848. PLATYSTELE MISERA
Orchidaceae

Steven Dodsworth

Summary. *Platystele misera* (Lindl.) Garay is illustrated as the first of two species of *Platystele* Schltr., a genus of tiny Pleurothallid orchids from South and Central America. The ecology and distribution of *Platystele* are discussed, accompanied by brief notes on the cultivation of this species.

Several aspects of orchid biology set them apart from other angiosperms, and these features have inevitably impacted the evolutionary history of the Orchidaceae, culminating in the extremely diverse family that we see today. Important characteristics include the production of huge numbers of minute dust-like seeds, consequent (complete) dependence on mycorrhizal fungi for germination and early growth (Suárez *et al.*, 2016), and a tendency for epiphytism. Although orchids are widespread globally, without doubt the most species occur as epiphytes in forests of the wet tropics (Gentry & Dodson, 1987). Indeed, such habitats are precisely where the genus *Platystele* Schltr. occurs in the Neotropics. In these regions features of the physical environment play a key role: tectonic and orogenic activity in the Andes has been creating new habitats for the past several thousand years, the colliding of oceanic currents – the cold Humboldt and warm California currents – off the coast of western Ecuador produces great climatic variability for an equatorial region, combining high rainfall and humidity, adequate sunlight year-round, and north and south facing slopes with quite variable conditions.

All these correlate well with a large number of orchid species (Dodson, 2003a). Climatic variability and the availability of distinct microhabitats plays a significant role in the diversification of plants generally, not just for orchids. In the northern Andes there are other families of plants that have undergone similarly rapid evolution; Gesneriaceae, Araceae (aroids), Cyclanthaceae, and Piperaceae amongst several others. On the other hand, Orchidaceae is the only family out of these that has very high pollinator specificity and this is likely to be a key

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Plate 848 *Platystele misera* LUCY SMITH

factor that has accelerated the rate of their speciation (Dodson, 1991).

Even for orchids, the Pleurothallidinae, to which *Platystele* belongs, are extremely diverse and make up one of the largest subtribes. Pleurothallids are almost entirely epiphytic and this important characteristic may offer a reason as to why they are particularly diverse (Vásquez & Ibisch, 2000). When combined with very efficient dispersal, epiphytism can provide huge ecological flexibility, leading to a widely distributed population with a continuous gene pool. A result of this efficiency is therefore fairly low diversity and this is found in epiphytic groups such as Bromeliaceae and Araceae, with terrestrial species being more prone to speciation.

As we know, the opposite is true of orchids. Even though epiphytic, they are not very efficient in contrast to other epiphytes, generally not exhibiting pollination by vertebrate animals (e.g. birds and bats) that can travel vast distances. They also lack true water-absorbing leaves like those found in the Tillandsioids (the Bromeliads commonly known as 'air plants'), which may further restrict them to more humid zones. The intermediate efficiency of the epiphytic habit disperses them just enough.

Pleurothallids are generally pollinated by tiny flies; the distances which these can travel are obviously small and their seeds are dispersed an intermediate distance by the wind. This combination almost certainly promotes speciation by allowing establishment in a new microhabitat (with its own microclimate) but discouraging the creation of large contiguous populations. The need for a specific fungus where a seed lands is also crucial, as they are entirely dependent on symbiosis with fungi for germination and early growth which is likely to restrict certain species to certain areas. These classic features of orchid biology all result in a one-way ticket to restricted gene flow, with resulting potential for rapid reproductive isolation.

Platystele Schltr. is a small genus consisting of 95 species of exclusively Neotropical orchids inhabiting several countries of South America, (WCSP, 2016). Its distribution extends from Mexico in the north to Bolivia and Brazil in the south. Ecuador is, by far, the country richest in *Platystele* with at least 51 species

(Dodson, 2003b) and of these 33 are endemic (Jørgensen & León-Yánez, 1999). A similarly high number of species are found in Colombia – 34 (Viveros, 2007), but only six have been found in Peru, probably because it has not yet been extensively explored for smaller Pleurothallids (Brako & Zarucchi, 1993). The genus is also uncommon in Brazil.

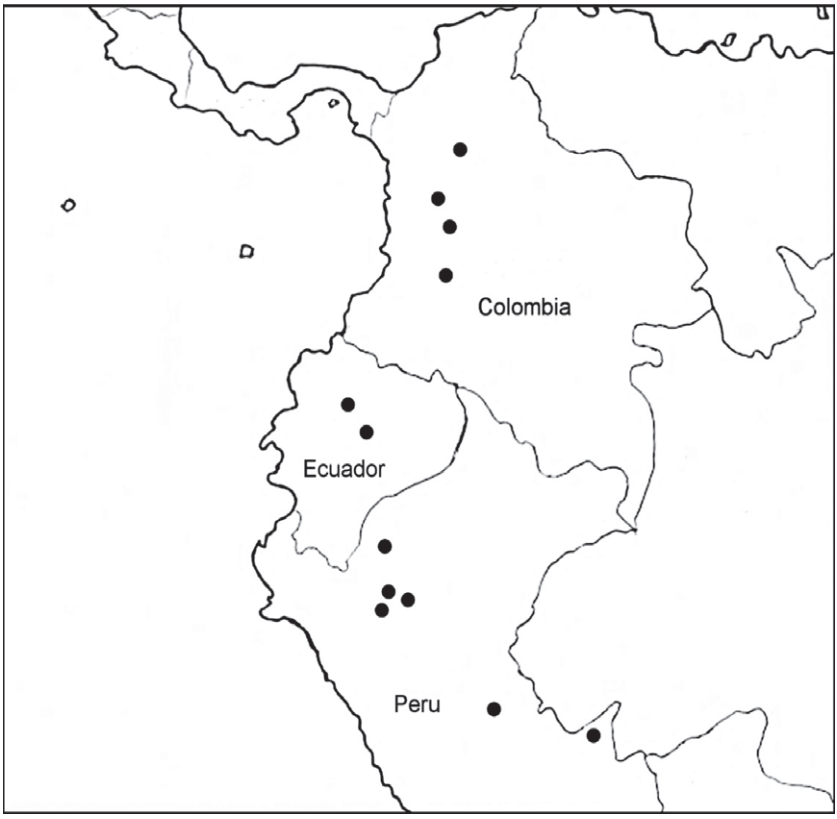
Along with numerous Pleurothallid orchids, *Platystele* plants are virtually microscopic in size, but with thickly coriaceous leaves somewhat resembling *Masdevallia*. Their pollination is virtually unknown, but they are likely to be pollinated by tiny flies (Dodson, 2003b); a combination of deceptive pollination via the release of aggregation pheromones plus nectar-secreting sepals has been documented recently in the related Pleurothallid genus *Specklinia* Lindl., which attracts species of *Drosophila* (Karremans *et al.*, 2015).

Platystele misera is found throughout Peru and the Andes of Colombia and Ecuador (Map 1.). Herbarium specimens of *P. misera* have been collected from 1850 to 2535 m. It is related to *P. consobrina* Luer, with which it has been confused many times, but the latter is easily distinguished by thinner, narrower, acute leaves and much longer racemes up to even a metre in length.

The genus also includes *P. jungermannioides* (Schltr.) Garay, widely reported to be the smallest known orchid species (the other likely contender being *Bulbophyllum minutissimum* (F. Muell.) F. Muell.). These small epiphytes are most commonly found in wet cloud forest, but inhabit areas with wide differences in humidity and at elevations from 500 to 3000 m.

Luer (1990) thought that the Peruvian *Platystele misera*, the Ecuadorian *P. gyroglossa* Luer and the Colombian *P. consobrina* Luer were very closely related, yet with distinct geographic distributions, but recent collections have shown that their distributions are likely to overlap.

In naming this *Platystele misera*, Lindley must have thought only about the size of the flowers compared to other *Pleurothallis* rather than alluding to their miserable appearance in a literal sense. The specific epithet *misera* comes from the Latin *miser*,



Map 1. Distribution of *Platystele misera* in South America based on herbarium specimen data.

in this case translating as miserable or unfortunate, as the flowers of this species (and indeed all *Platystele*) are very small when compared to larger-flowered species of *Pleurothallis* R.Br. In his original description of this species John Lindley writes 'flowers among the smallest in the genus [*Pleurothallis*]' (Lindley, 1859). Despite their small stature, they are far from unfortunate. The flowers of *P. misera* are graced with elegantly shaped petals and sepals and an exquisite deep rose labellum, making this tiny species of orchid very charming indeed (Fig. 1).

Cultivation. *Platystele misera* is very easy to grow and bloom in a cool greenhouse with a minimum winter temperature of about 12°C. The species is able to tolerate quite fluctuating conditions,

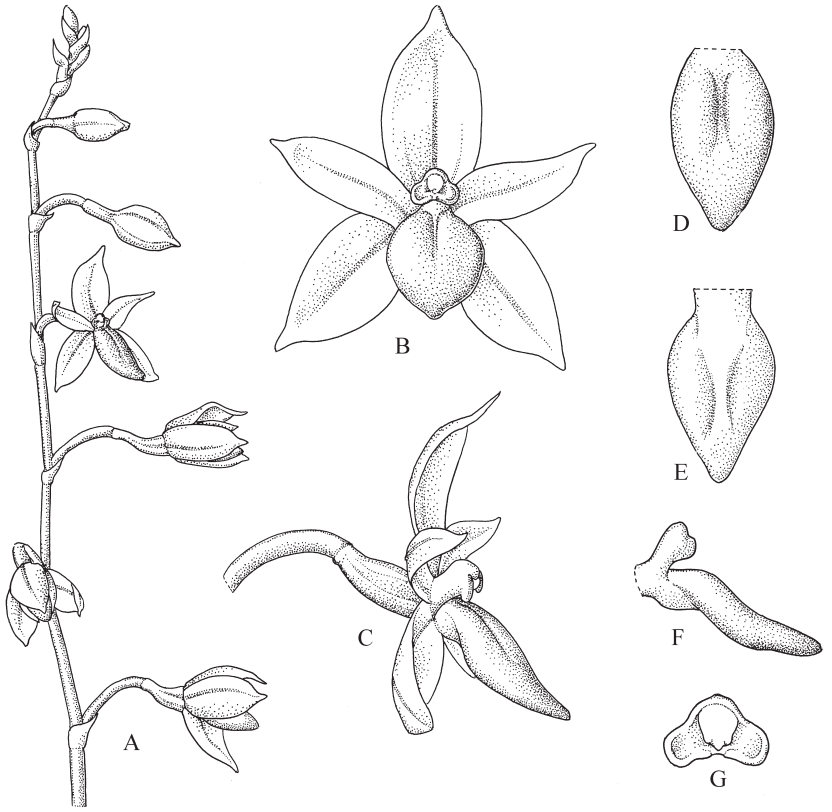


Fig. 1. **Platystele misera**. A, part inflorescence, ×4; B, flower, front view, ×10; C, flower, side view, ×10; D, labellum, inner face, ×10; E, labellum, lower face, ×10; F, column and labellum, ×10; G, pollinium, ×18. Drawn by Lucy Smith from specimens cultivated in the Tropical Nursery, RBG. Kew.

the coriaceous leaves being an advantage in this respect. It can be grown equally well in pots or on mounts in cool to intermediate conditions with medium shade.

With adequate water and diffuse light, the plant will flower throughout the year, on lengthening inflorescences that extend to about three times the length of the leaves. Grown with sphagnum moss at a humidity of 70–85% seems to be ideal (author's experience). This species is commonly found in specialist orchid nurseries in the UK and Europe. Other species of *Platystele* are variable in their ease of cultivation, but all require fairly high humidity.

Platystele misera (Lindl.) Garay, Bot. Mus. Leafl. 21: 251 (1967).

Pleurothallis misera Lindl., Fol. Orchid. 9: 36 (1859). Type: Peru, Dept. of San Martín, Chachapoyas, on tree trunks, *Mathews 3197* (Holotype K!, Isotype G).

Humboldtia misera (Lindl.) Kuntze, Revis. Gen. Pl. 2: 668 (1891).

Description. *Plant* medium in size to large for the genus, epiphytic, caespitose; roots fleshy. Ramicauls erect, stout, 1.5–2.5 cm long, enclosed by 2–3 thin, tubular sheaths. *Leaf* erect, coriaceous, 5–8 cm long including a petiole 1.5–2 cm long, the blade elliptical-obovate, obtuse to rounded, 1–1.5 cm wide, cuneate below into the petiole. *Inflorescence* an erect, subdense, distichous, successively many-flowered raceme up to 25 cm long including the peduncle 6–8 cm long, several flowers produced simultaneously, emerging laterally from the ramicaul; floral bracts thin, 1.5 mm long; pedicels 2–3.5 mm long; ovary 1–1.5 mm long; *sepals* and petals translucent, lightly suffused with rose, the sepals ovate, subacute, glabrous, subcarinate, the dorsal sepal 2–2.25 mm long, 1–1.25 mm wide, the lateral sepals oblique, 2–2.25 mm long, 1 mm wide, free to the base; *petals* narrowly ovate, acute, glabrous, 2 mm long, 0.6 mm wide; *lip* rose-purple, thick, cellular-glandular, elliptical-ovate, 2 mm long, 1 mm wide, the apex narrowly rounded, the base subtruncate with a faint, shallow glenion, fixed to the column-foot; *column* cucullate, 0.5 mm long, 1 mm broad, the stigma bilobed, the foot rudimentary.

Distribution. Peru: from the Dept. of Amazonas and San Martín. Colombia: from the provinces of Antioquia and Cauca, and less commonly in Ecuador.

Habitat. Montane cloud forest, typically from 1500 to 2500 m.

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