found at Caraça, growing best in sphagnum (with *G. violacea* plus *D. graminifolia*) and in decaying organic matter under the semi-shade of bushes at 1800m, where leaves are up to 45 cm tall and lamina reach 10 cm across. The flowers nod at the end of scapes up to 105 cm long and are stunningly beautiful! They may be up to 5 cm tall and wide, varying from light-lilac to violet in color. On the lower lip are 2 verticle yellow stripes, each inside a white stripe, which is sometimes surrounded by a dark violet ring. *U. reniformis* is also found growing on humid rocks receiving spray from waterfalls, in semi-shaded to very shady places from 1250-1800m. In this case, the leaves are practically sessile and only a few centimeters across. I never found plants in this condition flowering.

U. SIMULANS - grew in sandy-muddy soil at Diamantina and S Cipó, from 1200-1300m, with yellow flowers on scapes up to 11 cm tall. The fringed calyx lobes are the outstanding characteristic in this specie.

U. SUBULATA - worst CP weed known, grew anywhere and everywhere at all 3 places with yellow flowers on scapes up to 15cm tall.

U. TRICHOPHYLLA - grows in shallow water in marshy areas, around 1200m at Diamantina and 1400m at the S Cipó, with yellow flowers on scapes up to 20 cm tall.

U. TRICOLOR - found at Diamantina from 1200-1350m, most often with sphagnum in sandy soil on stream sides, bearing violet to lilac flowers with an orange-yellow or yellow spot on the lower lip, on top of scapes up to 40 cm long.

At the S. Cipó found at 1300-1450m growing among grasses in very wet, sandy areas or in marshes, with scapes reaching 62 cm in length.

U. TRILOBA - grows in all 3 places at 1150-1450m with scapes up to 25cm tall I'd never noticed it at Caraça due to its extreme similarity with *U. subulata*

U. SP. "PYGMY-AMETHYSTINA" - probably what used to be *U. hirtella* but now considered a synonym of *U. amethystina* by Taylor. Found at all 3 places, growing in sandy-muddy soil from 1200-1450m, but never near *U. amethystina*, from which it is distinctly different in the wild. Its smaller in size, with peduncles up to 17 cm tall but usually shorter. The flowers are tinier, varying from light-lilac to white to light-yellow. Right after I returned from M Gerais in March, I found this specie growing among CPs from the Parque Nacional das Emas and soon realized it was the white-flowered specie I'd found at the Chapada dos Guimarães in 1991.

This trip turned out to be the most fruitful CP-hunt I've ever gone on, with 27 species found! It was also the best of all the trips I've made to the interior of Brazil. Since I was alone, I could stop when I wanted to and not worry about others not interested in PCs and wanting to push on, nor did I have to worry about slow people holding me up. To reduce weight during the trip I sent various boxes with CPs through the express mail which is supposed to arrive the following day to a friend in São Paulo and paid quite a lot money for it. Unfortunately, for reasons unknown to me, the plants from Diamantina took 5 days to arrive while the ones from the S. Cipó took 8 days. I hadn't foreseen this and hadn't worried about the plants being excessively wet, thinking that a day in the mail would be no problem. The result that I lost around 30% of the CPs from Diamantina and 60% of the ones from the Serra do Cipó. The *Drosera* came out best, but most of the *Genlisea* croaked. Well disasters like these only help stimulate my desire to return as soon as possible and explore these areas more deeply!!

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