

Pleurothallis colossus





Pollination by Anthomyiid Flies at El Refugio Nature Reservation

TEXT AND PHOTOGRAPHS BY EDUARDO CALDERÓN-SÁENZ

[1] *Pleurothallis colossus* in cultivation at El Refugio Nature Reservation. Grower: Eduardo Calderón-Sáenz.



[2] Group of blooming racemes arising from a single leaf in *Pths. colossus*.

[3] Close-up of three flowers of *Pths. colossus*. Note the club-shaped petals and a drop of liquid nectar produced by the lip (flower in the middle, arrow).

[4] An anthomyiid fly licking the nectar on the surface of a club-shaped petal.



PLEUROTHALLIS COLOSSUS,¹ WHICH is distributed from Costa Rica to Ecuador, is perhaps the largest pleurothallid. Although individual flowers of *Pths. colossus* are perhaps not the largest for the genus, the size of the leaves and the racemicauls — up to 10½ inches broad and 16½ inches long (26 × 41 cm) and up to 46 inches (115 cm), respectively, hold the record for the genus. (The measurements were made on a full-grown plant at El Refugio Nature Reservation.)

At the El Refugio Nature Reservation, near Cali, Colombia, plants of this species are grown terrestrially on an embankment, in a slightly shady spot under nearly natural conditions. The species is also found naturally in the cloud forests of El Refugio and surroundings, both as epiphytes and terrestrials.

El Refugio, located 14 miles (23 km) west of Cali, corresponds, or is close to, the type locality of *Pths. colossus*, which was vaguely defined by Kerchove (1894) as “Colombia: Cauca: West Andes above Cali” (nowadays belonging to the state of “Valle del Cauca”). The plant–insect interaction details described here correspond to a plant growing under almost natural conditions and close to a natural population of the species and, consequently, such pollination modus is likely to be occurring in the natural population of the species.

Several insects, especially Diptera and Hymenoptera, are attracted by the fragrant flowers of *Pths. colossus*, which emit a pronounced, sweet, semenlike scent. These insects are attracted not only by the fragrance, but also by a liquid, possibly nectar,² produced at the club-shaped petals and other flower parts (lip and column). The freshly opened flowers are usually visited by flies of the family Anthomyiidae; these flies are frequently seen licking the droplets that are on the surface of the petals, and they are the only insects that are able to remove the pollinaria of *Pths. colossus*.

A typical anthomyiid fly visit begins with the insect hovering back and forth between flowers and licking the petals. Sometimes, the flies use the scapus (or inflorescence axis) as well as the pedicels and the bracts as a perch for short intervals. Eventually, the flies try to lick the lip surface, attracted by the nectar and scent. But in order to be able to lick the lip surface, the fly has to be hanging from the column-lip complex, with the body upside down, right in the middle of the synsepaline cavity. This is the only way to approach the adaxial surface of a lip that is bent downward so strongly, to the extent of its adaxial surface is partly facing the synsepal surface. The fly

¹Also known under the synonym *Pleurothallis hirtzii*.

²Judging by its sweet taste.

then pokes his head deep into the synsepaline cavity, and eventually the ventral part of the neck or the thorax makes contact with, and adheres to the viscidium of the pollinarium, and the latter becomes attached to the thorax and is removed by the fly.

Flies with attached pollinaria have no impediment to try a second or a third visit, no matter how many pollinia are attached on the ventral part of the neck and thorax. Such visits can end up with additional pollinaria attached, close to the previously attached pollinaria. Some flies have been seen with a tuft of up to four or five pollinaria on their thorax, confirming multiple visits to flowers.

In spite of intensive removal of pollinaria, only a few capsules develop, typically one or a few per raceme, suggesting low pollination rates. More observations are needed to ascertain the causes of such low pollination rates, in spite of the frequent visits of a fly capable of pollinarium removal for this species.

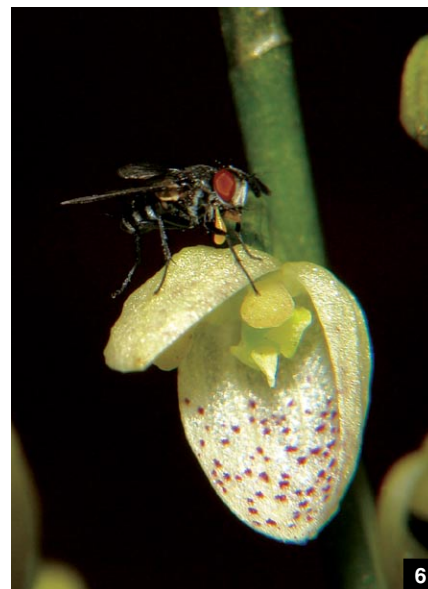
There are some interesting traits in this type of pollination. First, the position of the attached pollinaria, which invariably hang down from the neck or chest of the fly, and second, the upside-down position assumed by the flies during pollinarium removal. By comparison, other insect pollinators of orchids usually carry the pollinaria either attached to their backs or heads (bees) or to the proboscis (butterflies), and the insect approach is usually not upside down.

On the other hand, this is a case of a rewarded pollination for the flies, taking into account the abundant supply of nectar, which is obviously sought after and taken by the flies. This is also a special situation, as most orchids are deceit flowers (Pridgeon et al. 2001).

References

- Kerchove de Denterghem, O.C.E.M.G. de. 1894. *Le Livre des Orchidées*. Gand, Hoste.
- Pridgeon, A.M., M. Solano and M.W. Chase. 2001. Phylogenetic Relationships in Pleurothallidinae (Orchidaceae): Combined Evidence from Nuclear and Plastid DNA Sequences. *American Journal of Botany* 88:2286–2308.

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[5] An anthomyiid fly getting in position to lick the nectar produced by the adaxial surface of the lip. The fluid is produced also by the club-shaped petals and the column surface (arrows). The sternum (chest) of the fly is making contact with the pollinarium.

[6] An anthomyiid fly with the pollinarium attached to its sternum.

[7] An anthomyiid fly with many pollinaria of *Pths. colossus* on a nearby plant (not an orchid).

[8] An adult plant of *Pths. colossus* in fruit. The capsules are small, and can be seen near the middle of the photograph toward the left and upper side. The matchbox, for scale, is $1\frac{3}{8} \times 1\frac{1}{4}$ inches (3.3×4.4 cm).

