CARNIVOROUS PLANT NEWSLETTER

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COVER

Sarracenia purpurea ssp. *purpurea* f. *heterophylla* in habitat. This quite legitimate genetic variant lacks all red pigment in all growth stages. For more details, see feature article "A Photographic Primer of Variants of *Sarracenia purpurea* L." beginning on page 41.

Photo by Donald Schnell

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your dues to the ICPS.

All correspondence regarding dues, address changes and missing issues should be sent to Mrs. Kathy Fine, c/o The Fullerton Arboretum, Dept. of Biology, California State University, Fullerton, CA 92634. DO NOT SEND TO THE CO-EDITORS. Checks for subscriptions and reprints should be made payable to CSUF FOUNDATION-ARBORETUM.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

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

Copy deadline for the September issue is August 1, 1981.

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Editor's Corner

By Don Schnell

ICPS members of course have diverse interests — from very formal and scholarly researches to those who simply enjoy growing CPs or seeing and photographing them, and all gradations and combinations in between. Among the predominant growers and collectors of CPs there seems to be a growing impatience, as indicated by our personal and Society mail, to rapidly acquire material that is relatively exotic in culture, or simply yet not available through markets or trading or seed banks. Some individuals have proposed ambitious and sometimes naive schemes to develop collections of rare material rapidly, primarily material desired by American members and native to other countries, often in relatively inaccessable areas.

In some cases, ICPS has been asked as a society to participate in these exercises in several ways:

1. Provide financial backing for expeditions to other countries to collect plants;
2. To supply prominent ("full page") advertisements in CPN soliciting financial backers of such expeditions;
3. To provide official letters of introduction stating that the expedition has the "moral support" of ICPS.

Presently, policy is for ICPS to decline all three requests. We will briefly expand on the reasons for this policy.

While it is not unheard of for certain societies to provide support for various exploratory expeditions (such as the Royal Geographic Society and the National Geographic Society), they only do so under rigidly controlled circumstances after thoroughly investigating the intent of the expedition as being one of enlightenment, and the potential individuals involved as being fully qualified and experienced in such activities. Financially, of course, larger, older societies are better prepared to underwrite expeditions, but they are also careful to ensure the ethics and planning and goals of the venture. An ill-prepared venture — and the inexperienced are often frankly ill-prepared in spite of confidence to the contrary — into another nation for the sake of plant collection, and likely without considering the laws, mores and sensitivities of the people of that country, cannot be countenanced. As an introduction to those contemplating such a venture, we suggest they read a recent article (Taxon 30:87-89, 1981) outlining a proper approach and good manners in such situations.

There are also new, complex local and international legal restraints on collections and transport of some material that one must look into. More importantly, each individual must decide the moral value of pursuing possibly threatened or endangered plant material, removing it from its evolved habitat, and then attempting to grow it without much experience with similar material, or much theoretical and practical broad knowledge of botany and horticulture.

Therefore, ICPS cannot financially underwrite, support by letters of introduction, or prominently advertise such ventures. With some reservations, however, we feel generally obligated to place any requests for aid or support you may wish to make among the membership in the regular columns (such as News and Views) of CPN. The editors reserve the right to edit such material in cooperation with the individual requesting the space, so that the request is clear in intent and in taste.

Many universities, gardens, arboreta and other groups do sponsor or support

various explorations (usually after the careful investigations mentioned above). However, their activities are separate from those of ICPS and our policies do not reflect those of the above listed in summary, although they would agree with many of the concepts presented above.

SEED BANK

Patrick Dwyer
St. Michael's Episcopal Church
49 Killean Park, Albany, NY 12205

$.50 per packet

Byblis liniflora (15), *Cephalotus follicularis* (5), *Darlingtonia californica* (15), *Dionaea muscipula* (5), *Drosera aliciae* (3), *D. arcturi*, *D. binata* (1), *D. burkeana* (4), *D. burmanii* (Taiwan), *D. capensis*, *D. capensis* (narrow), *D. capillaris*, *D. capillaris* (long) (10), *D. erythrorhiza* (12), *D. filiformis filiformis*, *D. filiformis tracyi* (7), *D. glanduligera* (3), *D. intermedia*, *D. montana*, *D. natalensis* (3), *D. pygmea* (3), *D. rotundifolia* (Oregon), *D. spathulata* (Australia), *D. spath.* (Kansai), *D. spath.* (Kanto), *Nepenthes gracilis* (15), *N. khasiana*, *N. mirabilis*, *N. rafflesiana* (4), *Pinguicula lutea* (10), *Sarracenia alata* (9), *S. flava*, *S. flava* (heavy vein) (14), *S. leucophylla*, *S. minor*, *S. oreophylla* (5), *S. psittacina*, *S. purpurea purpurea*, *S. purpurea venosa*, *S. purpurea venosa* "Louis Burk", *S. rubra gulfensis* (10), *S. rubra rubra* (10), *S. leuco × flava*, *Sarracenia* mix, *Utricularia resupinata* (5).

CPN BOOK SHOP

The books listed below are Japanese books written in their language on the subject of CPs. They are generously interspersed with many excellent pictures in color and in black and white. The prices include all postage and insurance costs (both overseas and domestic). Please send your check or money order to J. A. Mazrimas before August 15, 1981. At that time the books will be ordered and you should expect a wait of two to three months before you receive the books. All books are sent by surface mail. Starred book is newly published.

AUTHOR	TITLE	PAGES	PRICE
———	Aldrovanda vesiculosa at Hanyu-City	32	$6.75
———	Garden Life Magazine (Vol. 7, 1977)		$5.00
I.P.S.J.	Insectivorous Plants	199	$10.30
Komiya, S.	Carnivorous Plants, Observation & Cultivation	160	$4.75
Komiya, S. & Shimizu, K.	Examination Notes on Carnivorous Plants	90	$4.60
Kondo	Carnivorous Plants	292	$10.30
Kusakabe, I.	(CP portion) Cacti, Succulents and Insectivorous Plants	127	$9.40
Shimizu, K.	The Mystery of Carnivorous Plants	54	$5.75
*Shimizu, K.	Venus Fly Trap	—	$8.00
Suzuki	Insectivorous Plants (Cult. & Coll.)	168	$3.35
Yamakawa, G.	Insectivorous Plants	152	$4.00

News and Views

BILL CARROLL (NC Botanical Garden, Chapel Hill, NC 27514) sends the following information and photos: I'm enclosing three slides showing a species of *Exyra* and the damage done by the larva. Over several months, the single larva destroyed or damaged eight pitchers of a large *Sarracenia purp.* ssp. *venosa*.

Exyra larva feeding in pitcher of *S. purpurea* ssp. *venosa*.

The plant was kept in a makeshift cage in a greenhouse. The larva pupated probably during October and the moth emerged by the end of November.

I was quite amazed at the destructiveness of the pest. The plant has begun a new flush of growth and appears well on its way to recovery. (Photos taken at UNC Botany Dept. by Susan Sizemore.)

Exyra larva

Exyra moth on pitchers damaged by larva.

Glenn Claudi-Magnussen (26861 Quevedo Lane, Mission Viejo, CA 92691) comments: "Looking at the latest CPN [9(4)], I noticed the following two errors were made in the printing of "More on Predacious Fungi":

1. [second paragraph, third sentence] "Also, the validity of several genera." should read "Also, the validity of several genera is still in question because of their similarity to other genera."
2. [fourth paragraph, first sentence] "encounttering" should be spelled "encountering".

In the list of stamps appearing on page 19, a 1978 stamp from Seychelles was not listed (although it was mentioned in the article). For those interested, the Scott's catalog number is **402**.

I also noticed that little mention has been made in CPN (or other references) about the flowers of *Drosera adelae*, which are in some respects quite different from the "typical" *Drosera* flower. Therefore, I wrote the following description:

The flowers of *Drosera adelae* are quite different from the "typical" *Drosera* flower. The five pointed petals form a star that is about one centimeter in diameter. The pointed, pale green sepals are slightly shorter than the petals, but long enough to be seen between the petals. There are up to 35 or more flowers on each scape. The scapes may be 25 cm or taller. Unlike most *Drosera* flowers, those of *D. adelae* remain open for about five days, the color gradually changing from yellow-green to pinkish-brown.

Another note of possible interest to CPN readers: I have noticed that plantlets of *D.* × *wateri* frequently sprout from the tops of scapes.

ASHISH HANSOTI (18, Navjivan Bldg., Dattatreya Rd., Bombay, India 400 054) has some comments to pass along. In his experience, vermiculite is suppressive or toxic to Droseras. Sarracenias, *Nepenthes* and *Byblis liniflora* however do well for him if the vermiculite is mixed with an epiphyte tree moss that grows nearby. He has also grown *Nepenthes* very well in a modified mixture of red soil (local), vermiculite and coarse gravel. Mr. Hansoti is experimenting with these mixes since sphagnum and peat are not readily available. A mixture suitable for Droseras has been tree fern, coconut fiber, tree moss (see above) and fragmented brick pieces. Teak sawdust has not been useful. When transplanting tiny seedlings, Mr. Hansoti finds the small wire loop used by bacteriologists or in flame tests by chemists to be very useful for handling the seedlings without injury. Forceps with fine points and the points bent slightly outward so they do not pierce the tissue are also helpful if used so that the seedling tissue is not crushed.

Finally, Mr. Hansoti has some suggestions: that CPN publish an ICPS membership directory soon (Ed. note: see bylaws), and that ICPS propagate and sell plants through the Arboretum, as the Sempervivum Society apparently does.

BILL LAVARACK (National Parks and Wildlife Service, Marlow Street, Pallarenda, Townsville, Qld. 4810, Australia) wishes to comment on T. Mosisch's comments of finding *Drosera rotundifolia* (CPN 9:102) at Bribie Island. Dr. Lavarack wishes to challenge this, stating that it would be a first in Australia and only a second in the Southern Hemisphere. The existing record is the highlands of New Guinea. Lavarack feels Mosisch probably found a slightly different form of *D. spathulata*. Lavarack has little hesitation in stating that *D. rotundifolia* does not occur in Australia.

MRS. F. PERSCH (22 Myrtle St., Mirto Heights, N.S.W. Australia 2566) sent the following: "I have a *Sarracenia* collection which includes *psittacina, purpurea* (*venosa* and *gibbosa*), *leucophylla, willissii* × *leucophylla, alata* × *psittacina, alata,* and *Dionaea* and many others. I also grow *Cephalotus follicularis*, my favorite plant. I dis-

covered with this species, removing all small pitcher leaves resulted in increased size of the remaining forming pitchers when they matured. I use the small pitcher leaves that I remove as cuttings which produce roots in 4 to 6 weeks. I also have two small plants of *Nepenthes, khasiana* and *mirabilis*. My plants are only three inches high although each leaf has a pitcher 1½ inches long on it.

"All my plants are housed in a 10 by 16 foot glass house shaded during the summer months and unheated during winter. I have lost no plants by death as yet. All plants are large and healthy and I am increasing my collection constantly from many sources. Some of my plants I have grown from seed, others from cuttings, all with great success. I live on five acres and during winter *Drosera peltata* grows wild here; it is hard to walk around my property without stepping on them. Also, there is *D. pygmea* growing by the river down to the back of the gorge."

EDWARD WEISS (Dept. of Biology, Christopher Newport College, 50 Shoe Lane, Newport News, VA 23606) makes the following comments and request: "I have been conducting field and laboratory studies involving the mineral nutrition of *Sarracenia flava*. In both situations, the production of phyllodia appears related to the overall availability of nutrients, the combination of soil-available and carnivory-supplied. I am presently initiating studies to further define this relationship and would be interested in hearing the observations of others concerning *S. flava* phyllodia. Also, any observations on phyllodia in other species of *Sarracenia* would be most useful.

"I want to take this opportunity to express my appreciation to you and your fellow co-editors for a continuing fine job. I look forward to the growth and development that should come with the evolution of the ICPS."

J. MACK WILLIAMS (P.O. Box 463, Yanceyville, N.C. 27379) writes: "I would like to mention growing conditions of my CP especially for those members who grow them near windows. For the past four years I have been growing approximately 40 varieties of CP successfully in two very large kitchen windows facing southeast. I do this only in the colder months, while in the spring and summer months I place them outside to feed. During their time spent on the windowsill, I cover them with plastic wrap to overcome the severe dehumidifying effects of electric heat in the winter, leaving some small holes to prevent heat build-up in direct sunlight. Among these CPs are 12 different Sarracenias including a few hybrids. I have found that I can give these Sarracenias their proper dormancy requirements by simply placing them against the cold glass of the window and at one end of the window which stays mostly in shadow. I also keep the moss barely moist as required. Last winter I used no plastic covering over the plants, only misting them a few times a day. The sundews survived, but weren't very large. This winter I learned to appreciate the role which humidity plays in CP growth. By simply covering each pot with plastic wrap (like so many mini-terrariums), rich growth has continued through the winter. My advice to new CPN members is that one can achieve very fine results with such simple procedures."

SARAH ZART (9548 McVicker Ave., Oak Lawn, IL 60453) reports: "I took about 12 older leaves of *Pinguicula gypsicola* with the white base and dipped them in Root-one with fungicide. Out of those 12 leaves, four made it. I put them in a container (covered) in barely moist sphagnum moss, and kept my fingers crossed. In about a month's time, I found tiny plants growing along the bottom of the leaves.

"I would like to start a round robin on growing CP in general. I would like to limit it to U.S. and Canadian members only and each robin would have eight members to help keep postage costs down. Please contact me if you are interested in joining."

THE OXFORD SYMPOSIUM ON CARNIVOROUS PLANTS

By Stephen E. Williams
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A symposium on carnivorous plants was held as a part of the Society for Experimental Biology meetings in Oxford, England on December 18, 1981. The symposium was organized by Dr. B. E. Juniper of the Botany School, Oxford University. Topics covered were: the structure and function of carnivorous plant glands, the kinetics of amino acid uptake by *Dionaea*, the physiology of the movements of the *Droseraceae* and the culture and propagation of carnivorous plants. In addition, the excellent collection of carnivorous plants at the Oxford Botanical Garden was viewed and a film on CPs called "The Tender Trap" was presented. The approximately 75 people attending included John Watkins, the secretary and founder of the British Carnivorous Plant Society, and Paul Simons, the British Society President. The morning session was chaired by Dr. Juniper of Oxford University and the afternoon session was chaired by Dr. Robins of East Anglia University.

Since much of the information presented is covered in recently published papers, references to "Review of Recent Literature" in CPN are given in place of more lengthly description of each talk.

Glands and Their Secretory Activity was the topic addressed by the majority of the speakers. J. Heslop-Harrison of Aberwyth, Wales, R. J. Robins and B. E. Juniper of Oxford and East Anglia, England, U. Luttge of Darmstadt, Germany and D. Joel and B. E. Juniper of Hebrew University, Israel and Oxford, England all presented papers on this topic. These papers covered a wide range of CPs but it became clear that they have much in common with CPs and flower nectaries. All have an endodermis (a layer of cells with impermeable lateral walls) that forces water and dissolved substances to pass through the protoplasts of the endodermal layer and thus creates a semipermeable barrier. All have secretory cells external to the endodermis that produce the various substances that are secreted and a set of basal reservoir cells (the stalked glands of *Drosophyllum* and *Drosera* tentacles which lack reservoir cells were not covered in this meeting). In all cases, similar mechanisms that cause the secretion of chloride ion seem to control fluid secretion.

However, the mechanisms that control secretion seemed to differ in the two major groups of plants which were discussed. Work from Dr. Juniper's laboratory indicates that in the *Droseraceae* (*Dionaea* and *Drosophyllum* sessile glands) there is a digestive cycle with secretion and absorption phase. Digestive enzyme production in this group occurs de novo in the secretory cells after stimulation. By contrast, the work of the Heslop-Harrisons in the *Byblidaceae* (*Byblis*) and *Lentibulariaceae* (*Pinguicula, Utricularia* and *Genlisea*) indicates that digestive enzymes are produced as a normal part of secretory cell development and are released upon stimulation in a single destructive secretory event. The *Droseraceae* are capable of going through several cycles of secretion and absorption while the other two families seem to rely on a one shot mechanism.

Amino acid uptake by Dionaea was the topic of a talk by P. Rea, a student of Dr. Juniper. Mr. Rea presented a kinetic analysis of amino acid uptake

(Please see OXFORD, p. 48)

THE ROLE OF INDOLEACETIC ACID IN THE CONTROL OF LEAF BLADE MOVEMENTS OF *DROSERA CAPENSIS*†

By Inga Weilbrenner* and Martin Bopp
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Excised leaves of *Drosera capensis* respond to stimulation by a piece of cheese placed on the center of the blade by bending both the blade and tentacles in the vicinity of the cheese. The leaf appears to respond by growing since leaf blades were 1.5 to 2.0 mm longer after bending and unbending than unstimulated control leaves.

A role of indoeacetic acid (IAA) in the control of the movements is indicated since the antiauxin p-chloropheoxyisobutyric acid (PCIB) is capable of inhibiting the response of the leaf to the standard 3 × 3 × 1 mm piece of Edam cheese (27% protein and 25% fat) which was used as a stimulus in all experiments. Leaves which had their cut base placed in 10^{-3} M PCIB showed a clearly diminished response to a cheese stimulus but regained their responsiveness when placed in water for 24 hours.

The auxin transport inhibitor 2,3,5-triiodobenzoic acid (TIBA) diminished the response of the leaf to the cheese when it was placed acropetal to the cheese stimulus. When a 10^{-4} M TIBA barrier was present acropetal to the stimulus, the leaf was always observed to bend acropetal to the barrier while reduced bending, and in 30% of the cases no bending was observed beneath the cheese. In controls that lacked the barrier maximum bending was observed the cheese. This data is consistent with the hypothesis that bending of the leaf blade beneath the cheese is due to the redistribution of IAA produced in the leaf tip in the stimulated portion of the blade.

IAA applied to the surface of an unstimulated leaf will cause bending only at the site on the leaf where the IAA was applied. However, when 10^{-3} to 10^{-4} IAA is applied to a stimulated leaf acropetal to the cheese stimulus, in addition to the bending at the site of application, an enhanced response was observed beneath the cheese. Greater bending and more rapid bending occurred in response to the greater applied concentrations of IAA. There was no enhancement of response by IAA concentrations of less than 10^{-5} M.

IAA applied to the leaf acropetal to the cheese stimulus always had the same effect. Regardless of the site of application the leaf always bent around the cheese. Additional IAA only enhances the response of the leaf blade to the cheese stimulus. No significant effect of applied IAA on tentacle movement was observed.

Bending of the leaf blade in *Drosera capensis* during prey capture is likely to be due to differential growth caused by a redistribution of IAA produced at the leaf apex and transported to the region beneath the prey.

† A contributed paper presented at the Oxford Conference on Carnivorous Plants in Oxford, England, December 18, 1980.

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COMING IN SEPTEMBER

— Evolution of CPs

— How Exclusive are CPs?

POLYPOMPHOLYX

By Allen Lowrie
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Duncraig, 6023 Western Australia

Polypompholyx is represented in the plant world by two plants. *P. multifida* and the smaller plant *P. tenella*, both which grow sometimes together here in Western Australia. *P. tenella* is also found in Victoria and South Australia, but *P. multifida* grows only in Western Australia.

P. multifida is a plant that loves to grow in very wet places and it doesn't seem to favour any particular soil type. I've found it growing in peat, clay, moss, and sand.

P. multifida (I'm not sure of *P. tenella*) seems to be an annual, growing the following season from seed produced this season. The wet areas these plants grow in are mostly wet all year.

Polypompholyx are not self-pollinating. I do not know what insect pollinates the flower, but in the glasshouse they must be pollinated by hand. The flower parts are very similar to those of *Pinguicula*; they can be pollinated the same way as the latter.

P. multifida has bladder traps about 4 mm long just under the soil surface, with small green leaves (turning red with age) about 5 cm long pressed flat to the ground, forming a small rosette. The flower spike can be anywhere from 6 to 20 cm tall, terminating in two to six flowers. *Polypompholyx* flowers come in all shades of pink; some are even bicoloured. Occasionally I have come across plants

(Please see *POLYPOMPHOLYX*, p. 47)

THE CZECH BUTTERWORT *PINGUICULA BOHEMICA*

By M. Studnička
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Czechoslovakia

Pinguicula bohemica Kraj. (syn. *P. vulgaris* ssp. *bohemica*) Domin) is a Czechoslovak endemic (Holub, Procházka and Čeřovský, 1979). A Czech professor of botany, now a university professor in Vancouver, described the plant in 1927 (Krajina, 1927). *Pinguicula alpina* and *P. vulgaris*, the nearest relative of *P. bohemica*, also occur in Czechoslovakia.

According to Hadač (1977), *P. bohemica* originated at the start of the postglacial period through the isolation of a small number of *P. vulgaris* in the central part of our country. Nine thousand years ago a very dry and warm climate set in in Europe and the remains of glacial flora receded to the mountains. *P. vulgaris* also receded from the plains to the mountains but a part stayed on a small marshy piece of land near the river Elbe (figure 1). It adapted itself to the warm climate in the plain and the specific soil rich in mineral salts.

At the end of the warm, dry period *P. vulgaris* spread back again from the mountains to the hills and plains. In some localities it met with the already different *P. bohemica*. Hybrids are rare, however. In some localities there remained a genetically pure growth of the Czech butterwort.

Pinguicula bohemica is more robust than its sister *P. vulgaris* and reaches up to a height of 30 cm. The leaves are conspicuously veined. The relatively large

(Please see CZECH, p. 40, 44)

Polypompholyx multifida in habitat.

POLYPOMPHOLYX

Photos by Allen Lowrie

Close up of cluster of flowers.

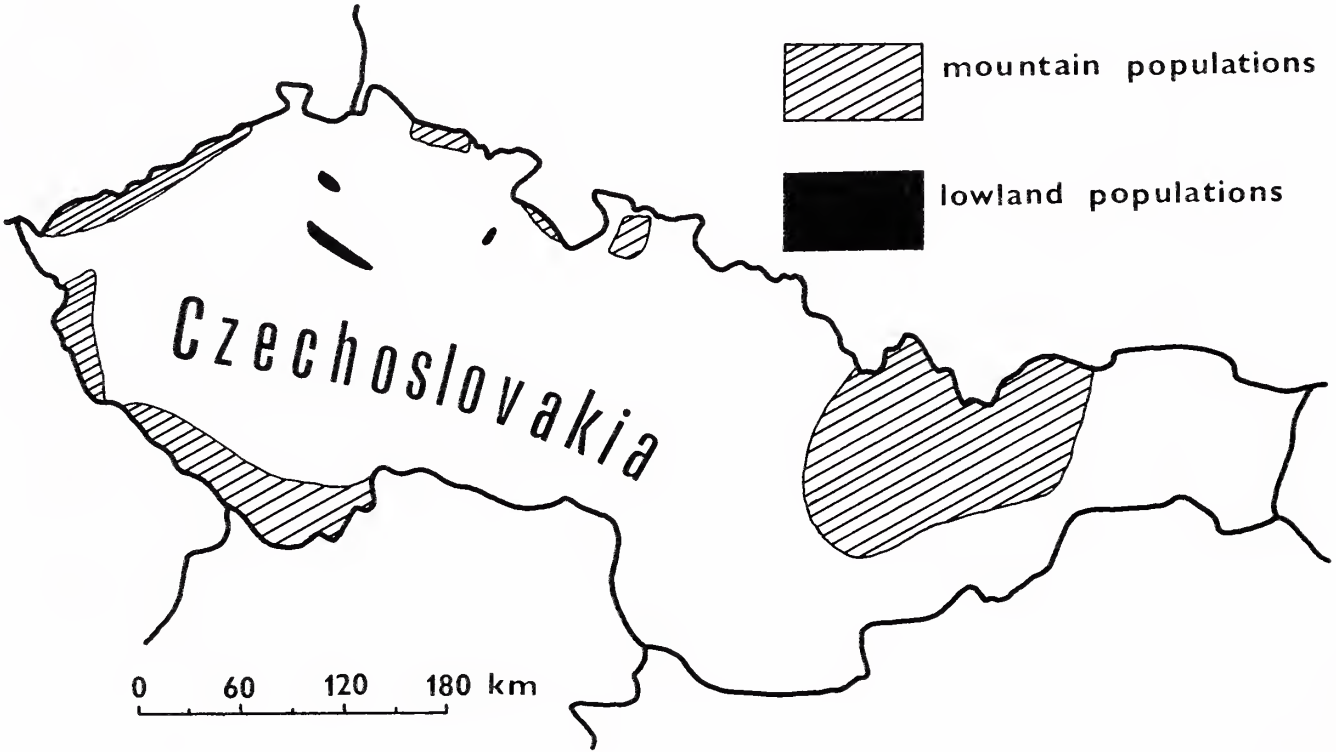


Fig. 1. The assumed distribution of *Pinguicula* plants 9,000 years ago on today's Czechoslovak territory.

A PHOTOGRAPHIC PRIMER OF VARIANTS OF *SARRACENIA PURPUREA* L.

By Donald E. Schnell

In CPN 9:41-44 (June, 1980) we presented the first of a proposed series of color photo articles intended to aid the reader in discerning and evaluating variants of various CP species. The first article covered *S. flava* and met with considerable positive comment so we are continuing the yearly series with *S. purpurea* in this issue, and will likely next cover *S. rubra* either in another issue this year or in one next year.

The co-editors would appreciate your suggestions for ensuing editions of this series. One reader has already suggested variants of some of the *Pinguicula* ssp., and of course we have had many requests for *S. purpurea* and *S. rubra*.

As in the first installment of the series, the text will be brief, at times telegraphic, and the reader is of necessity referred to more detailed references for an in-depth discussion. We will try to select reasonably available references. In the case of *S. purpurea*, I still have a few copies of reprints of my review paper on variants of the species and will gladly supply them to interested as long as they last. (See references at the end of the article.)

In my review of "published" botanical variants of *S. purpurea* (some not legitimately so), I covered nine cases of varying interest, ranging from the vigorously discussed concept of northern and southern subspecies over the years, to some extremely questionable variants mentioned only once in the literature and often representing sports or ecophenes, and the "horticultural variety Louis Burk" (LB) case on the Gulf Coast.

The photos and brief differential descriptions presented will be of what I feel are acceptable genetic variants, and two others. Var. *ripicola*, which is almost certainly not genetic, will be presented due to interest and confusion where the plants appear in fens of the northern range, and "LB" will also be shown since it is of some interest and its status is still under study.

The numbers preceding the paragraphs below correspond to the figure numbers.

1) ssp. *venosa*. The southern subspecies (I accept ssp. separation as botanically legitimate) ranges from Delaware and New Jersey (where bogs of it frequently intermingle with the northern ssp. *purpurea* and where hybrid intermediates can be found commonly) southward. The pitchers are proportionately shorter and wider than in ssp. *purpurea*, with more flaring lids and usually covered externally by hairs.

2) Flower of ssp. *venosa*. This is most often deep red along the Atlantic coastal plain (and in inland bogs), occasionally lighter red or maroon.

3) Flower of ssp. *venosa* "Louis Burk." The flower is generally larger with light pink petals. Vegatatively, the pitchers are in the same proportion as ssp. *venosa* elsewhere but are larger (as they are in some Piedmont Carolinas bogs). Research is under way to determine the exact status of this variant, but it appears to predominate over the Gulf Coast, rather than being rare as originally thought. Discussion of this variant and its possible relationship to the partial break in species range in south Georgia can be found in reference 1.

4) Flower of ssp. *venosa* "Louis Burk" showing the very light green to nearly white umbraculate disc.

5) ssp. *purpurea*. The pitchers are proportionately longer and more narrow than in ssp. *venosa* and are usually glabrous. This is the northern ssp. as typically seen in sphagnum bogs.

6) ssp. *purpurea* f. *heterophylla*. This quite legitimate genetic variant lacks all red

(Please see VARIANTS, p. 44)

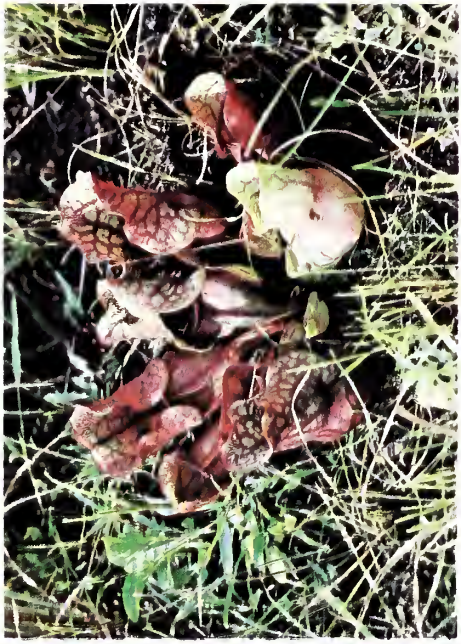


Fig. 1. *S. purepurea* ssp. *venosa* in coastal North Carolina.

Fig. 2. Flower of ssp. *venosa*.

VARIANTS OF

ALL PHOTOS BY

Fig. 3. ssp. *venosa* "Louis Burk" flower. Note pink petals and somewhat lighter sepals.

Fig. 4. ssp. *venosa* "Louis Burk" flower showing very pale to nearly white "umbrella."

Fig. 5. ssp. *purpurea* in a sphagnum bog.

Fig. 6. ssp. *purpurea* f. *heterophylla*.

SARRACENIA PURPUREA L.

DONALD SCHNELL

Fig. 7. Flower of ssp. *purpurea* f. *heterophylla*.

Fig. 8. ssp. *purpurea* growing in a northern marl fen as "ripicola" habitat variant.

VARIANTS

(Continued from p. 41)

pigment in all growth stages (cf. the green pitchered variant of *S. flava*). It occurs rarely in some northern bogs but is being found in more areas with increased searching. The form must be clearly differentiated from shade-grown more typical ssp. *purpurea* in which red color has not developed. One should insist that putative f. *heterophylla* have yellow-green pitchers, bracts and flowers when growing in the open; all shade growing plants must remain suspect until more closely examined or grown in full light. In bogs where f. *heterophylla* is found, more typical ssp. *purpurea* is almost always present with resulting hybrids. These can be differentiated by at least fine red venation of pitchers, pink or veined petals and red pigment of leaf scales at the base of the plant rosette.

7) Flower of ssp. *purpurea* f. *heterophylla*. Note that all parts of the flower are yellow-green.

8) ssp. *purpurea* "v. *ripicola*." The error in naming this non-genetic variant is a classical example of the result of not doing meticulous transplant experiments in varying habitats, as well as not noting older literature where the work may have already been done (e.g., reference 2)! It is the growth form of ssp. *purpurea* most often seen in northern marl fens, as opposed to the "typical" growth form in acid sphagnum bogs. In the "ripicola" plants, the pitchers are quite short and brittle, often very deep red to maroon, and there are often more pitchers per rosette. When moved from their marl or sandy soil habitat to sphagnum conditions, they revert to typical ssp. *purpurea* sphagnum bog appearance in 1-3 years. Conversely, sphagnum bog growing ssp. *purpurea* plants moved to an open marl fen assume the "ripicola" characteristics.

Again, we refer interested readers to the sources below on all of these variants of minor importance. The references contain bibliographies through which one must further backtrack in order to begin to gain some understanding of these plants.

References

1. Schnell, D. E. 1979. A critical review of published variants of *Sarracenia purpurea* L. Castanea 44:47-59. (Reprints from author. A general critical review containing bibliographic references which should be further consulted.)
2. Mandossian, A. J. 1966. Variations in the leaf of *Sarracenia purpurea* (pitcher plant). Mich. Botanist 5:26-35. (This is one paper of a trilogy by the author on aspects of the biology of the species in Michigan. Too often overlooked, one might criticize details or extent of some experiments and observations, but on the whole they present valuable data and observations among which are transplant experiments and other observations contradicting the concept of genetic var. *ripicola*, which Mandossian in turn was apparently not aware of.)
3. Schnell, D. E. 1978. Systematic flower studies of *Sarracenia* L. Castanea 43: 211-220. (A secondary reference as far as this presentation of *S. purpurea* variants is concerned, but which emphasizes some floral observations.)

CZECH

(Continued from p. 38, 40)

flowers of *P. bohemica* are almost white with a dark violet mark in the neck, quite the opposite of the typical colouring of *P. vulgaris*. In the light colour of its corolla *P. bohemica* resembles *P. vulgaris* f. *bicolor* (Wolosczak) Krajina (see CPN 7/2:47, 50). But there are certain clear features which distinguish *P. bohemica* from *P. vulgaris* and its forms. The most striking of these is the shape of the calyx and capsule (figure 2). *P. bohemica* has the lobes of its calyx rounded at the tip whilst *P. vulgaris* including the bicolor form has bluntly pointed lobes. The calyx of *P. bohemica* is not open but is bell-shaped and fitting closely to the

(Please see CZECH, p. 47)

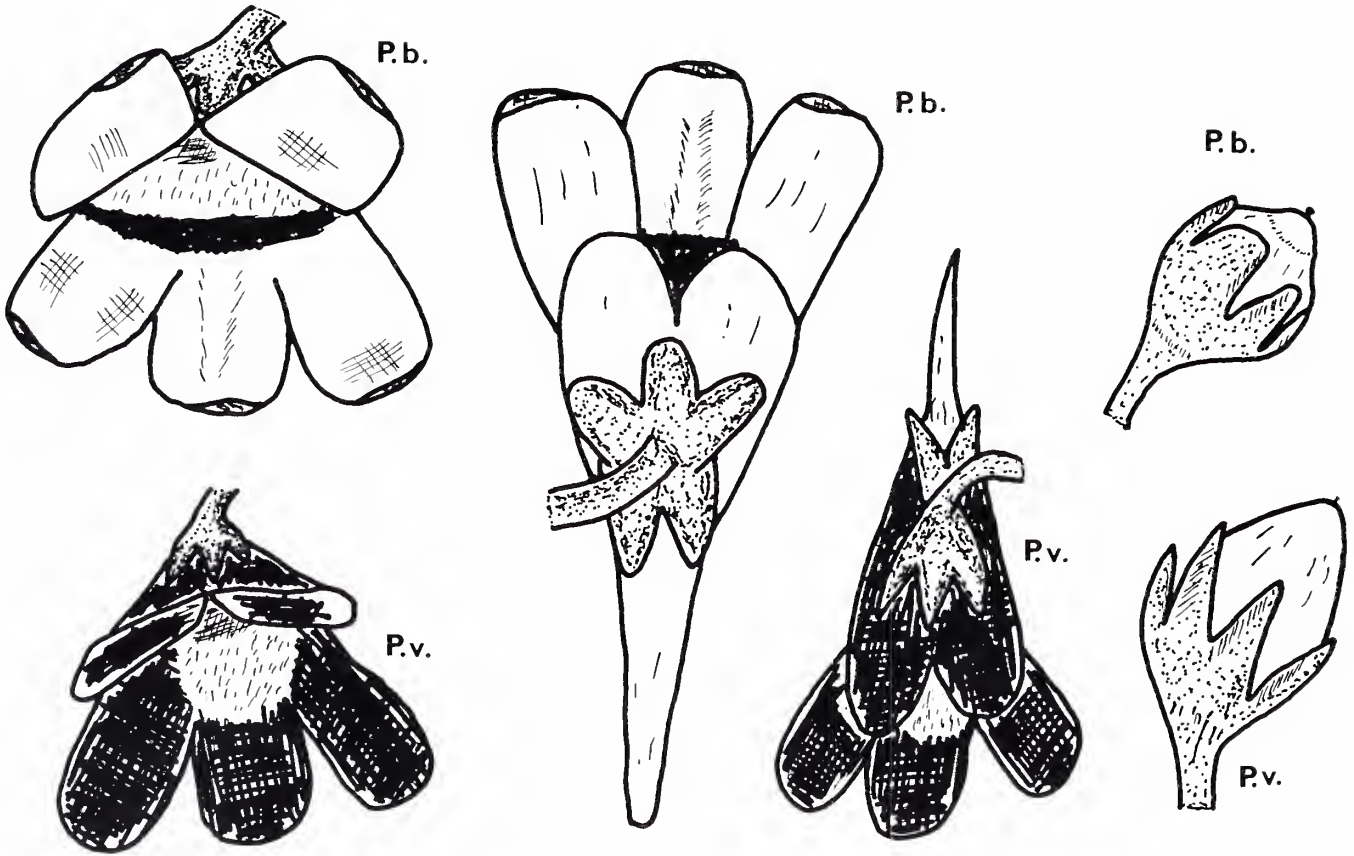


Fig. 2. A comparison of the shape of corolla, calyx and capsule between *P. bohemica* (P. b.) and *P. vulgaris* (P. v.).

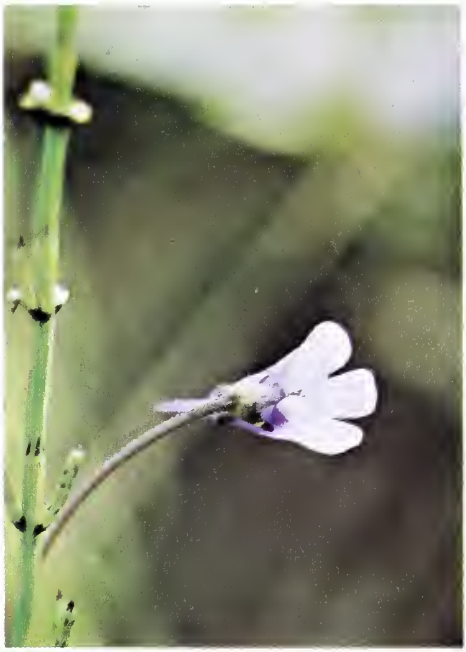


Plate 1. The flower of *Pinguicula bohemica*.

Plate 2. *P. bohemica* in habitat in northern Czechoslovakia. Photos by author.

White form of *Polypompholyx multifida*. Photo by A. Lowrie.

CZECH

(Continued from p. 44)

capsule. The capsule is remarkably short, almost spherical or slightly pear-shaped.

Very few botanists have had the opportunity to study a good specimen of this plant and so *P. bohemica* is practically unknown. Ernst, monographer of the genus *Pinguicula*, gives the name of *P. bohemica* without comment (Ernst, 1961). Casper, monographer of the European butterworts, even doubts the existence of *P. bohemica* as a species and considers it just a form of *P. vulgaris* (Casper, 1962). Hadač (1977) criticizes this view as unfounded. The latest opinions are that *P. bohemica* is an independent taxon, quite different from the typical *P. vulgaris* and other European species. The differences between *P. bohemica* and all other European butterworts are given in detail by Krajina in the quoted original description of the specimen.

Pinguicula bohemica was found in at least 10 localities 50 years ago. Farming, unfortunately, in the fertile country here is a grave threat to this endemic, most of all through changes in the water system and through the use of nitrates and phosphates to enrich the soil. Plant life is changed by this and the butterwort is subjected to interspecific competition. Today we know of only one locality where a few dozen Czech butterwort plants grow, and this unfortunately a protected nature reservation.

The butterwort grows here on a small marshy field measuring 300 by 200 meters. At the end of the glacial period there was a large shallow lake here which gradually filled up with marshy soil. There were many such swamps in this part of the country. The Czech butterwort grows here together with many other rare plants such as the orchids *Dactylorhiza maculata, D. majalis, Epipactis palustris, Liparis loeselii, Platanthera bifolia,* the creeping willow *Salix repens,* interesting and often endemic sedges *Carex* spp., *Tofieldia calyculata, Parnassia palustris* and *Menyanthes trifoliata*. At places with the most acid soil rain reaction there are islands of *Sphagnum palustre* and rare occurrences of *Drosera rotundifolia* and *Utricularia minor* f. *terestris*.

Pinguicula bohemica will probably soon become extinct in its natural surroundings, and all that will remain is a few documents in the herbariums of Charles University and the National Museum in Prague. A few thriving plants grow in the Botanical Gardens at the town of Liberec in Czechoslovakia. This "genetic bank" is a final attempt to preserve this beautiful and also scientifically interesting carnivorous plant.

References

Casper, S. J. (1962). Revision der Gattung *Pinguicula* in Eurasien. Feddes Report. Beih. 66:1-148.

Ernst, F. (1961). Revision der Gattung *Pinguicula*. Bot. Jahrb. 80:154-194.

Hadač, E. (1977). Notes on endemic plants of the Czech Socialist Republic. Reports of Czechoslovakia Botanical Society 12/1:1-15.

Holub, J., Procházka, F. and Čeřovský, J. (1979). List of extinct, endemic and threatened plants of the flora of the Czech Socialist Republic (first draft). Preslia 51: 213-237.

Krajina, V. (1927). *Pinguicula bohemica*, species nova a sectione Pionphyllum DC. Memoires de la Sociétié Royale des Sciences de Bohême 1926/15:1-13.

POLYPOMPHOLYX

(Continued from p. 38)

in the field that are taller and have larger blooms than normal, but this is probably due to soil conditions. *P. tenella* grows to only 5 cm at best.

On rare occasions I have found pure white forms of *P. multifida*. As yet I have not managed to collect seed of this form.

Polypompholyx are truly worth growing — not only for their CP appeal but also for their fantastic long lasting flowers.

OXFORD
(Continued from p. 36)

by discs cut out of *Dionaea* leaves. His work indicates a co-transport mechanism that uses secreted hydrogen ions and that compounds that increase the rate of secretion increase the rate of uptake of amino acids.

Movements in the Droseraceae was a topic addressed by two speakers. S. E. Williams of Lebanon Valley College, U.S.A. presented a broad review of the entire topic and covered some more recent work which indicates that both cell wall plasticity (growth) processes and a turgor mechanism are likely to be involved in the rapid movements of *Dionaea* leaf blades. Inga Weilbrenner, a student at Heidelberg University, Germany presented a paper on the control mechanisms of the slow movements of *Drosera* leaf blades. Miss Weilbrenner's work indicates auxin is likely to be involved in these movements which she demonstrated to be caused by differential growth.

Horticulture of Carnivorous Plants was covered by J. K. Burras, who is in charge of the Oxford Botanic Center. Judging from the impressive display of healthy plants which is reputed to be the most diverse in Great Britain, he is a man well-qualified to speak on the subject. The exceptionally large number of *Heliamphora* in prime condition was the most outstanding feature of the collection. A discussion among the audience revealed that the preponderance of evidence now indicates that *Heliamphora* is not carnivorous and that pitchers serve primarily to collect water. Dr. Burras stated that when he put water in the leaves it was quickly absorbed and that no fluid was secreted by his plants. A list of suggestions for the culture of carnivorous plants follows.

Culture Methods

Water. Use soft water (except for one or two species of *Utricularia*. Dilute sulfuric acid-treated water brought to pH 6.8 works well but rainwater is best. Avoid domestic softeners because the large amounts of sodium they introduce is a problem. Use overhead watering for *Nepenthes* and *Heliamphora*.

Light. Avoid shade. This must be particularly important in England with its short, gloomy winter days. Artificial light is a help. Growlux lighting is recommended at 400 foot-candles.

Substrate. The following is a list of raw materials: sphagnum peat (avoid sedge peats), two year-old leaf mold from oak leaves, chipped bark from coniferous trees (coarse grades for most plants but finer grades for *Drosera* and *Sarracenia* species), sphagnum moss, *Typha* (cattails), sand (sharp sand 1/8 inch (2 mm) and down — avoid builder's or beach sand), perlite, vermiculite (avoid for *Drosera, Drosophyllum* and *Byblis*), clay pots for *Darlingtonia*, plastic pots for other species to avoid water loss.

Use sand, peat and leaf mold for most plants. Some tips are:

—*Drosophyllum.* Plant one per pot and then do not disturb the roots.

—*Dionaea.* Use peat, sand and perlite. Three-fourths inch of the base of a leaf will root.

—*Heliamphora.* Use leaf mold and sphagnum moss. Never grow the plants at temperatures higher than 25° C (78° F) and divide them only in springtime.

—*Sarracenia.* Peat, sand and a little leaf mold for the soil. However, *S. psittacina* should be grown underwater in winter.

—*Darlingtonia.* Can be grown out of doors in England. A coldhouse plant. Keep roots cool and give overhead watering in the summer.

—*Cephalotus.* Divide only in the spring since the plant normally dies back in winter.

—*Aldrovanda* and *Utricularia.* Boil dry *Typha* leaves and peat in soft water and let stand for a few days. Take out the remains of the *Typha* leaves. Try to keep ahead of the algae.

Review of Recent Literature

Beebe, J. D. 1980. Morphogenetic responses of seedlings and Adventitious buds of the carnivorous plant *Dionaea muscipula* in aseptic culture. Bot. Gaz. 141:396-400. Seeds cultured to seedlings on Murashige-Skoog medium containing added NAA and BA seemed to produce an inordinate incidence of adventitious buds at the tips of the petioles in place of traps. These buds could be subcultured to produce root, shoot and bud. The buds are useful in the propagation of the species. The adventitious bud formation seems dependent on a relatively higher BA/NAA ratio. A brief review of adventitious budding in *Dionaea* is in the paper.

Bell, E. A. and Charlwood, B. V., editors. 1980. Secondary Plant Products, vol. 8 of Encyclopedia of Plant Physiology. Springer-Verlag, New York. A rather large number of CPs are listed in a table (pp. 448-449) as containing free histamine, these including the genera *Drosera, Pinguicula, Nepenthes* and *Sarracenia*. (This information is derived from Werle in Paeck, K. and Tracey, M. V., editors, 1955. Modern Methods of Plant Analysis, vol. 4, pp. 517-623.) The significance of this compound in CPs is not yet known.

Cannon, J., Lojanapiwatna, V., Raston, C., Sincha, W. and White, A. The quinones of *Nepenthes rafflesiana*: The crystal structure of 2,5-dihydroxy-3,8-dimethoxy-7-methylnaptho-1,4-quinone = Nepenthone E and a synthesis of 2,5-dihydroxy-3-methoxy-7-methylnaphtho-1,4-quinone = Nepenthone C. Aust J. Chem 33(5):1073-1094, 1980. There are 5 Nepenthones, A, B, C, D, and E, beside plumbagin, droserone, and hydroxydroserone found in the roots of this CP.

Eastman, L. M. 1981. *Drosera anglica* Huds., New to New England. Rhodora 83:158-160 (one full page black and white plate.) The species is described for the first time from New England (closest previous stations being Gaspe County, Quebec and Bruce County, Ontario), in the crystal Bog Preserve of Aroostock Co., Maine. The plants had apparently been previously confused with *Drosera intermedia* which also occurs in the bog. See CPN 8:68 for a review of *Drosera linearis* in this same bog as being the only Maine location.

Heslop-Harrison, Y. and Heslop-Harrison, J. 1981. The digestive glands of *Pinguicula*: Structure and cytochemistry. Ann. Bot. 47:293-319. A thorough and well illustrated summary of the light and electron microscopic and physiologic studies of *Pinguicula* digestive (sessile) glands. This paper covers secretion, and an ensuing one is to cover digestion and absorption. Basically, the superficial or head cells of the digestive glands produce digestive enzymes and during the production period, various sub-microscopic cell structures disintegrate resulting literally in a bag (intervening lateral cell walls also dissolve) of enzymes ready for holocrine secretion. Superficial head cells are then apparently regenerated from basal reserve cells. The secretion stimulus has been shown previously to be chemical.

Luttge, U. and Noe Higinbotham. 1980. Transport in Plants. Springer-Verlag, New York. Pages 26ff and 92ff in particular mention CPs and the importance of studies on these plants in implications applicable to plant physiology in general. There is particular study and discussion of plant wall incrustations and cell wall transport (paricularly in glands) and a review of action potential physiology. For advanced readers with a particular interest in detailed physiology.

Martin. T. 1980. Hardy sundews. Quart. Bull. Alpine Gard. Soc. 48:328-331. This article discusses the outdoor culture in alpine gardens of *Drosera rotundifolia, D. anglica, D. intermedia, D. capillaris* and *D. filiformis* in Great Britain.

McCarten, N., Campbell, F. T. and Gibson, T. C., "The International Trade in Plants Focussing on the United States," January 1981. This huge report on orchids, cacti and CP can be obtained for $4.50 from TRAFFIC (U.S.A.), 1601 Connecticut Ave. N.W., Washington, D. C. 20009, telephone (202) 797-7901.

"Meat Eaters," in Good Gardening (Australia), Jan. 1981. A popular treatment of some common CP and how to culture them. *Sarracenia, Cephalotus, Dionaea* and *Drosera* are pictured and cultural instructions are given.

Moeur, John E. and Istock, Conrad A. 1980. Ecology and evolution of the pitcher-plant mosquito. J. Animal Ecol. 49:775-792. A discussion of the life cycle of *Wyeomyia smithii* from the viewpoint of energy flow economics, centered mainly around changes in maturation rates and directions *re* food supply.

Pooney, S. C. et. al. 1979. *Drosera linearis* Goldie rediscovered in Crystal Bog, Crystal, Maine. Rhodora. 81:145. Crystal Bog in Aroostook County, Maine is the only herbarium location for *D. linearis* in Maine, there having been seven collections and the last of these in 1935. In June, 1978, two stands of about one hundred plants were rediscovered in this same location by the authors. They were accompanied by *D. rotundifolia* and *D. intermedia*.

Robins, R. J. and Juniper, B. E. 1980. The secretory cycle of *Dionaea muscipula* Ellis. II. Storage and synthesis of the secretory proteins. III. The mechanism of release of digestive secretion. New Phytol. 86:297-311, 313-327. In the first of these two consecutive papers, it is shown for the first time in a carnivorous plant that *de novo* protein synhesis occurs during the secretory phase of activity and that part of this protein is directly secreted (as opposed to secretion of stored proteins only). In the second paper, autoradiography is used to propose a model of secretory activity: direct fusion of endoplasmic reticulum to the plasmalemma, or via vacuoles and vesicles derived from endoplasmic reticulum.

Robinson, James T. 1981. *Sarracenia purpurea* L. forma *heterophylla* (Eaton) Fernald: New to Connecticut. Rhodora 83: 156-157. For the first time in the state, f. *heterophylla* is described as being found in a bog in a natural area of the Connecticut Arboretum at Connecticut College. It was found in January while exploring the frozen-over bog, several plants of the form being mixed with typical forms. Population studies will continue.

Schnell, Donald E. 1980. Notes on the biology of *Sarracenia oreophila* (Kearney) Wherry. Castanea 45:166-170. The apparent optimum habitat of this species, often misunderstood in the literature, is clarified as an open, grassy seep-slope bog. The relative timing of anthesis and pitcher maturation is discussed, as well as the phenology of pitcher leaf deterioration in late summer along with phyllodia formation. Flower fragrance, also disputed in the literature, is again emphasized as present and similar to that of *S. flava*. (Reprints: D. E. Schnell, Rt. 4, Box 275B, Statesville, NC 28677, U.S.A.).

Schnell, D. E. 1980. Notes on *Utricularia simulins* Pilger (Lentibulariaceae) in Southern Florida. Castanea 45:270-276. Previously considered *U. fimbriata* (see CPN 3:4-5), the species was rediscovered in western Collier County, Florida. The paper gives a brief history of the species in Florida, plant descrip-

tion with photos, and discussion of its ecologic relationships. (Reprints: D. E. Schnell, Rt. 4, Box 275B, Statesville, NC 28677). (Ed. Note — See color photo CPN 8:72.)

Simons, P. J. 1981. The role of electricity in plant movements. New Phytol. 87:11-37. A good review of the part electrical stimuli (intrinsic) and conduction contribute to movements in plants. Several genera of CP are mentioned wherein there has been at least some detailed research, and other speculative areas where this process is involved is discussed. The comparisons of CP (in which we all specialize) with other plants exhibiting movements is interesting and provides perspective.

Smith, Lauralee V. 1981. *Nepenthes*. Am. Horticulturist 60:20-21, 34. A popular article on the genus from Longwood Gardens, discussing morphology, trapping, digestion and culture. One color and one black and white photo. Source list.

Tiagi, Y. D., and Trivedi, A. P. 1978. Photoecotypic differentiation among natural populations of *Utricularia inflexa* Forsk. var. *stellaris* (Linn. f.) Taylor. Environ. Physiol. Ecol. Plants, pp. 155-164. This Indian species has a strong habit with coppery coloration of leaves when grown in sun, and a weaker habit with green leaves when growing in the shade. These are interpreted as photoecotypes. (Note — The above publication is a book published in India and is not a journal.)

Yanchinski, S. "De Fungus," in New Scientist, Oct. 1980. p. 38. This article is a review of a recent BBC television movie called "Rotten World About Us" and describes all the habits of fungi including the well known strangling fungus that digests small worms and nematodes found in soil.

Jeanette Taylor, age 7.

A POEM BY DAVID TAYLOR

1. WHAT WONDERS ARE THESE
THAT SHINE IN THE SUN
THAT LIE QUIET AND STILL
THEY LOOK SO MUCH FUN

2. THOSE POOR LITTLE ELIES
THAT BUZZ ALL AROUND
CAUGHT BY THE PLANTS
WITH HARDLY A SOUND

3. MY DAD'S ALWAYS HERE
DAY AFTER DAY
WALKING AROUND
WATERING EACH TRAY

4. HE'S HERE BEEORE BREAKEAST
AND STRAIGHT AFTER TEA
YOU CAN'T UNDERSTAND IT
WHEN YOUNG JUST LIKE ME

HORTICULTURISTS' CORNER

By Larry Mellenchamp

Are there any ants in your plants?

I have specimens of all ten species of southeastern pitcher plants (*Sarracenia*), along with several hybrids, which I grow outdoors in full sun all year. They are grown in various sizes of plastic pots which I keep sitting in shallow water. Some of the large specimens are growing in 12" diameter plastic tubs. The growing medium is mostly plain coarse whole-fiber sphagnum moss, though some are growing nicely in a mixture of Canadian brown peat and white quartz sand (1:1). For some of my *S. oreophila* I have mixed in a little sandy clay along with the sphagnum to see how that does; so far, so good. The specimens range in age from one and two year-old seedlings (*S. leucophylla* and *S. purpurea*) to some specimens which I have been growing for over ten years (*S. purpurea*). This past winter we experienced the worst cold situation that anyone could remember. It dropped to zero (0° F) one night late in late spring after the spring thaw had begun. Usually the winter low is around 10° F, and it occurs in February in Charlotte. It was devastating to many garden shrubs which had never experienced cold tolerance problems before. Such hardy types as azalea, ligustrum, nandina, and holly were severely damaged; some were killed to the ground, while other merely lost leaves and young twigs. Meanwhile, my collection of pitcher plants seemed to suffer no ill effects from this cold snap. They usually remain frozen all winter, thawing occasionally as the weather oscillates between cold and warm. The only plants I lost were a few *S. psittacina* from Mobile due to the fact that their pots happened to be too exposed. Other specimens of *S. psittacina* which were situated nearer other larger pots escaped unharmed. This provides some evidence that southeastern pitcher plants are quite cold hardy when properly acclimatized to the winter. They can withstand even colder weather in Michigan (temperatures to –25° F and below) if they are growing in the ground and can be covered over by the winter snow blanket. The secret seems to be having sufficient medium around the roots (as a large pot, aggregations of pots, sinking the pots and/or plants into the ground or bed of some sort or covering up the collection of plants with plastic) to provide some insulation, and having grown in the particular climate long enough to slowly adjust to the weather change (probably several weeks to several months, depending on the severity of the climatic region to which they must adapt). In other words, plants take a few weeks of growing to get ready for winter; if they are abruptly transplanted just before very cold weather (such as from inside to outside, or south to north), then they will probably experience damage from cold temperatures. They have to build up their "anti-freeze" before winter, and they do this by manufacturing thickening substances inside their cells which make the sap thicker, and hence have a lower freezing point.

Now, what does all this have to do with ants? Well, after winning the bout with cold weather, I thought nothing could hurt these plants. As spring sprung and summer simmered, the pitcher plants seemed to sending up stunted and deformed pitcher leaves, and they were not coming up as rapidly as they usually did. I thought they must be feeling the effects of the cold, as some tissue was damaged and was beginning to rot. I watched the plants through the summer, which

was the wrong thing to do; I should have acted sooner! They became worse and worse, fewer and fewer leaves were produced, and those were severely deformed. One day, when I finally had the time, I decided to figure out what was going on. To do this, I was going to take each plant out of its pot and look at it. When there is something wrong with the top of a plant and there are no obvious problems up there, then you can rest assured that there is something wrong with the root system or underground rhizome. There is no better way to become intimately acquainted with your pitcher plant collection than by spending four days unpotting and carefully examining each specimen. So, I began.

To my surprise as I began working with the collection I first noticed ants crawling around the pots — not up and down the leaves, but just in the pots. The first plants I unpotted told the story. In one 8″ pot of *S. alata* was an ant colony, full of lively workers and numerous white eggs and larvae. They had essentially taken over the pot. Normally, ants would not harm a plant themselves, even growing so close (ants do not eat living roots). But what does happen, which is far worse, is that the ants bring mealy bugs (flat, white oval-shaped insects related to aphids) and "plant" them on the young, tender growing portions of the underground rhizome (down among the leaf bases where they are hard to see) and the mealy bugs suck juices from the plant, convert some of it to a thick syrupy material, and exude it from their bodies. The ants then "milk" the mealy bugs, just like they do aphids on young leaves and stems of other garden plants, to collect the "honey dew." The ants literally stroke the mealy bugs and wipe off the sticky honeydew, which they then feed on. Ants carry young mealy bugs from plant to plant, and start new colonies of their "cows" everywhere they can. They had literally seeded mealy bugs onto every pitcher plant in my collection, some worse than others. Mealy bugs reproduce rapidly and can weaken the plant as more and more of them suck juices. This is what caused the leaves to be deformed — the disruptive presence of the mealy bugs, and the ants were responsible for putting them there.

As I repotted each plant, I cleaned off all the old sphagnum, removed all the old leaf bases, dead roots, and dead rhizomes and thoroughly sprayed (or soaked) each rhizome in a solution of 25% wettable powder malathion (2 tablespoons per gallon). The powder comes dry and you mix it directly in water. This seems perfectly safe for the pitcher plants, which have been known to be sensitive to some of the petroleum-base solvents used to produce the liquid insecticides normally used in garden pest control. After spraying each plant, especially down between the leaf bases and making sure all the white cottony mealy bugs have been removed, I replanted each rhizome in new, clean, presoaked sphagnum. Now, after five weeks, all the plants are putting up strong, new leaves and are beginning to look as good as ever. I have applied this malathion liquid as a drench directly into the pots of the plants one time since repotting as a preventative. I also mix in a fungicide with the malathion as a preventative for fungus infection.

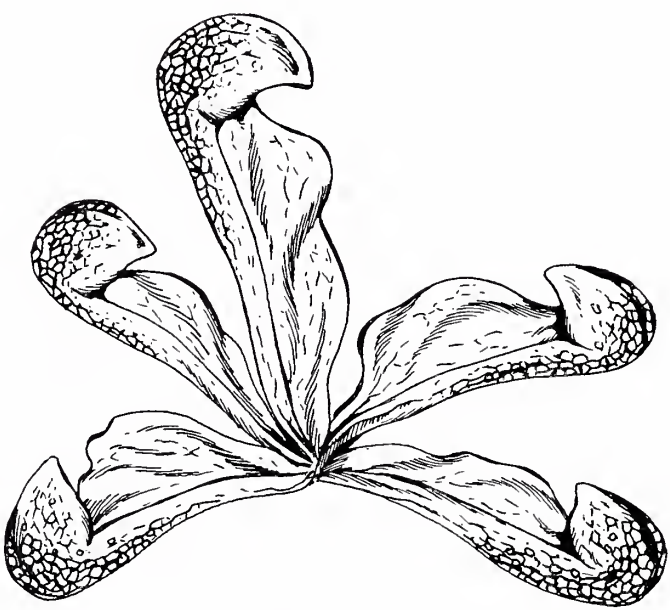
How do you avoid a problem like mine? Keep close watch over your plants, especially if they are outside close to the ground. Watch for ants. Even inside a greenhouse, ants moving along quietly on the benches and ground are not harmless. They are there because food is there. And, they are tending their "herds" of old, finding the best pastures, and moving them as conditions change. Follow the trail of ants and you will usually find the source of their nourishment; you may even find a nest in one of your pots. Destroy them immediately, repot if necessary, and keep watch for future invasions. This goes for all carnivorous plants, and other kinds of ornamental plants as well.

SPECIAL ANNOUNCEMENTS

We are still soliciting nominations for the Society officers. Please send all nominations to J. A. Mazrimas, 329 Helen Way, Livermore, CA 94550, U.S.A. All nominees must be Society members. If you are not sure, submit the name anyway. It will be checked against the master list. A person can nominate only one person/office. The nominations will be tallied and those with at least 25 non-repetitive signatures will be listed on the ballot to be sent in either September or December, depending on response. Please be sure that nominations are clearly marked as to office.

Nominations may also be submitted by those wishing to nominate themselves for a particular office. These must be accompanied by a brief statement of their qualifications for the office in question. Please see page 55 for the duties of each office.

NEW WALL CHART AVAILABLE. Keith West, one of the foremost botanical artists of the world, is completing a series of 16 24″ × 31″ full color wall charts depicting composite scenes from major U.S. botanical regions, somewhat similar to the British Museum's series for Britain. The first four are completed, and one is on Southern Pinelands, including in the painting four species of *Sarracenia*, two Droseras, one *Pinguicula* and two Utricularias. Included in the scene are various pinelands orchids and other associated plants familiar to those who have botanized the eastern coastal plain. This chart is number 306C, costs $8.00 (plus $1.50 postage) and is available from the New York Botanical Garden Shop, Bronx, NY 10458. The plants are all very well done, as is the printing.



Sarracenia psittacina
Drawing by Jim Miller

WANT ADS

When submitting Want Ads, please be sure to print clearly for best results and to eliminate mistakes. Please circle the correct letter before each item (Want, Trade, Sell or Buy). Want ads are limited to carnivorous plants, terrariums, greenhouses and moss. There is a charge of ten cents per item, with no limit to the number of items you may submit per issue.

Send coin or check to:
Arboretum, Want Ads
California State University
Fullerton, CA 92634

Orgel Bramblett [Route 2, Box 90, Miami FL 33187] (TS) fresh *Nepenthes khasiana* seed, *N. thorelii.*

Steve Smith [Rd. 1, Box 296, Kirkwood, NY 13795]. (T) any *Heliamphora* except *heterodoxa*. (S) *N. alata, N. ampullaria, N.* × *coccinea, N. gracilis, N.* × *hookeriana*; rooted cuttings $11 each. *P. moranensis, D. brevifolia, D.* "Gidgeganup" white; $3 each. *Cephalotus* $6 each. All postpaid; in order of receipt; U.S. only.

Bill Webber [3526 Belle Ave. NE, Roanoke, VA 24012]. (WB) large *Darlingtonia, Heliamphora nutans, H. tatei.* (S) *Byblis gigantea, P. caerulea.*

Geoffrey B. Wong [c/o 1637 Chabot Terrace, San Leandro, CA 94577]. (T) *Heliamphora* ssp. for *Nepenthes villosa.*

Stewart Segal [806 Verano Place, Irvine, CA 92715]. (WTB) *Darlingtonia californica, Drosera schizandra*, Mexican pinguiculas, *N. ampullaria, N.* × *dyeriana*. (T) *D.* × *nagamoto, N. khasiana, N. maxima, P. caerulea, U. longifolia.*

Terry Brokenbro [14 Hood Road, Rainham, Essex, RM13 8AS, Great Britain]. (WTB) Genlisea sps., *Utricularia purpurea* (white flower), North American *Pinguicula sps.*, North American *Utricularia* sps.—mainly terrestrial, pygmy *Drosera sps.*, endemic Cuban *Pinguicula* sps., *P. corsica, P. ramosa, Heliamphora* sps./hybrids. (T) plants and/or seeds of above. Enquire for CP list if interested in trading.

DUTIES OF ICPS OFFICERS

- President -

The president shall officiate at all general Society and Executive Committee meetings and appoint committees and chairpersons as deemed necessary and/or useful by the members of the Executive Committee, and shall act in a general leadership role and as the Society's liaison representative to individuals and groups within the bounds of the bylaws.

- Vice President -

The vice president shall be the president-elect and shall fulfill presidential duties in the latter's absence.

- Secretary -

The secretary shall keep an accurate record (or directly supervise and sign such record keeping) of all official Society business meetings.

Drawing by R. S. Bennett

Caption for rear cover for June 1981

Flower of *Sarracenia purpurea* ssp. *venosa*. This is most often deep red along the Atlantic coastal plain (and in inland bogs), occasionally lighter red or maroon.

Photo by Donald Schnell