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## NOTES ON PINGUICULA, SECT. ORCHEOSANTHUS

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The long-spurred, or orchid-flowered species of *Pinguicula* (Lentibulariaceae), comprise a small group of closely related taxa in Mexico and Guatemala. About eight species have been described. One of these, *P. gypsicola* Brandg. (Univ. Calif. Publ. Bot. 4: 190. 1911), is seemingly unique in having the summer leaves linear-lanceolate. The other so-called species, with obovate, rotund or spatulate summer leaves, are scarcely distinguishable from one another, and their taxonomic positions are in doubt. Herbarium study of these plants is difficult and frustrating because the leaves and other vegetative and reproductive structures are so fragile that dried specimens are seldom adequately preserved. Usually but a single flower is found on a plant, and the extraordinarily fragile pressed flowers often lose their original color and shape to a very large extent. Often neither vegetative nor reproductive structures can be studied without severe damage to the specimen.

Much more field-work is needed. Five years ago we undertook a study of variation in these long-spurred *Pinguiculas* as they occur in Mexico. Our conclusion, after some field-study and after examination of much herbarium material, was almost the same as that stated by Barnhart many years earlier: "The range of variation is enormous, but how much is seasonal, how much individual, and how much of taxonomic importance, is at present mere guesswork" (Mem. N.Y. Bot. Gard. 6: 47. 1916).

We can, however, make a few general observations. Younger leaves and scapes are usually more densely pubescent than the older ones on the same plant; 2) leaf-size often increases markedly after anthesis; and 3) leaf-size, flower-size and scape-length vary considerably with the size and vigor of the plant as a whole. Perhaps more than in many other taxa of flowering plants, small (and therefore small-flowered) individuals look out of place in the populations to which they belong.

The most vexing taxonomic problem in Sect. *Orcheosanthus* has to do with the status of *P. macrophylla* HBK., *P. moranensis* HBK., and *P. caudata* Schlecht. Hemsley (Biol. Centr. Am. Bot. 2: 471. 1882), after observing some plants in cultivation, and the herbarium specimens then available to him, concluded that all these, and *P. bakeriana* Gard. Chron., *P. orchidioides* A.DC., *P. flos-mulionis* Morr. and *P. ablongiloba* DC., represented the same species. Indicating some doubt about the identity of the two species described by Kunth in the *Nova Genera et Species*, Hemsley took up the next oldest name, i.e. *P. caudata* Schlecht. Perhaps mostly on Hemsley's authority, the name *P. caudata* has been rather generally and indiscriminately applied to specimens in this group for the last 75 years.

Sprague, writing nearly a half-century after Hemsley (Kew Bull. 1928: 230-234. 1928), took a contrary point of view. He supposed that the individual species were probably distinct but closely and complexly interrelated, distinguishable chiefly by characters that are often or always lost in dried specimens (e.g. position of the spur in the fresh flower).

Our own field-observations in Mexico lead us to believe that but one species,

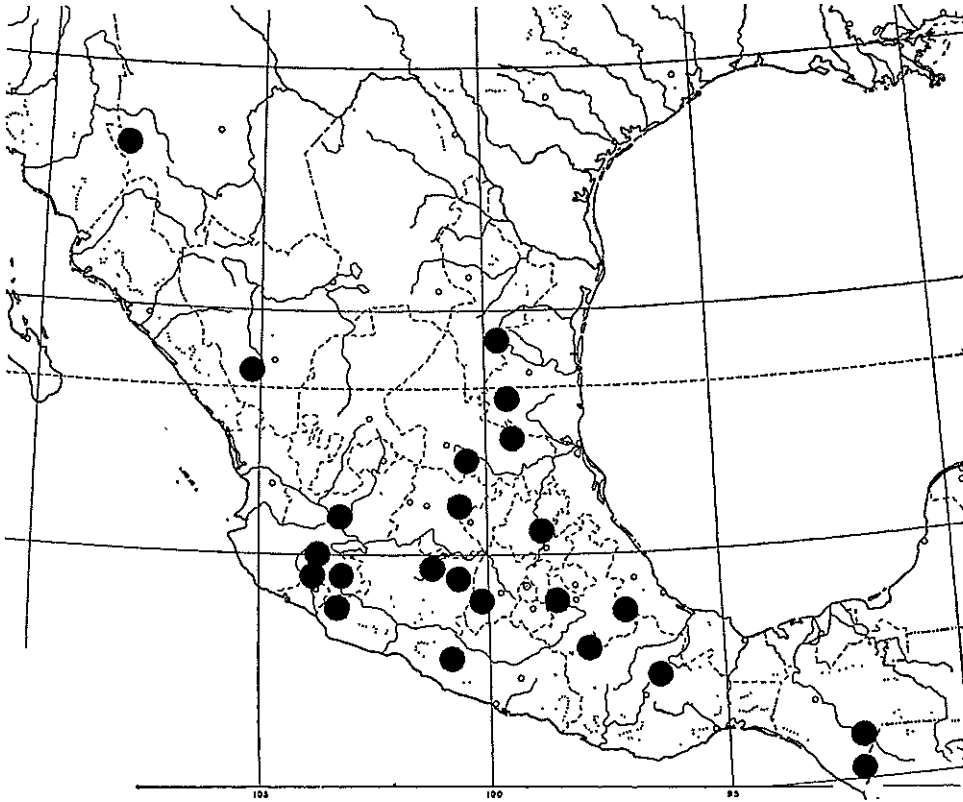
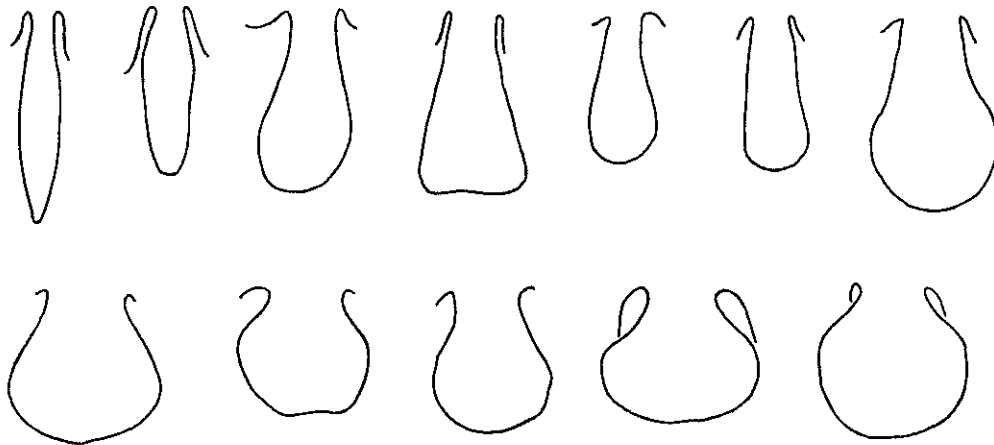


FIG. 1. Distribution in Mexico of *Pinguicula macrophylla* as that species is interpreted in this paper. Records are taken from the Herbarium of the University of Michigan (MICH) and that of the Missouri Botanical Garden (MO).

albeit a polymorphic one, is involved. Its range in Mexico is exactly what might be expected of a species inhabiting cool banks and rocks in the mountains (Fig. 1); its habitat, once seen and observed, is a predictable one; the flowers are always recognizable as belonging to this plant, although the lobing of the corolla is very variable; the leaves are consistently few (1-5, rarely 6-8); the blades in old plants tend to be rather uniformly rounded at base and slender-petiolate; they often lie flat on the ground, inconspicuous or almost invisible among mosses and other herbs; the margins are involute, a feature readily observed in living plants and also in dried specimens; in color the blades are usually a soft gray-green or dark green, or occasionally (especially in old leaves) yellow-green; the scape at the time of anthesis and in fruit is 8-15 (-25) cm. long (or, in about 3 out of every 100 scapes examined, as little as 5 cm long).

The corolla is characteristically deeply divided, but the lobes vary in shape (Fig. 2). The middle lobe of the 3-lobed lip (i.e. the "lower lip" in the sense of A. DeCandolle in DC. Prodr. 8: 27. 1844), varies from spatulate or obovate to almost linear, but it is relatively uniform in its proportions and in size: It is 2.5-4 (rarely -4.5) mm wide at the base, 5.5-9 (rarely -10.5) mm wide at the widest point, 10-15 mm long, and often about twice as long as wide (the extremes are from about 1.5 to 4 times as long as wide).



FIGS. 2-3. Flowers of *Pinguicula*. Variation in the middle lobe of the 3-lobed lip of the corolla. FIG. 2 (above). *Pinguicula macrophylla*. Left to right: Hinton 14504 (Guerrero); King 2086 (Oaxaca); Maysilles 7153 (Durango); McVaugh 10390 (Guanajuato); Moore 3278 (Hidalgo); Gregory & Eiten 73-3 (Jalisco); Matuda 2779 (Chiapas). Drawn from specimens at MICH; all drawings ca.  $\times 1.6$ . FIG. 3 (below). *Pinguicula colimensis*. All drawings from the type (MICH), ca.  $\times 1.6$ .

The oldest names for plants of this complex appear to be *P. moranensis* HBK. and *P. macrophylla* HBK.; the name in general use, as pointed out above, is *P. caudata* Schlecht. We have seen what appears to be an isotype of the latter (*Schiede* no. 74, MO) and, from the Bernhardt Herbarium (MO), a specimen of what we suppose to be authentic material of *P. macrophylla* HBK. In our opinion the two are conspecific. We take up the name *P. macrophylla* HBK. (Nov. Gen. & Sp. 2: 226. 1818), relegating to synonymy *P. moranensis* HBK. (l.c.) and *P. caudata* Schlecht. (Linnaea 7: 393. 1832). We are much indebted to the authorities of the Missouri Botanical Garden for the opportunity to study the specimens of *P. macrophylla* and *P. caudata*.

In western Mexico, where numerous collections have been made in recent years, *P. macrophylla* is a common species at elevations above 1500 meters, at least up to about 3000 meters, often in calcareous or at least alkaline soil in oak or pine forest, usually on moist steep banks and ledges where other herbaceous vegetation is scanty. The following species comes from quite a different area, namely the one of limestone and gypsum hills at an elevation of about 500 meters, about 15-16 kilometers south-southwest of the city of Colima, in the tropical deciduous forest dominated by *Bursera*, *Cordia*, *Cnidoscolus*, *Cassia* and various other legumes. The habitat of the *Pinguicula* is on vertical or near-vertical gypsum cliffs and ledges, in partial sun or nearly full shade. From *P. macrophylla* it may be distinguished as follows:

Corolla-lobes very broadly rounded, about as wide as long or a little wider; median lobe of the 3-lobed lip 10-13 mm long and wide, 5-6 mm wide at the base; scape in flower and fruit 4-7.5 cm long; summer leaves [the "foliage leaves," produced during the flowering season and immediately thereafter] 6-10 or more, broadly obovate, gradually narrowed to a broad petiolar base; blades very light yellow-green, their distal margins revolute and stipitate-glandular. *P. colimensis*.

Corolla-lobes spatulate to obovate, oblanceolate or oblong, noticeably longer than wide; median lobe of the 3-lobed lip 10-15 mm long, mostly 5.5-9 mm wide at the widest

point, 2.5-4 mm wide at the base, 1.5-2 times as long as wide or even longer; scape in flower and fruit 8-15 cm long or more, rarely shorter except in buds and opening flowers; summer leaves 1-5 (rarely 6-8), obovate or elliptic, some or all of them usually rounded at base and with a slender petiole 1-4 cm long; blades pale green, gray-green or deep green, rarely yellow-green, their distal margins involute, glabrous.

*P. macrophylla*.



FIG. 4 (above). *Pinguicula macrophylla* HBK. A specimen from the Bernhardt Herbarium (MO), labelled "*Pinguicula macrophylla* H.K." and thought to be authentic. Univ. of Mich. neg. 1050. FIG. 5 (right). *Pinguicula lateoliata*. Plants from the type (MO). Univ. of Mich. neg. 1055.

***Pinguicula colimensis* McVaugh & Mickel, sp. nov. Figs. 3, 6, 7.**

Herba scaposa foliis rosulatis biseriatis, hiemis eis numerosis angustis obtusis scariosis, aestatis eis expansis viridibus obovatis 6–10 vel pluribus, floratione 1.5–4 cm longis, 1.1–2.4 cm latis, maximis post florationem demum 6–10 cm longis, 4–6 cm latis; laminis pinguibus, marginibus revolutis, glandulis stipitatis instructis; scapi 1–2, glanduloso-pubescentes, 4–7.5 cm longi; calycis lobi 5, 2–3 mm longi, membranacei, paullo foliacei; corolla punicea [anglice *bright pink*], lobis 5 subaequalibus suborbicularibus, labio [“inferiore”] trilobato 2.5–3.5 cm lato, lobis 10–13 mm longis latisque, lobo intermedio basi 5–6 mm lato, palato villoso, calcare reliqua corolla sublongiore 2–3 cm longo; capsula subcoriacea erecta, 3–4 mm longa, 2 mm lata, seminibus (immaturis) linearibus, minutissimis.

MEXICO: COLIMA: Mountain summits near the pass 10–11 miles south-southwest of Colima, sunny slopes, on gypsum, elevation ca. 500 m, 18 Jul 1957 (in flower and fruit), *McVaugh 15534* (MICH, type); the same locality, on north-facing gypsum cliffs, 21 Sep 1958 (sterile, past fruit), *McVaugh 18065* (MICH).

The field-aspect of *P. colimensis* is very different from that of *P. macrophylla*. The leaves of the new species form conspicuous rosettes suggesting in form and color those of young lettuce plants, whereas those of *P. macrophylla* rarely form a tight rosette, and their color is an inconspicuous green that blends with the surrounding herbage. The flowers of *P. macrophylla* are usually described as purple; although some individuals may be thought of as having “pink” flowers, the corolla is usually darker than those we have seen of *P. colimensis* and probably has more violet intermingled with the red or pink color.

Except for the thousands of plants at the type-locality, we have not seen any undoubted specimens of *P. colimensis*. The following specimen suggests that species by its ample rosette of basal leaves and its very large flowers with broadly rounded corolla lobes (lobes 2.5 cm wide and long, spur 3.5–5.5 cm long), but the leaves appear to be involute rather than revolute, and the scapes are 7–12 cm long or more, and rather sparingly glandular:

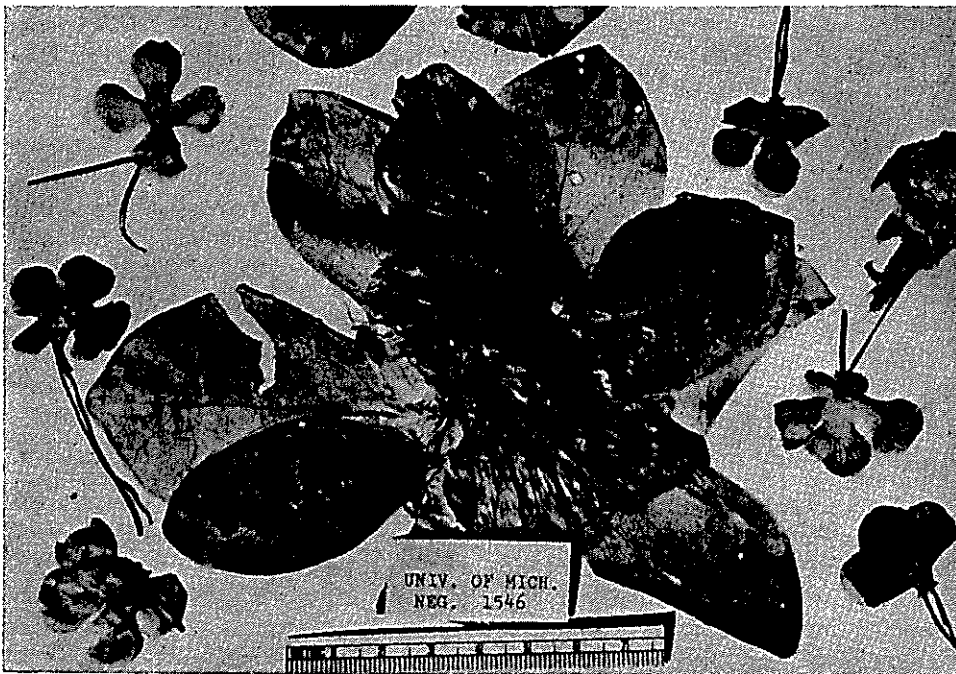
MEXICO: GUERRERO: Mina Distr., Pilas, top of wet cliff, 18 Sep 1937 (flower), *G. B. Hinton 10682* (MICH).

The following species also seems to differ from the widespread *P. macrophylla*; the two known collections were originally referred by their discoverers to quite unrelated species:

***Pinguicula lateciliata* McVaugh & Mickel, sp. nov. Fig. 6.**

Herba “semi-succulenta” scaposa foliis rosulatis, hiemis eis brevibus dense ciliatis spathulatis, aestatis eis expansis viridibus spathulatis 5–10, floratione 1–2.5 cm longis, 0.6–1 cm latis, planis, sub apicem contractis indeque usque ad basin gradatim angustatis; laminae glabrae, sed marginibus lateralibus copiosiuscule ciliatis; scapi 1–3, copiose glanduloso-villosi, 2.2–5 cm longi; calycis lobi 5, anguste ovati, acuti, subfoliacei, 2–3 mm longi; corolla violacea [anglice *deep violet*], lobis 5 subaequalibus suborbicularibus, labio [“inferiore”] trilobato 1.5–2.5 cm lato, lobis ca 10 mm longis latisque, lobo intermedio basi 3.5–4 mm lato, palato subvillosa, calcare reliqua corolla sublongiore 1.7–2.6 cm longo; capsula subcoriacea erecta 3 mm longa, 2 mm lata, seminibus (immaturis) linearibus, minutissimis.

MEXICO: NUEVO LEON-TAMAULIPAS border: 3 miles northeast of Dulces Nombres, in limestone crevices on cliffs near El Caracol, 17 Jun 1948 (flower and fruit), *F. G. Meyer &*



FIGS. 6-7. *Pinguicula colimensis*. FIG. 6 (above). Living plants at the type-locality, 21 Sep 1958. From a kodachrome by Hugh F. Loveland. FIG. 7 (below). Flowers from the type; leafy plant from *McVaugh 18065*. Univ. of Mich. neg. 1546.

*D. J. Rogers 2538* (MO, type); same locality but 8 miles east of Dulces Nombres, elev. 1300 m, 24 Jun 1948 (flower), *Meyer & Rogers 2658* (MO).

As only the two collections have been seen, and those in flower (with some nearly mature fruit), the fully grown late-season leaves are unknown. In the flowering state the plants are characterized by the spatulate, long-based leaves with numerous lateral cilia, by the short scapes which are often little more than twice as long as the spur of the corolla; by the very broadly rounded corolla-lobes. The corolla indeed suggests that of *P. colimensis*, but is smaller and apparently differently colored. In both *P. colimensis* and in *P. lateciliata* the sepals are thin and relatively broad, membranaceous and villous; those of *P. macrophylla* (at least the three narrower ones) tend to be elongate, lanceolate or linear rather than ovate, glabrous or nearly so at maturity.

### THE LICHEN GENUS THAMNOLIA<sup>1</sup>

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Observant travelers to the Arctic and to alpine zones all over the world soon become acquainted with the common soil-inhabiting lichens called *Thamnolia*. These conspicuous fruticose lichens have whitish thalli with curved, hollow, pointed, elongated or horn-like branches. They are always sterile. Their morphology is unique yet varies so little that most lichenologists have always considered *Thamnolia* to be monotypic and represented by *T. vermicularis* (Sw.) Ach.

But some twenty-five years ago Asahina (1937) showed that from the point of view of the lichen substances that they produce, all thamnolias really belong to one or the other of two very distinct types. Some specimens produce only thamnolic acid, whereas the others lack that substance but produce instead both squammatic and baecomycesic acids. Asahina referred the first group, the thamnolic acid-producing specimens, to the old species *Thamnolia vermicularis* and the others to his new species *T. subvermicularis* Asah.

The introduction of considerations of chemistry into taxonomy here as elsewhere has of course engendered controversy. I have recently discussed the role of lichen chemistry in taxonomy (Culberson 1960, 1961) and it is unnecessary to go into it again. Suffice it to say that of the different types of chemical variation known in morphologically very similar or indistinguishable lichens, the situation in *Thamnolia* seems to be among the most significant: it is one of the outright replacement of one substance by others rather than one of the casual occurrence of additional substances. And the view that this difference in *Thamnolia* is of specific magnitude has recently been strengthened by Sato's (1962) demonstration—from an examination of many herbarium specimens of these often-collected lichens—that the geographic ranges of the chemically different types are not identical although they broadly overlap.

<sup>1</sup>This study was made while the author held a grant from the National Science Foundation.