

RECIRCUMSCRIPTION OF *PITYPHYLLUM* (ORCHIDACEAE: MAXILLARIINAE)¹

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ABSTRACT: Based upon morphological and molecular evidence, *Maxillaria huancabambae* (Kraenzl.) C. Schweinf. and *M. saragurensis* Dodson are transferred to *Pityphyllum* Schltr. These and other species of *Pityphyllum* are illustrated with photographs and a revised key to the genus is presented. In the course of our ongoing studies of the phylogenetics of subtribe Maxillariinae, we have made several trips to the extensive orchid greenhouses of Ecuagenera in Gualaceo, Ecuador. Although field and herbarium work is indispensable for taxonomic studies, large living collections such as those at Ecuagenera provide valuable opportunities to see large numbers of related taxa cultivated side by side. Recently, our observations of its large collections of *Maxillaria* and related genera provided us with insights into the relationships of the genus *Pityphyllum* Schltr.

THE GENUS *PITYPHYLLUM* Schltr. (Maxillariinae) currently consists of five poorly known species from the high Andes of Colombia, Ecuador, Peru and Venezuela (Dodson, 2003). The plants are scraggly, pendent epiphytes of montane cloud forests with elongate, branching rhizomes. In habit, they vaguely resemble Spanish Moss (*Tillandsia usneoides*, Bromeliaceae). The tiny pseudobulbs are widely spaced along the rhizome, are frequently ribbed, and bear small, semiterete leaves often borne in tufts at the apex (Figs. 1, 2). The name *Pityphyllum* is derived from the Greek *pitys* (pine) and *phyllon* (leaf), and alludes to the tufted, needlelike terminal leaves of some species that resemble pine needles (*Pinus*). As in *Teuscheria*, the pseudobulbs are completely enveloped by a brown, nonfoliaceous scarious sheath (Fig. 2). This sheath is distinct at the apex, but it is fused to the pseudobulb for much of its

length (M. Blanco and M. Whitten, personal observation); it has a hole at the tip through which the terminal leaves of the pseudobulb emerge. We propose the term *tunica*, which means “outer sheath,” for this structure. The rhizomes are covered in papery brown imbricating bracts that may or may not bear green leaf blades (depending on the species), and the solitary flowers usually emerge from between the bracts along the rhizome, not at the base of the pseudobulb (Fig. 3). The small (<5 mm) flowers are simple, with narrow segments that do not spread widely. The simple lip lacks conspicuous lateral lobes and the column lacks a column foot (mentum), characters found in most *Maxillaria* species. The pollinarium consists of four ovate pollinia attached to a small, rounded viscidium, sometimes with a short stipe (in *P. amesianum*).

Pityphyllum species are rarely cultivated and poorly represented in herbaria, due in part to the inconspicuous nature of the plants and their flowers, but they also seem to be rare (Dunsterville and Dunsterville, 1977). There might still be a number of undescribed species. According to Iván Portilla (Ecuagenera), they require a combination of high light intensity, cool temperatures and pure water. Sweet (1972) discussed and illustrated the four species known at the time, and Dodson (1996) described one additional species (*P. hirtzii* Dodson). *Pityphyllum amesianum* was illustrated by Dunsterville and Garay (1972:232–233), Dunsterville and Dunsterville (1977) and Speckmaier (1995), and Dodson (2003) illustrated *P. pinoides*, *P. hirtzii* and *P. laricinum*.

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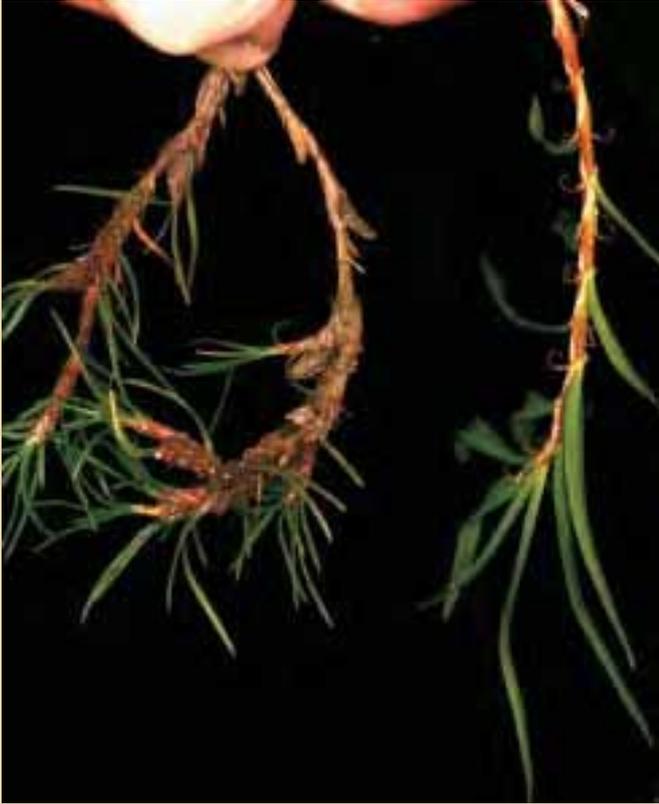


Fig. 1. Comparison of *Pityphyllum pinoides* (left) and *P. saragurensis* (right), showing overall vegetative similarity. Photograph: W.M. Whitten.



Fig. 2. *Pityphyllum* cf. *pinoides*, showing the characteristic brown sheaths covering the rhizome, the tunicas (sheaths that completely surround each pseudobulb), and the leaves clustered at the apex of the pseudobulbs that emerge from the terminal hole of the tunica. Photograph: W.M. Whitten.



Fig. 3. Flowers of *Pityphyllum antioquiense* emerging between the sheaths of the rhizome. Photograph: W.M. Whitten.

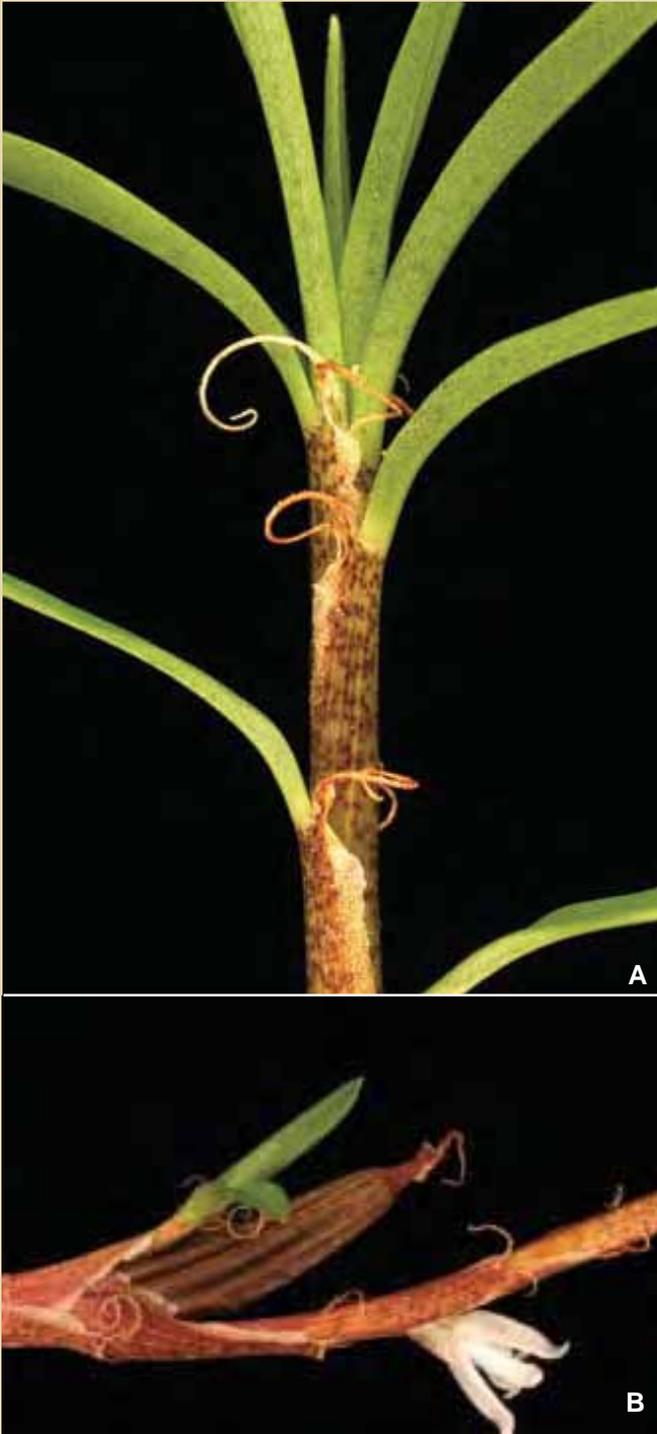


Fig. 4. *Pityphyllum saragurense*. A. The conduplicate leaves with a pair of hooklike, curved ligules attached to the sheathing base of the leaf just below the abscission layer. B. A pseudobulb covered with the brown tunica, paired ligules at the apex of the tunica and rhizome sheaths, and a flower emerging between the rhizome sheaths. Photographs: W.M. Whitten.

During a recent visit to Ecuagenera, we were examining a large mixed series of *Pityphyllum* plants when we noticed several odd ones. These plants had the overall habit of *Pityphyllum*, but with broader, flattened leaves and with curious, minute, recurved hooks on the scarious bracts along



Fig. 5. *Pityphyllum pinoides* stem apex, from herbarium specimen (Whitten 2401, FLAS), showing pair of short, curved ligules at apex of leaf sheaths. Photograph: W.M. Whitten.

the rhizome, and the pseudobulbs had tunicas like those of *Pityphyllum* (Figs. 1, 4 A–B). A search of the literature confirmed that these odd plants matched the description of *Maxillaria saragurensis* Dodson (see also Fig. 1268 in Dodson, 2002). Although described as a *Maxillaria*, this species also lacks a column foot, which provides another morphological character in common with *Pityphyllum*. Dodson (1994) even considered this species intermediate between *Pityphyllum* and *Maxillaria*. He mentioned that it has a short column foot, but if this structure is present at all, it is extremely reduced. Bennett and Christenson (1995) provided more detailed illustrations of *M. saragurensis*, and noted the minutely papillose leaf margins. They used the term “stipules” for the recurved hooks, but this is an incorrect application of the term because they do not arise from the stem at the base of the leaves, but instead originate from the top of the leaf sheath (just below the abscission layer, if there is a blade present). The term “ligule” is probably more appropriate, as these structures are analogous to the ligules present on the leaves of grasses, although the homology of the structures is dubious. Most species of *Pityphyllum* also possess smaller leaf sheath ligules (Fig. 5).



Hanging nearby in the greenhouse were numerous plants of *Maxillaria huancabambae* (Kraenzl.) C. Schweinf. (synonym: *M. jamboensis* Dodson) (Figs. 6A–B). This species also has distinctive brown tunics covering the pseudobulbs (first noticed by Schweinfurth, 1945), minutely papillose leaf margins, small ligules on the tunica, and the flowers lack a column foot (Dodson and Vásquez, 1989; Dodson, 1994). It differs from *Pityphyllum* only in the slightly more robust rhizomes, the presence of one to two (rarely three) broader, ovate to elliptic leaves, and in the larger, bright yellow, globose flowers with broad sepals and petals (see also Fig. 1225 in Dodson, 2002). The flowers are superficially similar to those of many species of *Ornithidium* (*Maxillaria* section *Ornithidium*), and are probably pollinated by hummingbirds. Schweinfurth (1945) described *M. huancabambae* var. *cuzcoensis*, which differs from the typical form in its narrower leaves and white flowers.

DNA sequence data (internal transcribed spacer regions 1 & 2, *matK*, and *atpB-rbcL* spacer) of more than 350 species in subtribe Maxillariinae (Whitten *et al.*, in prep.) confirm that *Maxillaria huancabambae* and *M. saragurensis* are more closely related to *Pityphyllum* than to other species of *Maxillaria*. Based on the shared vegetative and floral characters and upon the molecular evidence, we transfer these two species to *Pityphyllum*.

***Pityphyllum huancabambae* (Kraenzl.) Whitten, comb. nov.**

Basionym: *Ornithidium huancabambae* Kraenzl.

Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 54(117):29. 1916.



Fig. 6. *Pityphyllum huancabambae*. A. With relatively broad leaves and bright yellow globose flowers that are atypical for the genus, it shares the characters of brown, scariosus tunica covering the pseudobulbs, sheath ligules (present only in the tunicas), and minutely papillose leaf margins. DNA sequence data also support its close relationship to other *Pityphyllum* species. B. Flower. Photographs: W.M. Whitten.

Revised Key to *Pityphyllum*

(Modified from Sweet, 1972)

- 1a. Leaves semiterete, needlelike, less than 5 mm wide. — 2
- 1b. Leaves conduplicate, not semiterete, usually more than 6 mm wide. — 6
- 2a. Leaves restricted to apex of pseudobulb; stems covered only in brown bracts. — 3
- 2b. Leaves distributed both along rhizome and pseudobulb apex. — 5
- 3a. Pseudobulbs with 1–5 needlelike leaves; lip entire — 4
- 3b. Pseudobulbs with 20–40 needlelike leaves; lip obscurely 3-lobed — *P. amesianum* Schltr.
- 4a. Leaves 1–2 per pseudobulb — *P. hirtzii* Dodson
- 4b. Leaves 3–5 per pseudobulb — *P. antioquiense* Schltr.
- 5a. Leaves to 15 mm long; lip ovate to oblong-ovate, obtuse — *P. laricinum* (Kraenzl.) Schltr.
- 5b. Leaves to 25 mm long; lip narrowly oblanceolate-ovate, subacuminate — *P. pinoides* Sweet
- 6a. Leaves restricted to apex of pseudobulbs; flowers globose — 7
- 6b. Leaves distributed along stems; flowers with narrow segments — *P. saragurensis* (Dodson) Whitten
- 7a. Flowers yellow — *P. huancabambae* (Kraenzl.) Whitten var. *huancabambae*
- 7b. Flowers white — *P. huancabambae* var. *cuzcoense* (C. Schweinf.) Whitten

Synonyms:

Maxillaria huancabambae (Kraenzl.) C. Schweinf. *Botanical Museum Leaflets* 11:277. 1945.

Maxillaria jamboensis Dodson. *Orquideología* 19(3):73. 1994.

***Pityphyllum huancabambae* var. *cuzcoense* (C. Schweinf.) Whitten, comb. nov.**

Basionym: *Maxillaria huancabambae* var. *cuzcoensis* C. Schweinf., *Botanical Museum Leaflets* 11:278. 1945.

***Pityphyllum saragurensis* (Dodson) Whitten, comb. nov.**

Basionym: *Maxillaria saragurensis* Dodson. *Orquideología* 19(3):85. 1994.

The inclusion of these two species with broad leaves into *Pityphyllum* requires a slight expansion of the diagnostic characters for the genus. As the accompanying photographs show, the distinction between semiterete, needlelike leaves and conduplicate leaves is largely a matter of degree; the species illustrated show a range of leaf width/thickness from needlelike to flat and broad. Other well-defined groups within the Maxillariinae (e.g., the “*Maxillaria madida* alliance”) also have some species with narrow, semiterete leaves and others with wider leaves. They also possess brown scarious sheaths at the base of the pseudobulbs, but they do not form closed tunicas as in *Pityphyllum*; they are caespitose plants or have

short rhizomes between the pseudobulbs, unlike *Pityphyllum*. Most species of the *M. madida* alliance are restricted to southeastern Brazil, whereas *Pityphyllum* is distributed exclusively in the Andes. Our DNA data indicate that these two groups are not closely related, despite their superficial similarity.

Pityphyllum is diagnosable within Maxillariinae by the combination of a brown, scarious, closed sheath covering each pseudobulb and largely fused to it (tunica), leaf sheath ligules (see below), elongate pendent rhizomes, reduced or absent side lobes of the lip and the absence of a column foot. *Pityphyllum huancabambae* and *P. saragurensis* display a morphological grade into the other species in the genus. Both of them have only one to two apical leaves per pseudobulb, but so does *P. hirtzii*. The flowers of *P. huancabambae* are larger and more colorful than in the other species, but they are otherwise similar in structure. Most *Pityphyllum* species possess ligules; aside from those of *P. saragurensis*, there are smaller ligules in *P. cf. pinoides* (Fig. 2) and *P. pinoides* (Fig. 6); in *P. huancabambae* they are present on the tunica but not on the rhizome sheaths. The type specimen of *P. pinoides* (photograph in Sweet, 1972) includes a drawing of a leaf showing distinct ligules. *Pityphyllum antioquiense* apparently lacks ligules. We have not been able to study material of *P. hirtzii* and *P. amesianum*.

Based on our own limited examination of herbarium specimens and live plants, we are not able to corroborate the species limits as defined by Sweet (1972); however, until a thorough revision is completed, we modify his key to species to include these three additional taxa.

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