

PINGUICULA

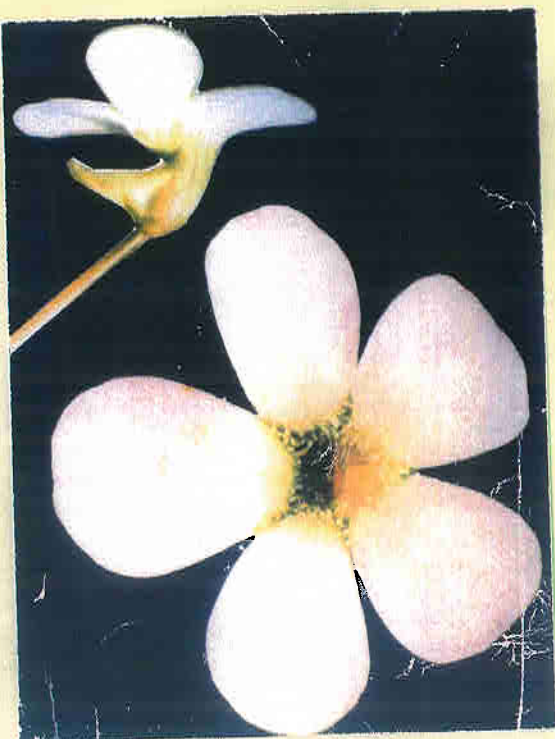
STUDY GROUP

Newsletter No.4.

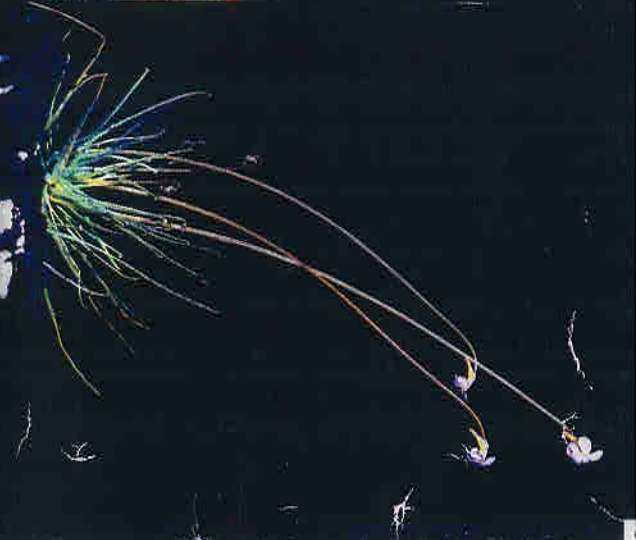
p. feticulata

February 1994

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Pinguicula acuminata. This remarkable species has been re-discovered after 150 years in obscurity, thanks to careful research and analysis by Hans Luhrs!
Photographed by Johan van Marum.



P. hemiepihytica
P. colimensis

P. fillifolia
P. lusitanica

P. heterophylla
P. primiflora

P. acuminata
P. acuminata

(Photos: M. Studnicka
H. Lührs - P. acuminata)

INTERNATIONAL PINGICULA STUDY GROUP

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AIMS OF THE I.P.S.G.

1. To meet with other collectors of the species and primary hybrids.
2. To exchange information between members and to provide a forum for the exchange of information.
3. To allow the exchange of seeds internationally to improve member's access to species so that they are perpetuated in cultivation. International exchange of plant material other than seed is more difficult. As phyto-sanitary regulations have to be abided by. *In-vitro* tissue culture and micro-propagation may make this easier in the future.
4. To encourage the use of botanically correct names or otherwise the use of *nomen-nuda* until the plant has been officially described as a species.
5. To encourage accurate record keeping including such details as: location data, altitude, climate and soil type.
6. To re-introduce "lost species" to cultivation.
7. To encourage the production and selection of new primary hybrids.
8. To encourage and help the preservation of habitats in all countries where the species grow wild.

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EDITORIAL

I am writing this as the IPSG reaches the end of its second year, with a feeling of great satisfaction now that I know our initial enthusiasm has not been short-lived. Instead, with our membership having grown in number, and an expansion in the range and quality of contributions being made to our Newsletter, I am looking forward to 1994 with immense optimism!

In order to preserve the freshness and vitality of this publication no articles are put to one side or 'saved' for future editions. Rather, it is our policy to publish all articles received only as soon as we have enough material to produce a worthwhile Newsletter. Newsletter number 4 is a 'bumper' edition in reward for your patience! This edition will mark beginning of the New Year with a truly International flavour, with contributions made by authors from Holland, Austria, Czechoslovakia, Italy and the U.K., on subjects encompassing exploration, discovery, cultivation and taxonomy.

I'm sure you will agree, IPSG is well worth your support and that the Newsletter is always worth the wait! All I ask in return, is for you to write back and let me have your news, or better still, resolve to write an article for the next edition if you can!

I hope you have noticed that Chris Heath has taken over from Ron as seed bank co-ordinator. This is a vital service in which the output can only be as good as the input; so make a resolution to pollinate and donate as much as you can!

Finally, please pay for this edition promptly, and please, please remember, if you pay by cheque, it must be made payable to Ron Mudd not IPSG. We cannot afford to return cheques made out wrongly, you simply will not hear from us again!

My thanks and best regards to you all for 1994,

Stan Lampard.

LOST AND REDISCOVERED, OR JUST FORGOTTEN?

Pinguicula acuminata Bentham

by Hans Luhrs

Since Bentham's description of *P. acuminata* (1839) very little has been known about this Mexican species, only until recently. Ernst, in his 'revision' (1961) had probably studied the original herbarium specimen in order to translate Bentham's brief description, and that of De Candolle (1844) and Hemsley (1882), into a more detailed review. Although Bentham described only the leaves of the winter rosette and the inflorescence, Ernst also stated: "Leaves in time of flowering are still undeveloped, long, small lanceolate with acuminate apex, a few centimeters long. De plant flowers from the winter rosette". This means that the material he had seen was collected in a winter state, showing the first but still unfolded summer leaves! A few years later Casper, in his well known 'monograph' (1966) had taken over most of Ernst's description because of the assumed loss of the herbarium specimen. Although both authors are convinced that the plant flowers from the winter rosette, Casper is under the impression that it could also flower from the summer rosette like *P. moranensis*, but he adds to this conclusion that this can only be assured when *P. acuminata* has been rediscovered.

During my first expedition in Mexico (May '89) to study *Pinguicula*'s and their natural habitat, various species like *P. emarginata*, *P. parvifolia* and *P. heterophylla* were found. At that time most plants except for *P. emarginata* and occasionally *P. moranensis*, started to flower from their winter rosette and some had developed their first summer leaves. While searching for *P. macrophylla* on the southern slopes of El Chico near Real del Monte, we found some rosetteless flowerstalks with lilac flowers which soon turned out to be a *Pinguicula* with its tight winter rosette buried a few centimeters in the loamy soil.

The winter rosette looked very similar with that of *P. macrophylla*, which I knew only from the description, but the flowers were quite different. With almost equal corolla lobes, a short spur, but with a square banded corolla tube I carefully came to the conclusion that according to its description, we probably had found *P. acuminata*. While continuing our search, we also found plants already developing their heart-shaped summer leaves. Some of them were still unfold in such a way, comparable with Ernst's description, which made me certain that we had indeed rediscovered *P. acuminata*.

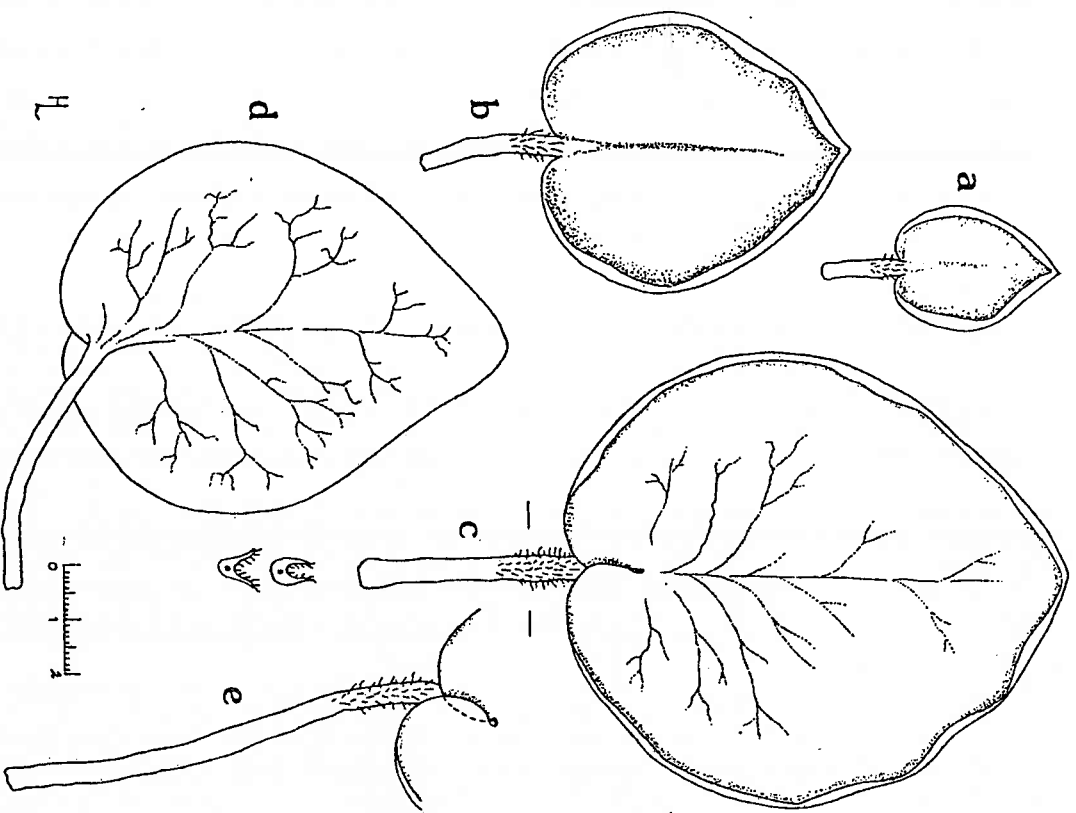
Two years later (October '91) when reexamining the same habitat and its surrounding area, eight new locations of *P. acuminata* were found including the type locality. Although the plants had already developed their new winter rosette, the enormous late summer leaves were still intact. On most places *P. acuminata* was found together with *P. moranensis*, while the latter was still in flower and fruit, no fresh or decayed flowerstalks were found on *P. acuminata*. This verifies Ernst's diagnosis that *P. acuminata* flowers from the winter rosette (only!). During those two searches in El Chico, we did not find *P. macrophylla*. Zamudio (1988) believes that the presence of *P. macrophylla* in El Chico is doubtful by identification of herbarium specimens under that name with additional material of *P. crassifolia*, but not with *P. acuminata*. Although I agree with his diagnosis; in my opinion *P. macrophylla* never existed in El Chico and the (by Zamudio unseen) collected material from Real del Monte (Martinez 15062-S) must have been almost certainly *P. acuminata* instead of *P. macrophylla*.

Pinguicula acuminata Benth
Perennial plant. Dimorphic leaves; leaves "aestival" few 2-4 (5), with a long petiole, 34-120 (160) mm. long, 16-83 mm. wide, lamina broadly-ovate or cordiform, 22-92 mm. long, cordate or imbricate at the base, apex acute or obtusely, entire margin involute and somewhat undulate, petiole 12-57 (70-80) mm. long, \pm 5 mm. wide, concave and hairy at the upper part, plants grow continuously larger during the growing season;

leaves "hiemal", present during flowering, many 18-36, broadly oblong-ovate acuminate or ovate-lanceolate acuminate, 6-19 mm. long, 3-9 mm. wide, entirely curved inwards. Flowerstalks 2-4 (7), erect, only the upper part glandular hairy, 74-150 (175) mm. long. Flowers 17-22 mm. long (incl. spur), 16-22 mm. wide; calyx two lipped, glandular hairy, 6.5 mm. long, 5 mm. wide, upper lip divided into three lobes, oblong-lanceolate, 2.6-3 mm. long, 1.2 mm. wide, lower lip divided into two lobes, lanceolate, 3 mm. long, 1.5 mm. wide; corolla two lipped, with almost equal lobes (subislobate), whitish, pale bluish-pink or lilac, with white-knobbed hairs in the centre, upper lip divided into two lobes, narrowly obovate to subcuneate, \pm 6 mm. long, 5 mm. wide, lower lip divided into three lobes, narrowly obovate to subcuneate, \pm 7 mm. long, 5 mm. wide, the middle lobe slightly larger; tube subcylindrical with three lines of knobbed hairs inside, 6-7 mm. long, \pm 4 mm. wide, glandular, strongly bend (95° - 105°) \pm in the middle; spur cylindrical, 4-5 mm. long, \pm 1.5 mm. wide, glandular, straight or slightly curved, with a blunt thickening at the end; stigma pale violet.
Florescence: March to May.

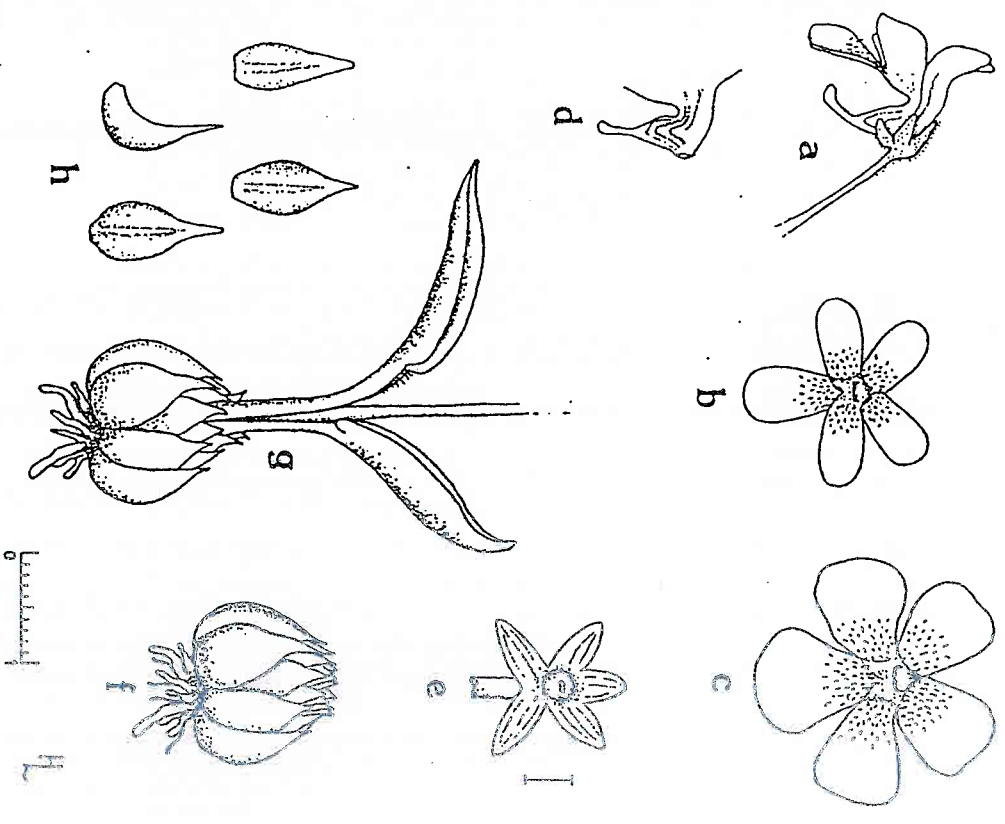
Habitat: Mexico, Hidalgo, municipality of El Chico and its surrounding area, on shady banks in misty forests; it is abundant in loamy soil between rocks on humid sites, and associated with colonies of moss, ferns and succulents, in wooded areas of *Quercus* and *Abies* species, at altitudes between 2400 and 2800 m., 30.IV, 20-22.V.1989, Aleman and Luhrs; 5-9.X.1991, Luhrs (a.o.).

The description of *P. acuminata* is based on notes and measurements taken from additional herbarium specimens, and on alcohol preserved material from the private collection of the author, which will soon be added to the herbarium collection of the Botanical Garden in Leiden, in the Netherlands.



P. acuminata. ab First summer leaves. cd Late summer leaves. e Petiole.

6.



P. acuminata. a Flower. bc Corolla. d Corolla tube. e Calyx. fg Winter rosette with first summer leaves appearing. h Winter leaves.

7.

SOME SUCCESS WITH SEED

BY LOYD WIX
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HELP PLEASE

I find the photographs of *Pinguicula*s growing in habitat very useful as an indication of their requirements when cultivated in our greenhouses.

Most reference books seem to indicate that *Pinguicula*s will grow in the one type of specially prepared medium. However, the habitats of these plants seem to vary so much I feel that I should try to give them something more specific to each plant's needs.

Take the photograph of *P. Myautia* in the last newsletter, could it be grown on tufa and in full sun? Would the tufa be too alkaline? (What rock does Chris use).

As a beginner, I should be grateful for guidance on composts - I know they should be 'open' - is the pH critical - does one use a small amount of sterilised loam? Watering - does one stand the pots in a tray of water during the growing season or only water when the compost is drying out. Looking at the habitat of *P. Myautia* I would think that it would be happy grown as if on a scree. What about feeding? I was advised to use a foliar feed of half strength Phostrogen once a month, the result would be stronger and longer roots and bigger and better leaves, yes or no, what do you advise.

How long before the plants reach maturity? I drooled over the large specimens of *P. agnata* Stan had in his greenhouse. I look at my *agnata* and wonder when, if ever, it will grow as big as those Stan has.

So many things to learn about to care for these lovely plants properly.

The loss of plants through ignorance is frustrating and expensive so can we have a Beginners' Corner in the newsletter please Ron.

Kathleen Pottinger.

Shortly into the new year of 1991, I placed (as I do every year) an order for seed from Chiltern Seeds of Cumbria. Amongst the seed I ordered was a packet of *Pinguicula leptoceras*. I had seen this seed in previous Chiltern catalogues, though had never ordered any mainly due to Adrian Slack's (ref. 1) uncompromising description of the plant.

After the seed arrived, it was promptly sowed upon compost of 5 parts moss peat to 1 part sharp sand. The seed tray was subsequently placed out side to be exposed to frost as recommended by Slack.

The following spring saw the germination of five tiny seedlings. Of these, four promptly fell victim to Sciard fly larvae leaving just one surviving seedling to slowly grow throughout the year. The autumn saw the small plant die down to its winter resting bud for the duration of the winter.

Obtaining just the one plant was slightly disappointing, especially as my interest in *Pinguicula*s had grown steadily during 1991. As a result, I reordered a second packet of *P. leptoceras* (and a packet of *P. vulgaris*) seed in my 1992 order to Chiltern, repeating the process I had carried out the previous year. Ordering the second packet of seed especially seemed justified when the small plant from the previous year failed to properly break dormancy.

Every so often I would inspect the seed trays containing the second batch of seed for signs of germination, though each time I was disappointed. One *P. vulgaris* seedling did appear though this unfortunately died in infancy. I was on the point of giving up entirely when I was surprised by the presence of a few tiny, but unmistakable butterwort leaves in the original (1991) *P. leptoceras* seed tray. Over the previous year the compost had become carpeted in moss growth, and the tiny plants were poking their leaves through this cover. As time went on, more and more of the tiny plants emerged from the moss layer until I could count over 70! The plants grew surprisingly quickly and enough survived the year to leave me with about 50 resting buds come the winter.

The majority of the resting buds survived the winter to commence new growth this year (1993). A further surprise came when several of the larger plants started to produce flowers (up to three on some plants). The delightful light violet and white flowers were not at all what I expected given Slack's description, and were well worth the two year wait (and the couple of pounds for the seed).

The second batch of *P. leptoceras* seed never did show any signs of germination, although five *P. vulgaris* have made an appearance this year (the second year). My experiences with this commercial seed would indicate that patience is required for success to be given a chance. I have also found that even fresh seed from my own plants can take a while to germinate. For example, I have had some seedlings of *P. hibernica* appear in a pot of seed I planted two years ago. In addition, hybridised seed (of Mexican species) have shown erratic germination, with one batch of seeds germinating at various times over the period of a year. It is with this in mind that I still hope to germinate some seed that has shown no signs up till now. If I'm as lucky next year with *P. alpina* (again from Chiltern and planted this year) as I have been with *P. leptoceras*, I will be happy indeed!

Reference: Adrian Slack - Insect Eating Plants And How To Grow Them.

NORTH AMERICAN PINGICULAS

During the months of September and October last year I was able to visit the south eastern part of the USA. Although my main intention was to visit and photograph Sarracenia sites I also found a number of locations with pingicula populations.

North American pingiculas may be conveniently separated into two distinct groups. As will be seen, failure to respect the growing conditions will inevitably lead to the loss of the plant in cultivation.

P. planifolia. primuliflora. ionantha.

These species grow in very wet conditions. I found two sites in the Appalachian National Forest containing P. planifolia. One was extremely water-logged with small amounts of surface water present in patches. At the second site planifolia was found growing on the edge of a small pool. Many plants were either partially or completely submerged in the water.

P. caerulea. pumila. lutea.

In complete contrast these species grow in very much drier conditions. I found a number of sites in Florida, Alabama and Georgia with pingiculas growing. The soil in these sites was virtually pure silver sand occasionally mixed with small amounts of loamy material.

Of course, one of the problems in making single field observations of growing conditions is that conditions can vary tremendously over a period of time. Ideally observations need over a much longer period of time. However certain assumptions can be made on the key cultivation points regarding these plants.

1). P. planifolia, primuliflora and ionantha need to be grown in very wet conditions during the growing season. I keep the water level of my plants very high; at least up to the soil level and occasionally submerging the plants completely for a few days.

2). P. caerulea, pumila and lutea need much drier conditions. During the summer plants can be watered on the standard tray system. Great care is needed in the spring when the plants are recommencing growth as too much water inevitably leads to rotting of the plants (I lost a huge lutea in this way this spring).

I use a standard mixture of peat and grit with a little sand for all North American pingiculas. Although some species, as mentioned above are found growing in silver sand I would not recommend using this in cultivation because of problems in maintaining sufficient moisture levels.

I would suggest overwintering all species in barely damp conditions similarly to that suggested for Sarracenias. Particular attention needs to be paid in removing dead leaves over winter since otherwise these can be a potential source of botrytis.

Unlike most Mexican pingiculas the North American species prefer full sunlight, usually growing in the company of Sarracenias and native Droseras often on open patches. Indeed P. planifolia needs full sunlight to develop the red colouration in its leaves.

Some of the North American pingiculas seem to have developed a reputation for being either difficult or just short lived. While I can not say for certain at the moment how true this is I feel that much of the problem is in knowing the correct natural growing conditions and then trying to reproduce them. I hope to return to the USA in the future and I will try not to get too distracted with the Sarracenias that I cannot devote a little time to the pingiculas of the area!

References.

Schnell. D Carnivorous Plants of North America.

PHIL WILSON JANUARY 1994

A TRIP TO TRINIDAD

BY LOYD WIX
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The first Study Group Newsletter included a list of species and locations compiled by Stan. This made me wonder if any of these (or other) *Pinguicula*s occurred on the Trinidad and Tobago Islands. After all, they occur further north in Cuba, and in neighbouring Venezuela to the south.

My interest at that time in that particular area of the Caribbean was due to my fathers attendance at the 5th Tropical Apiculture Conference (Sept. 92) in Trinidad. Beekeepers and Botanists do have a certain degree of interest in each others subjects. To the Botanist the honey bee is an important pollinating insect, whereas the Beekeeper has a keen interest upon which plants and trees the bees forage upon. Because of this, the Conference seemed to provide the ideal opportunity to test the local knowledge on *Pinguicula*.

Armed with my copy of the first Study Group Newsletter, and instructed to find out all he could on *Pinguicula*, my father found time to visit Trinidads National Herbarium. At the Herbarium, Mrs Yasmin Comenau consulted the information she held there, which mainly appeared to date back prior to Independence. One particular book referred to was the 'Flora of Trinidad and Tobago'. The conclusion of this was that Trinidad has *Bladdervorts*, but no record of *Butterworts*. Information regarding the rest of the Caribbean indicates that Cuba is the northern site in the island chain. There is one report of *Pinguicula elongata* from Jamaica, but this could be a misattribution of a specimen collected in Colombia. Apparently there is some uncertainty in the way this specimen was included in the 'Flora of Jamaica'.

Alas, there were plenty of bees in Trinidad but no *Butterworts*. Neither mind, perhaps the next Conference will be in Mexico, a country noted for it's honey production as well as it's *Pinguicula*s.

Pinguicula grandiflora forma *chionopetra*

The following is an extract from a paper published in:
WATSONIA Vol 19 part 4 August 1993 p. 273-275 by:

E.C. NELSON of: National Botanic Gardens, Glasnevin, Dublin 9, Ireland.

Entitled:

WHITE-BLOSSOMED *Pinguicula grandiflora* LAM. IN THE
BURREN, COUNTY CLARE IRELAND.

"During the Summers of 1989, 1990 and 1991 in one of the Burren populations, white flowered plants were seen and photographed. The flowers were entirely white, without any purple or pink marks or tints; however in 1990 a very young bud of one particular plant, just as it began to rise above the rosette, had a light pink flush but this was not apparent on the fully open flowers at anthesis. In 1989 & 1990 plenty of seed was produced by the white blossomed plants.

Steiger (1987) published a photograph of a series of flowers of *P. grandiflora* variants, including examples named *P. grandiflora* f. *pallida* (Gaudin) Casper and *P.g.* subsp. *rosea* (Mutel) Casper. In f. *pallida* the corolla throat was purple, and in subsp. *rosea* not only was the calyx purple but the corolla throat was lined with a darker pink. The white blossomed Burren examples did not have coloured markings on the corolla and the calyx is entirely devoid of red pigment.

No entirely white flowered variety of *P. grandiflora* has been published hitherto. *P. grandiflora* subvar. *albescens* Rouy (1909 '*corolle blanche lvee de rose*') could be interpreted as including the Burren variant. However, Rouy's subvariety has been relegated to synonymy under *P.g.* subsp. *rosea* (Casper 1962, 1966) which certainly cannot encompass white flowered plants ('*corollae ...fauce violacea vel pallida violacea-pliosa ...*'). To designate the variant with a white corolla as a variety is extravagant, and thus I proposed elsewhere (Nelson & Walsh 1991: 214, 318) that these occasional white flowered plants should be placed within a distinct form, *P. grandiflora* f. *chionopetra*.

Pinguicula grandiflora Lam. forma *chionopetra* E.C. Nelson forma nova.....

Corolla pure white, or at most the very young unopened flowers tinted pink; calyx yellow green without red or purple tints.

HOLOTYPE: 35mm Kodachrome 64 colour transparency (no. 16, 25.0590; acc no. 1991.1) (precise locality withheld.) County Clare, 12 May 1990, E.C.N. (DBN)

The epithet *chionopetra* is derived from *chion* (snow) and *petra* (rock) alluding to the white flowers and unique rocky habitat; it is equally appropriate for plants from Co Kerry should this form be collected there again."

I am grateful to Mike Grant of Birmingham England for bringing this article to my attention as it raises a number of interesting points:

Sub-species, variety or form?

Nelson has made a good diagnosis in designating the white blossomed plants as a new form. Such distinctive variations deserve recognition but not at varietal or even sub-varietal level. The term variety should only be used when it is separated geographically from the species to which it is 'attached' but the two elements share so many characters that individuals from the different populations cannot always be distinguished from each other. The term variety is easily confused with sub-species. It is not satisfactory to simply distinguish them upon the basis of dimensions of geographical separation, as disjunctions may be small but the habitat disparity may be great, or the time period of separation may have been long enough for populations to have simply 'drifted' apart genetically. How can such factors be judged? They cannot, not by simple observation, we can only see the evolutionary process at the stage it has reached at the present and we can only guess at the driving forces involved in each case. However, a good rule of thumb is to use variety when the populations 'blur' and the term sub-species when they do not.

The term variety should be used only to describe a disjunct population, never to describe individuals within a population. It is therefore easy to decide when the term form is appropriate as there are usually many recognisable forms within any population of significant size and stability. However, the question then arises as to when to describe and name a given form. As the form belongs to a population comprising many other such forms, all of which are most likely to interbreed randomly with each other, no given form has any greater or lesser status than any other, as their heritable characteristics become separated, mixed and recombined as each new generation is formed.

(It is a pity that Nelson was unable to follow the fate of the numerous seed in 1989 & 1990 as, unless self pollination had occurred, it is most unlikely that such a form would have been reproduced in the offspring.)

Therefore, from the pure taxonomic viewpoint, the term form has no significance.

However, from the horticultural viewpoint, certain combinations of usually outwardly visible characteristics are distinctive enough to warrant recognition. This is especially so if the species is sufficiently important to be the subject of breeding programmes, involving artificial selection, hybridisation etc.; when the sub-species, varieties and forms chosen are all important. It then becomes significant that these should be recognised and accurately named.

The role of horticulture.

Mike recognised the horticultural potential of *P. grandiflora* f. *chionopetra* in his letter to me. So too did Nelson, indirectly, by choosing to withhold the precise locality of his form. Alas it is true, all too often distinctive forms suffer human predation. This can be circumvented by other means.

Pinguicula grandiflora is a species renowned for its capacity to reproduce

asexually, through gemmae production, with remarkable fecundity (Slack A. 1986). Today, horticulturalists are well aware of the real pressures upon natural populations of the plants they know, grow and love to see - as much in habitat, if not more, than in their gardens or greenhouses. Such pressures include industrial and agricultural development, many peat bog and limestone communities have been harmed by 'mining' for example; pollution, is also a great threat, especially to plants with highly absorptive leaf surfaces such as lichens, epiphytes and carnivorous plants.

I applaud Nelson's prudence in not removing his solitary plant for preservation as a herbarium specimen, deploying a slide instead. However, I feel he may have overlooked the fact that the long term survival of *P. grandiflora* f. *chionopetra* would be more likely to be guaranteed in the hands of a skillful propagator than left to 'chance & necessity' or simple neglect. In his position I would exercise this greater responsibility by removing a few small gemmae (more likely to be smothered by the parent plant if left) to the security of Dublin Botanic Garden, from whence in time, they could be distributed more widely.

S.E. LAMPARD

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- CASPER S.J. (1966) Monographie der Gattung *Pinguicula* Bibliotheca botanica 127-128
STEIGER J.F. (1987) Pale flowered varieties of *Pinguicula grandiflora* Carnivorous Plant Newsletter 16 104-5
SLACK A. (1986) Insect Eating Plants and how to grow them ISBN 0906670

COMMENTS TO "DIFFICULT" PINGUICULA SPECIES

by Miloslav Studnička

In the course of last 10 years, butterworts are cultivated as frequently, as never before. Not long ago introduced or even newly discovered species occur in collections. They are found in natural stands, characterized by strange ecological properties. These properties are important, because butterworts are adapted to natural conditions. Small mistake in artificial conditions, and a rare plant is lost. Therefore I have chosen several examples of butterworts, in which I give a recipe to successful cultivation.

P. colimensis. - Mexican species with large purple flowers. It is characterized by summer leaves rolled below in the margins. The assumed "P. colimensis", more frequently cultivated, is correctly P. hemiephytica (Zamudio et Rzedowski 1991). It has summer leaves rolled up, with the margins upstairs.

Substratum is the first problem. I cannot recommend any sandy or granulated mixture (cf. Mudd 1992). I use a mixture of 2 parts of peat and 1 part of chalky clay, which is found in cretaceous geological formation. It is white or gray, and very plastic in moist state. The mixture proves good even in species growing on granite (P. heterophylla) or sandstone (P. emarginata).

The pot used to cultivation must be large (about 18 cm), what is necessary to prevent too rapid drying of the soil. The substratum must be filled up to 3 cm below the margin of the pot only. By means of this simple arrangement, you can give "moving" water to Pinguicula. In natural conditions butterworts are namely settled mostly in slopes, and water flows through soil there. In artificial conditions, water

given from above brings similar movement about (fig. 1).

In Summer it must be given plenty of water, in opposite to winter. Most of the Mexican butterworts are succulents (Studnička 1991), which need dry soil in the condition of winter rosettes. They should be misted every day on leaves at the same time.

The general biorhythm of the Mexican butterworts, including P. colimensis, is given by presented example of climadiagram (fig. 2) The end of winter season in Pinguicula is later than in other carnivorous plants. Keep the soil nearly dry up to May, when you find tips of larger summer leaves in the centres of rosettes. After this sign you can give again plenty of water into the soil. The summer season is long, because soils dry out slowly, beginning in November. According to my experience in green-house conditions, there are butterworts producing winter rosettes even in December.

The whole year, but especially in the winter, the plants also need a prominent difference of temperatures between days and cooler nights, like other succulents. In winter the temperatures should be completely lower (averidge 10-15 °C).

The described rhythm in temperatures and watering may be used also in further Mexican butterworts. It is necessary above all in P. heterophylla, a geophyte with underground onion.

P. emarginata. - This species, described not long ago (Ruiz et Rzedowski 1986), has been discovered also in Mexico. Nevertheless, it has quite different ecology, being homophyllous. It is home in very wet area, and it grows on acid substratum (Mann 1993). According to my experience, it is calcicolerant. Keep it wet the whole year and in the same temperatures like the previous species. Spray it also on leaves.

P. filifolia. - This homophyllous tropical species, endemic in Cuba, is found in wet savannahs, accompanied by Pinus caribaea, several species of Rhynchospora, grasses of the genera Paspalum, Panicum, Aristida etc. (Baldřtová-Tuláčřková and Capote 1965, Baldřtová-Tuláčřková and García 1987). The suitable substratum should be mixed of 2 parts of peat and 1 part of white quartz sand. Keep the plant very wet and by 25-30 °C the whole year. It requires much light. The best exposition is to East, if the butterwort is cultivated near a window. It is also necessary to illuminate P. filifolia by fluorescent tubes for 12 hours during short winter days. The air moisture should be high, and the species may be cultivated in a glass case.

The butterwort produces lilac isolobular flowers, but it is autosterile one. It cannot also produce young plants of leaf cuttings. Beginning by a single plant, one can multiply it deviding old vigorous specimen, which have 2 or more apexes. The separated specimen must be protected by a fungicide, for example by "Topsin M 70 WP" (product of Japan) or "Euparen" (product of Germany).

P. primuliflora. - This North-American homophyllous species is frequently multiplied in cultures "in vitro", also by seeds produced after man-made self-pollinating, and by young plants produced spontaneously on tips of leaves. Despite of easy multiplying, it is rather difficult to raise large specimen with many flowers. It is to be said, that P. primuliflora is a typical plant convenient to glass case. Very high air moisture is an important factor, whilst light necessity is modest. I grow P. primuliflora in pure peat, very wet the whole year. It is very tolerant to low temperatures during Winter, and to high temperatures during Summer. In the same area in the USA occur several closely related species.

P. hirtiflora. - The evolutionary archaic homophyllous species are rare in the European area. There are only the named species and P. lusitanica there, and in Asia (Cyprus, Turkey) it is yet P. crysellina. The area of P. hirtiflora is in Mediterranean warmer part of Europe. In Central Europe the species is a green-house plant. Nevertheless, it stands no high temperatures, because it is a plant of shady rocks and higher levels of mountains. It is also a typical plant for glass case, but it has demands on lower temperatures than the previous species (15-18 °C in Summer). It likes calcareous substratum, but in Albania it can be found also on alkaline serpentines (Casper 1962).

P. hirtiflora can be multiplied by seeds (man-made pollination is necessary), and also as it is described in P. filifolia. Leaf cuttings do not succeed.

P. lusitanica. - European species (with a protuberance to Morocco), limited to extremely oceanic climate, surviving winter either in seeds or in growing rosettes. Despite of easy production of seeds by self-fertilization (Henslow 1879), it is often lost in artificial conditions. It is steadily taken for a "difficult" one.

I have never been successful, cultivating it alone in a pot with wet peat, like Drosera species. Once I have sown P. lusitanica into a pot with a large specimen of Sarracenia. I have observed something like symbiosis after this. It is rich population of P. lusitanica among my Sarracenia species now, which is cultivated staying in water the whole year. Nevertheless, I have measured my largest P. lusitanica (47 mm across) settled in the water film in a semi-terrestrial culture of aquatic Utricularia gibba. Keep the butterwort like weeds, and it will grow as easy as weeds.

P. bohémica. - European species, occurring in an isolated population in the Czech Republic (Studnička 1992). It is a lowland species, and in consequence of that fact it is more endangered by human influence, than mountain species. Many specimens of P. bohémica are produced by means of cultures "in vitro" in the Botanical Garden in Liberec. All genetical individuals are multiplied, hardened against outdoor conditions, and given back to original location. Quite a number of plants in the outdoor culture cannot be committed to an automatical apparatus' care (Steiger 1975). Therefore the culture is arranged in principle as it is described in P. colimensis (fig. 1). That is to say, the "moving" water is necessary also in P. bohémica.

According to field research, P. bohémica takes roots into very wet remnants of dead particles of sedges (Carex panicea, C. fusca, C. distans etc.), of grass (Molinia caerulea), and in moss (mostly Drepanocladus revolvens, Scorpidium scorpioides, Campylium stellatum). It is also possible to settle P. bohémica on peaty or sandy soil, but the result is never so good.

I use a special substratum in artificial culture, attempting to imitate the described field conditions. The main substratum is a mixture of equal parts of peat and cocoa fibers. That substratum is covered by 1 cm thick layer of dead sheared Sphagnum. That all is slightly pressed and so prepared to planting. The proper pH \pm 7 is controlled by addition of CaCO_3 to water contained in the common large flat dish underneath all pots.

Winter buds can endure also severe cold in the field (even -20°C), nevertheless, they are killed by fast congelation and thaw in the garden culture. In natural swamps, the effect of frost is damped, in consequence of large thermic capacity of soil. To store hibernacula by 0 to $+4^\circ\text{C}$ in refrigerator is preferable to hibernation out of door in the garden.

P. vallisneriifolia. - This species, original in Spain, is a rock-plant (petrophyte). I grow it out of door, beginning in the middle of May. It is settled on pieces of meadow limestone (about $25 \times 25 \times 10$ cm), which is soaking porous calcareous material. The pieces are placed in an inclined dish, partially in water. Little pits in surface of the limestone are filled up with clay. So it is possible to place P. vallisneriifolia. The described culture is protected by a roof of glass, and by a network around. It is shaded off violent sun only. The pieces of limestone should be poured from time to time, because P. vallisneriifolia also likes the "moving" water.

Winter buds of the butterwort are stored completely together with the pieces of rock in plastic pockets, sheltered in a refrigerator by 0 to $+4^\circ\text{C}$. In Spring it is necessary to start vegetation by low temperatures, up to 10°C . Too high temperatures can stop growth of all European species of butterworts in this period (effect known as "secondary hibernation").

Remove never brood buds from a hibernaculum of P. vallisneriifolia. They have especial function, consisting in production of stolons. Young plants are born till on their tips. The butterwort finds successfully an occupation of vertical rocks, climbing by means of the stolons.

Acknowledgements

This article is based on rare plant material and ecological observations of Mexico, Spain, Greece (Olympus) and Cuba, given me from my friends and colleagues, namely H. Lubus (Netherlands), V. Pilous (Czech), H. Weiner and A. Wistuba (Germany). I am indebted to thank them for the help.

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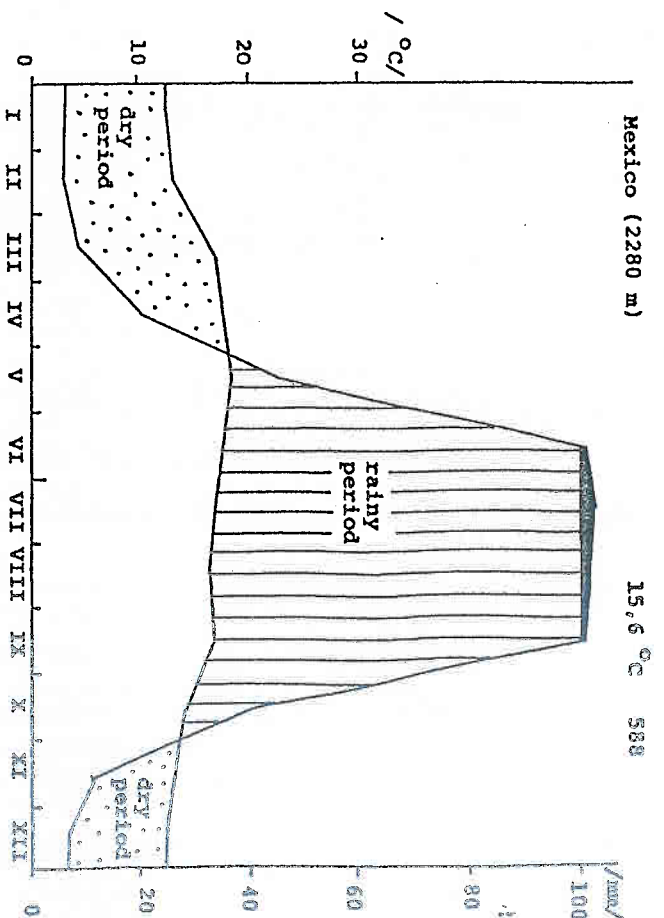


Fig. 2.- Climadiagram of the area of the Mexican *Pinguicula* species. The time of watering in artificial conditions should be similar. (According to Walter and Lieth 1964.)

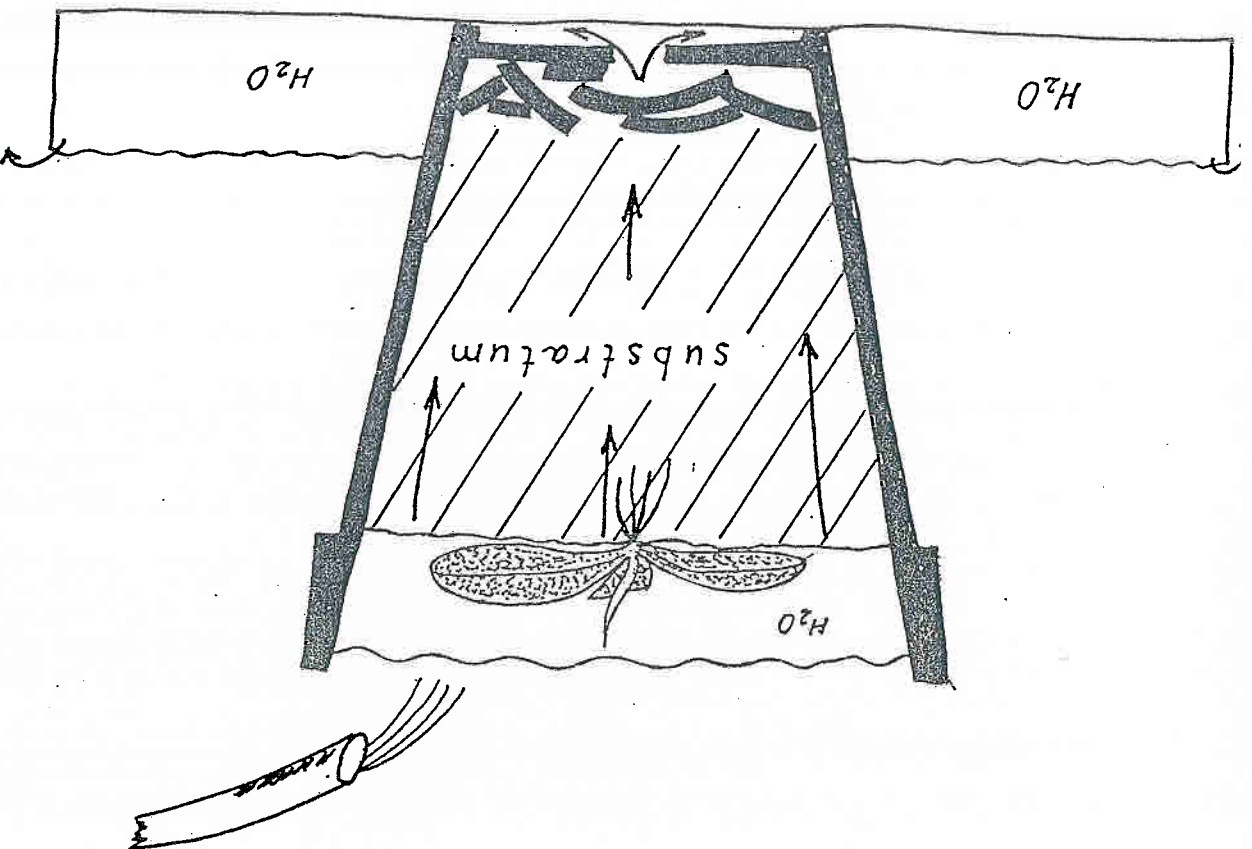


Fig. 1.- Water levels and water movement just at the moment of watering in the proposed *Pinguicula* culture.

Pinguicula emarginata Johan van Marm. Austria.

My wife and I decided to visit Mexico at the beginning of the Christmas holidays last year (92/93). A good reason for doing so was because of my great interest in *Pinguiculas*, especially the more recently described species from Mexico.

Pinguicula emarginata is one such species that we were lucky enough to find. It was originally described by Zamudio & Rzedowsky 1986. The locality was defined as the border area between Puebla & Vera Cruz, for instance near Tatzayanala, in the municipality of Atzacan, Vera Cruz, and at Cacada Olguin, between Teziutlan and Tlapacoyan in Puebla. The habitat was described very briefly as on rocks by riverbanks in misty woods.

Armed only with this information, I was never-the-less determined to locate plants in habitat. I was eventually successful after many hours searching along streams in the area of Tatzayanala. The vegetation of this area is typically subtropical, trees clothed with epiphytes such as bromeliads and orchids and the presence of many tree ferns providing evidence of the high humidities, especially close to the streams. Suddenly, we came upon a huge, vertical sandstone wall facing North and therefore shaded from direct sun. It was consequently more or less bare of any vegetation except for large, compact colonies of *P. emarginata*! They were thriving in patches where there was no competition with other plants. It was very impressive to see thousands of flowers hovering before the mass of leaves of so many hundreds of plants, which were clinging tenaciously by wiry roots to the thin, wet layer of humus coating the rock face. We were at an altitude of 1400m, which, in combination with the North facing aspect, resulted in a cool micro-climate, in spite of the otherwise tropical warmth of the area.

Seed collected that day has proved viable and plants have subsequently grown well in cultivation under conditions modelled upon habitat observations. This species must be kept moist throughout the year as, in contrast with the majority of Mexican *Pinguiculas*, it makes no significant preparation for dormancy. Most other species from Mexico make a tight 'sempervivum-like' rosette of non-carnivorous, succulent leaves in association with drought, not so *P. emarginata*, though it responds to temporary water stress by a reduction in leaf size and number. Again in contrast to most, it seems to prefer a peat rich compost rather than perlite / vermiculite mixtures which are popularly used for the 'Mexicans' currently in cultivation. The lack of a 'Winter resting' stage makes it difficult to judge how best to propagate this species. However, it does tend to divide naturally to form clumps which should be carefully broken up to avoid the risk of grey mould becoming established. Early experiments have shown leaf cuttings strike best when taken from near the centre of an actively growing plant. Of course seed

is viable but never plentifully produced unless two different clones are cross pollinated. Self-pollination should be used only as a last resort since the vigour of resultant offspring is much reduced, (low germination rate, smaller plants and flowers of poor quality were my reward for trying this - Ed.).

The small but delicately formed and very variable flowers are borne in profusion throughout the year, this and their unusual form means that my efforts to introduce this species to cultivation have been repaid already. It's charming appeal and accommodating nature should serve to ensure that it soon becomes more widely available to enrich all our collections.

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Variation in the flowers of *Pinguicula emarginata* by: Stan Lampard, Birmingham.

The accompanying drawings were made from three different specimens of *Pinguicula emarginata* to illustrate the range of variation in the form of the flower for this species. All were drawn from live specimens at a stage when the flowers were fully open. A zoom stereo-microscope (Meiji Techno EMZ) was used in order to capture three dimensional detail; the drawings were prepared first in pencil, then completed using a 0.1mm Rotring isograph pen on CS10 illustration cartridge paper.

The three different forms are each illustrated from the front face, diagonally from top left to bottom right; at the top is form 1, in the middle is form 2, at the bottom is form 3.

The top row shows form 1.: on the left viewed from the front, on the right from the side.

The middle row shows form 2.: on the left drawn from a vertical longitudinal section, in the centre viewed from the front, on the right from below.

The bottom row shows form 3.: on the left as a horizontal longitudinal section with the inferior tri-lobed petal removed to reveal androecium and gynoecium, in the centre the calyx is shown from above, whilst on the right the flower is shown from the front.

All scale bars = 1mm. Note the illustration in the bottom right corner is drawn to 2x the scale of all the other drawings.

This is clearly a very variable species, though the drawings are representative only of plants that have entered cultivation. There is also considerable variation in flower colour, ranging from white to deep violet, with the veins always a deeper shade than background colour and the blotch on the median lobe of the inferior petal being a uniform lemon yellow.



CORRECTIONS TO THE NOMENCLATURE SYNOPSIS
OF THE GENUS *PINGICULA*

by Hans Luhrs

Due to the fact that the author was still working on a 'review' of the Nomenclatural Synopsis while the IPSC editorial team already had printed the IPSC Newsletter, some errors occurred in the Nomenclatural Synopsis of the Genus *Pingicula* (IPSC Newsl. 3:12-14 (1993). Here come the necessary corrections:

The genus *Pingicula* consist of 69 species.

- P. calyptrata* H.B.K., Nov.Gen.et Spec.Pl. 2:226 (1817)
- P. macrophylla* H.B.K., Nov.Gen.et Spec.Pl. 2:226 (1817)
- P. moranensis* H.B.K., Nov.Gen.et Spec.Pl. 2:226 (1817)
- P. rayonesensis* ZAMUDIO & LUX = *P. rotundiflora* STUDNICKA
- P. filios mulionis* NORREN = *P. moranensis* H.B.K. /
- P. hemiepiphytica* ZAMUDIO & RZEDOWSKI (still unsure!)

CORRECTIONS AND ADDITIONS TO THE "FAMILY TREE"
(R.Mudd, IPSC Newsl. 3: insert (1993))

- Sect. *Discoradix* *P. cladophylla* = *P. casabitoana*
- Sect. *Longitubus* Subsect. *Infundibulares* *P. laeucana*
- Sect. *Nana* *P. alga*

Pingicula fiorii

The following article is based upon the description of a new European species of *Pingicula* by:
FERNANDO TAMMARO & LORETTA PACE of:
Dipartimento di Sc. Ambientali, settore Botanica, Università di L'Aquila.
Authors of an article entitled:
Il genere *Pingicula* L. (Lentibulariaceae) in Italia Centrale ed istituzione di una nuova specie *P. fiorii*. Tamm et Pace.
published in:
INFORMATORE BOTANICO ITALIANO Vol 19 1987.

The translation into English was carried out by:
FIONELLO VERONA, UDINE, ITALY.

ABSTRACT. The genus *Pingicula* L. (Lentibulariaceae) in Central Italy and description of a new species: *P. fiorii* Tamm. et Pace.
After studying the distribution in Central Italy of species related to *Pingicula*, it was noted that damp gorges in the Majella mountain (Abruzzo, Italy.) give shelter to a *Pingicula* that has proved to be quite different from the only three species known from Central Italy: *P. vulgaris* L., *P. leptoceras* Reichenb. and *P. reichenbachiana* Schindler. The Majella plants show morphological affinity with *P. balcanica* Casper, endemic to the Balcan Peninsula, but differ from it in the morphology of the leaves, calyx-lobes, calyx teeth and the rotundate corolla lobes.
For these differences we are of the opinion that the Majella plants belong to a new species which we named *P. fiorii* after the Italian botanist Adriano Fiori (author of the Flora of Italy)

***Pingicula fiorii* sp. nov.**
Individual plants collected in certain of Majella's gorges, surrounded by fagetum (beech) or oeno-ostetum (*Fraxinus oculus* & *Q. ilex* *carpinifolia*) at altitudes between 700-1200m on rocks with dripping water or on moss carpets, following Casper (1962) it had previously been identified as *P. balcanica* Casper s.l., endemic of the Balcan Peninsula, due to the form of the corolla lobes which are rounded and incurved at the edges and the dimensions of the flower and spur.
A more analytical examination has, however, permitted the distinction of this material from *P. balcanica* Casper s.s. on the basis of the calyx lobes which are rounded at the apex, the leaves which are notably more revolute, the capsule subequal or slightly emerging from the calyx, the microscopic form of the hairs of the corolla throat, and other characters.
For these morphological differences the Majella's form has been recognised as a new species; denominated *Pingicula fiorii* in dedication to Adriano Fiori, illustrious student of the Italian Flora.

DESCRIPTION.

A perennial plant with a winter bulbil, short rhizome and filiform roots.

Leaves 7-8 in a basal rosette, an entire margin, very revolute, to cover 1/5 of the entire leaf lamina, hairless below, glandular and sticky above, bright green colour. Broadly ovate, length (20) 24-27 (32) mm, width (9) 9.5-12 (16) mm. Flower scape 1-2, glabrous or glandular at the base, densely glandular at the apex, 50-75 mm tall, single flowered. Flower bilobed, 15-20mm long, azure-violet, calyx bilobed, glandular; superior calyx lobe trilobed, largely oval, with rounded apex; short, nearly as long as wide; inferior lobe bilobed, the division ending 1/3 from the base.

Corolla length 15-20 mm, bilobed, the throat hirsute with white multicellular hairs, which are smaller around the base of superior lobe than on the inferior lobe; inferior lobe trilobed, rounded-oblong, overlapping at the edges. Spur straight, blunt, diameter 4.5-5.5 (7.5) mm, about 1/3 of the corolla. Capsule ovoid, subequal to the calyx.

Holotypus: Eastern slopes of the Majella, in the locality of Cannelluccia di Bocca di Valle in a gorge on mossy calcareous rocks subject to dripping water, 750m, 30 May 1983, F. Tammaro(AQUU) in FI, RO.

Further specimens from the west slopes of Majella Valle dell'Orfento, Grotta di S. Giovanni. 800m.

HABITAT & ECOLOGY.

P. fiorii is strictly bound to rocky places with dripping water, in shady gorges, deep set in beech woods or 'oeno-ostrietus', both on the eastern and western slopes of the Majella mountain between 750-1400m.

The plant frequently grows within mossy carpets which are continually moist. It's companions include *Musci*, *Marcantha*, *Equisetum palustre*, *Parnassia palustris*, *Scrophularia nodosa*, *Angelica sylvestris*.

CHROMOSOME NUMBER $2n = 32$

SYSTEMATIC CORRELATIONS

P. fiorii shows a remarkable resemblance to *P. balcanica* Casper. for the form and dimensions of the flower, and overlapping corolla lobes; it differs clearly in the highly revolute leaves, rounded calyx lobes and for the capsules which only protrudes slightly from the calyx teeth. It differs from *P.*

reichenbachiana Casper. by the lesser dimensions of the spur (up to 24 mm in *P. reich.*) of the flowers and the leaves (besides differences in the pollen form, in the throat hairs and calyx teeth.) Finally, it differs from *P. vulgaris* L. in the form of the corolla lobes (in the latter they are oblong and non-overlapping) the corolla? teeth (acute) and other microscopic characters (corolla throat hairs, pollen, and seed coat)

SEED BANK

Due to a lack of seed donations , a list of seed available is

not being published in this issue

A small amount of seed is available from Chris (address inside

front cover). If you are interested in obtaining seed, write to Chris

through the year and he will let you know what is available.

Please enclose a International reply Coupon.

SEED

The group will maintain a seed bank, however seed will only be available to people who are NOT resident in the U.K. This will hopefully encourage an international movement of species. Anyone in the U.K. wishing to grow these species has access, in most cases, to the growing plants.

The seed bank will operate as follows :

1. Lists will be available throughout the year upon receipt of a self-addressed envelope and International Reply Coupon.
2. Packets of seed (20+) will cost £1, although any donations of seed made will be taken into consideration. A S.A.E. and Reply Coupon will be required. Payment is expected upon receipt of seed.
3. Quantities will be limited to one packet, per species, per year.
4. No seed will be kept in the bank for longer than 12 months.
5. PLEASE - if in any doubt about the name of your plant - send in seed with a short description of the parent.

PLANT EXCHANGE

Please send in a list of your wants and also those plants that you have available.

A list will be compiled which will be available upon receipt of S.A.E./reply coupon. The list will be updated each month and names will remain on the list for 12 weeks only. If you wish to extend this period, or if you wish to be removed before this - please let me know,

- RON

PLEASE REMEMBER THAT PHYTOSANITARY REGULATIONS MUST BE FOLLOWED FOR INTERNATIONAL EXCHANGE. SENDERS RESPONSIBILITY.