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On *Pinguicula lignicola*, an epiphytic heterophyllic member of the *Lentibulariaceae* in Cuba*

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Key words: Angiosperms, *Lentibulariaceae*, *Pinguicula lignicola*, *P. casabitoana*. – Heteromorphy. – Flora of Cuba.

Abstract: Some new morphological features of the endemic *Pinguicula lignicola* of Cuba are discussed, a detailed description of the heteromorphic habit and illustrations of this epiphytic species are presented. The identity of the other member of sect. *Discoradix*, *P. casabitoana* from Española, is considered.

On September 8, 1909, CHARLES T. RAMSDEN collected a small whitish flowering *Pinguicula* near “La Yberia”, a mining claim west of Baracoa in the eastern part of Cuba (Moa-Baracoa, altiplano de la Mina Iberia), but I am not sure if he was aware of the importance of his finding. Only later, JOHN ADOLF SHAFER, collecting along the rocky banks of a stream in the same region, i.e. the vicinity of Camp San Benito on February 24, 1910, and Camp La Gloria in December, 1910, saw a “beautiful blue-flowered *Pinguicula* (i.e. *P. benedicta* BARNHART) ... among the rocks, and epiphytic members (i.e. *P. lignicola* BARNHART) of the same family ... upon the bushes overhanging the stream” (SHAFER 1910, p. 218).

BARNHART (in BRITTON 1920) selected SHAFER'S San Benito specimens (SHAFER 4031, NY) as holotype of his *Pinguicula lignicola* BARNHART and characterized the new species as an epiphyte growing on twigs of trees and shrubs (Fig. 1).

The discovery of a *Pinguicula* growing on other plants came equal to a botanical sensation: Epiphytism was well known to science from lichens, mosses, tropical ferns, as well as from higher plants, especially of the families *Piperaceae*, *Moraceae*, *Hypericaceae*, *Melastomataceae*, *Asclepiadaceae*, *Rubiaceae*, *Gesneriaceae*, *Araceae*, *Orchidaceae*, *Bromeliaceae*, and from some carnivorous *Utricularia* species. But up to this day, the epiphytic members of the *Lentibulariaceae*, apart from a few exceptions, had not found entrance into relevant text- or handbooks of botany.

* This paper is dedicated to Prof. KARL HEINZ RECHINGER on the occasion of his 80th birthday. He has encouraged me to study the genus *Pinguicula* taxonomically, and liberally has placed at my disposal the rich plant collections and the library of the Botanical Department of the Museum of Natural History, Vienna, in the late fifties.

The first detailed description of *Pinguicula lignicola* was presented by ERNST (1961). (The description by ALAIN (1957) is nothing but a translation of BARNHART'S original diagnosis into Spanish.) ERNST could make use of the collections by ERIK LEONARD EKMAN from Minas de Iberias near Taco Bay (NY, G) of 1914. The first illustration can be found in CASPER (1966; flowers, tube hairs, habit – all drawings taken from dried specimens); maps of distribution were published by CASPER (1966) and BISSE & al. (1975).

Now rich material, collected (JE – no. 53 392) and fixed in alcohol by F. K. MEYER near Los Lechugos on the Loma NE of Alto de la Yamagua, in the Sierra de Imias, and excellent photographs taken by L. LEPPER between Revuelta de los Chinos and Pico del Toldo, Sierra de Moa, are available. Therefore, I can discuss some new morphological features and present a more detailed description of *Pinguicula lignicola*.

Results

The "typical" flowering and fruiting plants (Figs. 2, 4a) produce a well defined dense rosette of 10–20 (50) leaves which are curved downwards and form an umbrella-like shelter over that part of the branches to which it is fixed. The leaves are narrow, linear-spathulate, cuneate at base, attenuated into the rounded apex, (5) 7–15 (20) mm long and (1) 2–3 (4) mm broad, up to 1.5 mm thick (Fig. 3a–c); slightly convex above, pale green, brittle, slightly succulent; the margin entire, revolute for ± 0.5 mm (Fig. 4f); the whole upper surface (including the revolute margin) is densely covered with mucilaginous sessile and stipitate glands (Fig. 4e–g).

Of special interest are such minute rosettes (± 6 mm in diam.) which grow beneath other sterile, flowering, or fruiting plants and which consist of only 2–4 (5) leaves of quite a different shape (Fig. 4b–d). These leaves are tender, flat, obovate and rounded at the apex; their margins are not revolute and free from glandular hairs (Fig. 4d); their upper surface is loosely covered with mucilaginous sessile and stipitate glands confined to the area between the two curved marginal vessels.

At first sight the minute rosettes resemble seedlings, but the primary roots have already faded. A short thin stem clothed with a few adventitious fibrous roots has developed from which the rosette originates (Fig. 4b). Hence the minute plants represent a juvenile stage of development of our perennial epiphyte which deviate from the adult plants by leaves of a quite different form.

The question remains whether the minute leaf rosettes mentioned above merely represent the primary stage of development (as e.g. in *Paris quadrifolia*; cf. IRMISCH 1856) or are indications of a heterophyllic habit of *P. lignicola* since in *Pinguicula* the heteromorphic habit is a wide-spread phenomenon (CASPER 1963, 1966).

Different species, especially those of the *Orcheosanthus* or *Heterophyllum* groups, undergo a regular change of form, so that their leaves exhibit different forms and sizes at various stages of development.

Following the diagnosis by BARNHART (in BRITTON 1920) and the description by ERNST (1961), and having studied the sparse specimens then available to me, I had postulated a homophyllic habit of *P. lignicola* and the related *P. casabitoana* JIMÉNEZ (= *P. cladophila* ERNST; cf. CASPER 1966). After the investigations of richer collections now at my disposal I must revise by former opinion.

In the centre of well-developed rosettes with linear-spathulate leaves obovate-



Fig. 1. *Pinguicula lignicola*, growing on a stem of *Pinus spec.* Note the different stages of development. Cuba, Oriente: Sierra de Moa, between Revuelta de los Chinos and Pico del Toldo. — $\times 0.42$. — Photo: L. LEPPER

Fig. 2. *Pinguicula lignicola*, growing on a twig. Note the characteristic spatulate glandular leaves of the rosette, the short thick saccate spur of the flower, and the thickened scape with the enlarged bell-shaped calyx; locality see Fig. 1. — $\times 0.85$. — Photo: L. LEPPER

lanceolate ones occasionally appear with rounded apices and margins not revolute. They are up to 10 mm long and up to 5 mm broad ((Figs. 1e, 5m–n), thick at base and boat-shaped (in cross-section \pm triangular). It may be supposed that they will represent the first leaves of a leaf generation of special kind.

Indeed, well-developed fruiting plants (e.g. specimens of JE, Flora de Cuba 008788) produce lanceolate leaves (Fig. 5a–l) narrowed into a linear tip of different length; at base they are cuneate or moderately narrowed; they are 6–15 mm long, 1.5–3 (4.5) mm broad, moderately covered with mucilaginous sessile and stipitate glands on the upper surface; the margins are entire and not revolute (possibly with exception of the region of the narrow tip).

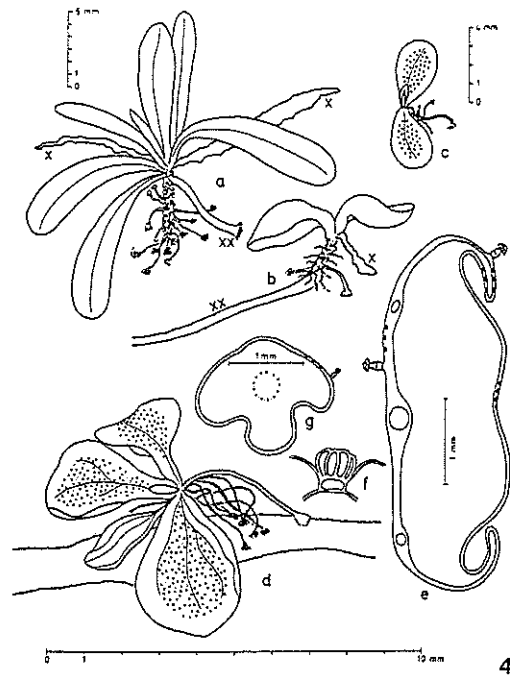
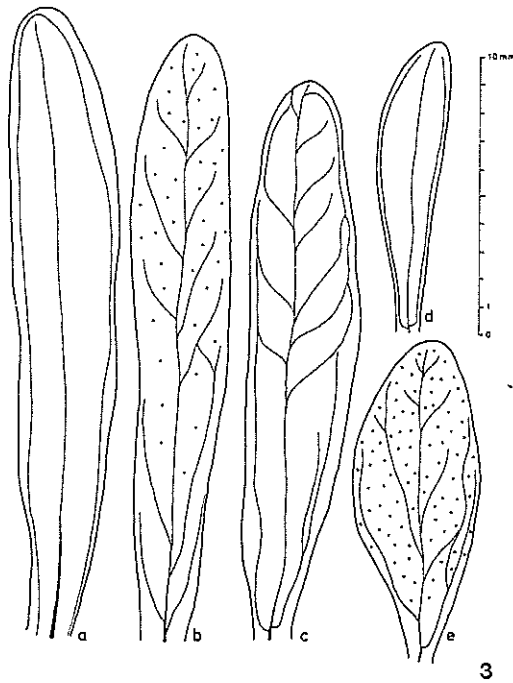


Fig. 3. *Pinguicula lignicola*, leaves of the flowering rosette. *a* Adult leaf, lower surface, margin rolled back; *b-c* adult leaves, upper surface; *d-e* "juvenile" leaves of the centre of the rosette, upper surfaces (*b, e* stipitate glands schematically indicated).—All drawings taken from alcohol-fixed material (JE, Flora de Cuba no. 53 392)

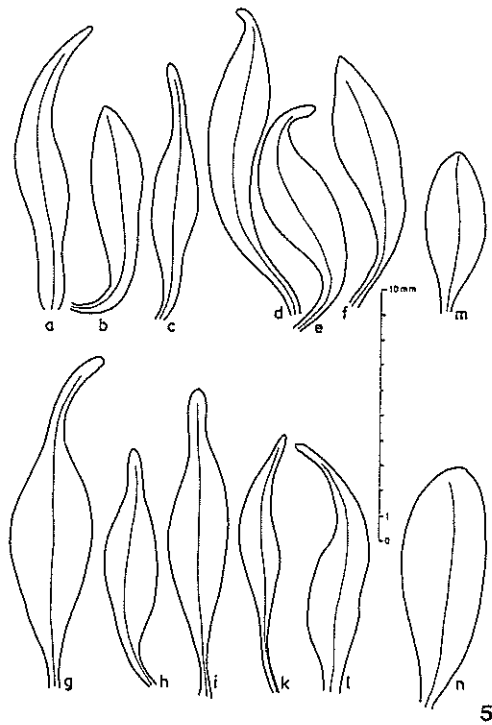


Fig. 4. *Pinguicula lignicola*. *a* Plant with typical linear-spathulate leaves (*x* = fading leaves), stem clothed with adventitious rootlets with fixation discs (*xx* = young white adventitious rootlet); *b* young plant with obovate leaves (*xx* = faded leaf); *c* young plant with two developed obovate leaves; *d* young plant with four well developed obovate leaves and adventitious sticking rootlets (*c, d*: note the distribution of the glands on the surface and the partially involute margins); *e* cross-section of leaf of specimen (*a*), note revolute margins, sessile and stipitate glands, and hydathodes (schematically indicated); *f* sessile gland of the upper leaf surface; *g* cross-section of flowering stem.—All drawings taken from material as in Fig. 3

Fig. 5. *Pinguicula lignicola*. Leaves of rosettes with faded flowers, in part fruiting; note the lanceolate outline and the narrowed tips.—All drawings taken from material as in Fig. 3

Up to this day a more detailed study of this striking "post-floral" rosette has not been possible because of the lack of any living, alcohol-fixed, or cultivated material. However, comparison with one isotype specimen of *P. casabitoana* (Santo Domingo, Alto de Casabito, leg. JIMÉNEZ no. 3029, JE) and specimens collected at the type locality by ALAIN & LIOGIER (no. 26635, JE) show that the rosettes consist of leaves of different sizes and forms in one and the same individual as in *P. lignicola*: linear-spathulate and lanceolate, long-tipped leaves. Therefore, *P. casabitoana* may be conspecific with *P. lignicola*, a suggestion that further investigations will have to prove.

Conclusions

Among the nearly sixty species of the genus *Pinguicula* known to science as carnivorous herbs growing on poor naked soils and often open, at least temporarily wet places two deviate by their epiphytic growth. They occur in the "Nebelwald" belt within the so-called mountain-"charrascos" in eastern Cuba between the Sierra del Cristal and the Sierra de Imias and Española, respectively. These two, *P. lignicola* and *P. casabitoana*, resemble a group of species united into sect. *Agnata* (CASPER 1963, 1966). Their common features are subisolate flowers, corolla-tubes cylindric, yellow, hairy inside and outside in the region of the throat, slightly funnel-shaped without palate, and spurs short, thick, saccate, standing off at an angle of nearly 90°. But the special structure of the sticking rootlets which enable the epiphytic growth of the plants, the stalked seeds, and the existence of leaves of different sizes and forms resemble the *Heterophyllum-Isolobopsis* group (CASPER 1963, 1966). The discovery of the heteromorphic habit of *P. lignicola* and *P. casabitoana* confirms the exceptional position of these epiphytic members of *Pinguicula* and their grouping into a section of their own, viz. sect. *Discoradix* (CASPER 1963, 1966).

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