

ANOTHER NEW SPECIES OF *RAFFLESIA* (*RAFFLESiaceae*) FROM LUZON, PHILIPPINES: R. LEONARDI

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SUMMARY

A new species of Philippine *Rafflesia* is described. *Rafflesia leonardi* is the eighth species of *Rafflesia* described from the Philippines and the fourth species from Luzon Island. It most closely resembles *R. lobata* and *R. manillana* in perigone colour and wart ornamentations and in the wide aperture relative to diaphragm diameter. It is, however, different from both of these and other Philippine *Rafflesia* species in its flower size and disk that lacks or has rudimentary processes.

Key words: Rafflesiaceae, *Rafflesia*, Philippines, Cagayan, conservation, taxonomy.

INTRODUCTION

The discovery of *Rafflesia speciosa* (Barcelona & Fernando 2002) from the island of Panay in the Philippines marked the start of a renewed interest in the study of Philippine *Rafflesia* and resulted in the description of four additional species new to science: *R. mira* (Fernando & Ong 2005) (syn. *R. magnifica* Madulid et al. 2006) from Mt Candalaga, Compostela Valley in Mindanao, *R. baletei* (Barcelona et al. 2006) from Mt Isarog and Mt Asog in Camarines Sur in Luzon, *R. lobata* (Galang & Madulid 2006) from Antique and Iloilo in Panay, and *R. banahawensis* (Barcelona et al. 2007; Madulid et al. 2007) from Mt Banahaw, Quezon in Luzon. Together with the previously described *R. manillana* (Teschemacher 1844) and *R. schadenbergiana* (Hieronymous 1885), this brought the total number of Philippine *Rafflesia* species to seven. The end of this period of growing knowledge on the biodiversity of *Rafflesia* in the Philippines is, however, not in sight as evidenced by the discovery of yet another new species of *Rafflesia* during fieldwork by the Cagayan Valley Partners in People Development (CAVAPPED) and the local community in north-eastern Luzon in 2005. This is the eighth *Rafflesia* species to be described in the Philippines and the fourth known from Luzon.

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***Rafflesia leonardii* Barcelona & Pelser, spec. nov. — Fig. 1; Plate 1**

Habitu *Rafflesiae manillanae* et *R. lobatae* similis in hospitis radicibus stirpibusque crescens, perigonii colore, verrucarum morphologia, diaphragmae ore lato, ab ambabus flore maiore, perigonii tubo sine maculis albis, disco fere plano sine vel paucis processis brevibus quodam modo illo *R. rochussenii* simili differt. — Typus: *Barcelona et al.* 3355 (holo, male open flower, PNH; iso, male bud, US; male semi-open flower, L), Philippines, Luzon, Cagayan Province, Gattaran Municipality, Barangay Bolos Point, Sitio Kanapawan.

Mature buds to 16 cm diameter. *Basal cupule* c. 3.5 cm high, c. 7.5 cm wide. *Bracts* (or *bud scales*) in three imbricate whorls, outermost smallest, c. 3 by 4 cm, largest innermost ones to 12 by 8 cm. *Flowers* (25.5–)28–34 cm diam. when fully expanded, 13.8–18 cm high, male and female flowers similar in size and shape. *Perigone tube* 9–11 cm long. *Perigone lobes* 5 (or 6), orbicular to broadly orbicular, 7.5–13 by 11–13.5 cm, base slightly auriculate, reddish orange, becoming darker with age, margins entire to irregularly sinuate, tan to pale yellow, warts prominent on the upper surface, mostly elliptic or roundish, larger warts interspersed with tiny ones, powdery white when fresh, becoming concolorous with background with age. *Diaphragm* 14–18(–22) cm diam., 2.5–3 cm wide from aperture rim to base of perigone lobe, 3–10 mm thick at base, becoming thinner towards the aperture, background concolorous with perigone, outer surface with shallow indentations from the perigone warts when the flower was in bud stage, marked with roundish tan coloured warts, some of which are elevated on mamilla, surrounded by tiny tan coloured speckles, windows absent; *aperture* 10.5–12.5(–19) cm diam., rim maroon in colour. *Disk* 7–8 cm diam., c. 1.2–1.3 cm thick midway between the margin and the point where the disk joins the column, nearly flat to slightly dome-shaped with a slightly raised margin, tan centrally, purplish maroon towards the periphery, devoid of or with few, rudimentary processes, margin irregularly and shallowly incised or crenulate, corona smooth, sparsely and minutely pubescent, cream-colored in bud; *processes* when present, up to 10, often tuberculate, sometimes pointed, up to 5 mm long, very seldom longer, dark maroon; *column* 3–5 cm from the base of cupule to the upper surface of disk; *neck of column* c. 3 mm long, c. 4.5 mm wide; *annulus* c. 1 cm wide, c. 9 cm diam., smooth, glabrous, whitish in the inner part, darker in the outer part. *Ramenta* dimorphic, to 2 mm long, those toward the base of perigone tube filiform, dense, those inside diaphragm stout, branched or cleaved apically, tips darker. *Male flower* without vestigial ovary; *anthers* 20 (or 21), semi-globular, c. 3 mm diam., deeply immersed in anther sulci that are 8–9 mm long and c. 5 mm wide. *Female flower* as big as the male, without vestigial anthers, ovary c. 1.2 cm tall, 6 cm wide, lunate.

Etymology — This beautiful *Rafflesia* species is named after Mr. Leonardo L. Co. With his enormous knowledge of the Philippine flora, Leonard (to colleagues and friends) has been a mentor to the first author and many other students of Philippine botany. He spent most of his prolific botanical career in Luzon's Sierra Madre Mountain Range where *R. leonardi* is found.

Distribution — Philippines: Cagayan Province, Luzon, Gattaran and Lal-lo Municipalities.

Habitat & Ecology — Logged-over lowland dipterocarp forests at 270–300 m asl, thus far the lowest elevation for *Rafflesia* populations in the Philippines. *Rafflesia*

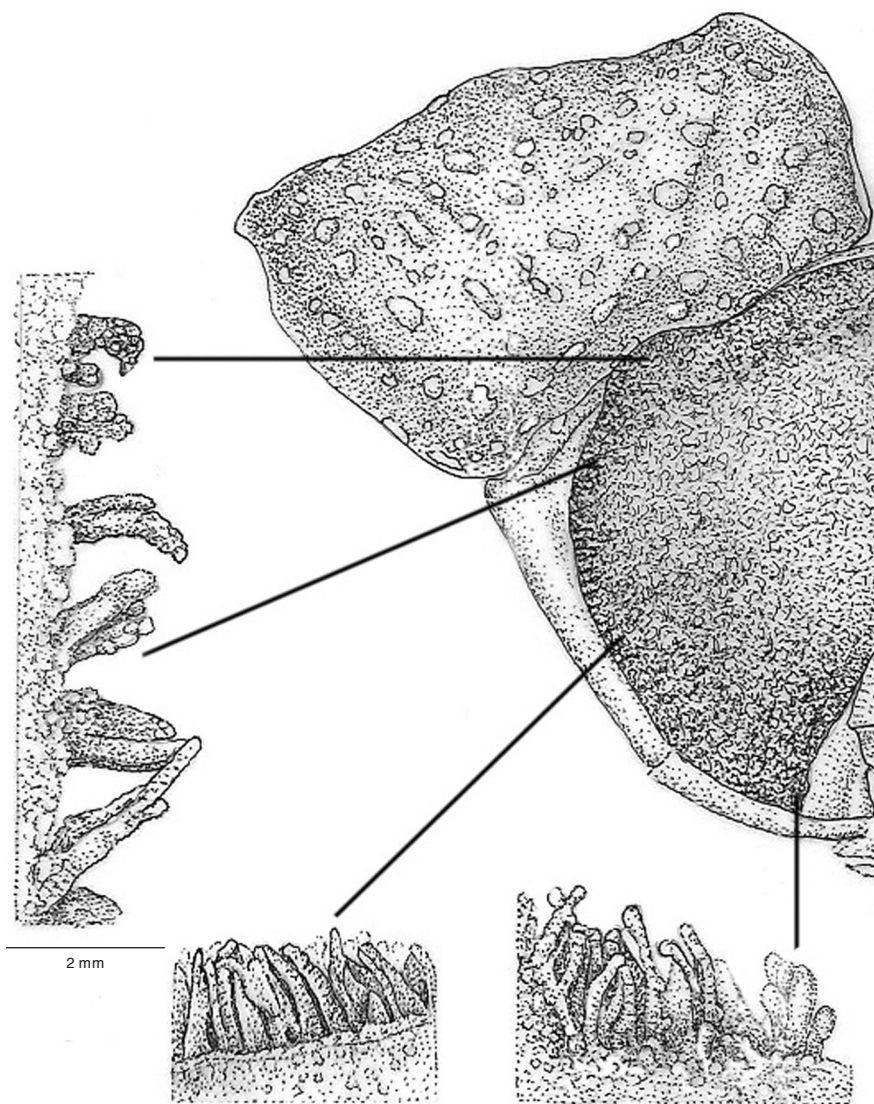


Fig. 1. *Rafflesia leonardi* Barcelona & Pelser. Magnified ramenta from different portions along the inside of the perigone tube and diaphragm (Barcelona et al. 3354).

leonardi usually grows along river and stream banks on thin soil and rocky substrate and among trees that have exposed roots and form buttresses. A total of six populations were found in the area. *Tetrastigma* cf. *loheri* (Barcelona et al. 3356, PNH, US) was identified as the host plant. On one host plant a total of ten buds and four developing fruits were observed, although usually fewer flowers per host plant seem to be produced. *Rafflesia leonardi* not only forms flowers on the exposed roots of its host, but also blooms along the aerial portions of the host liana (Plate 1a), some buds reaching

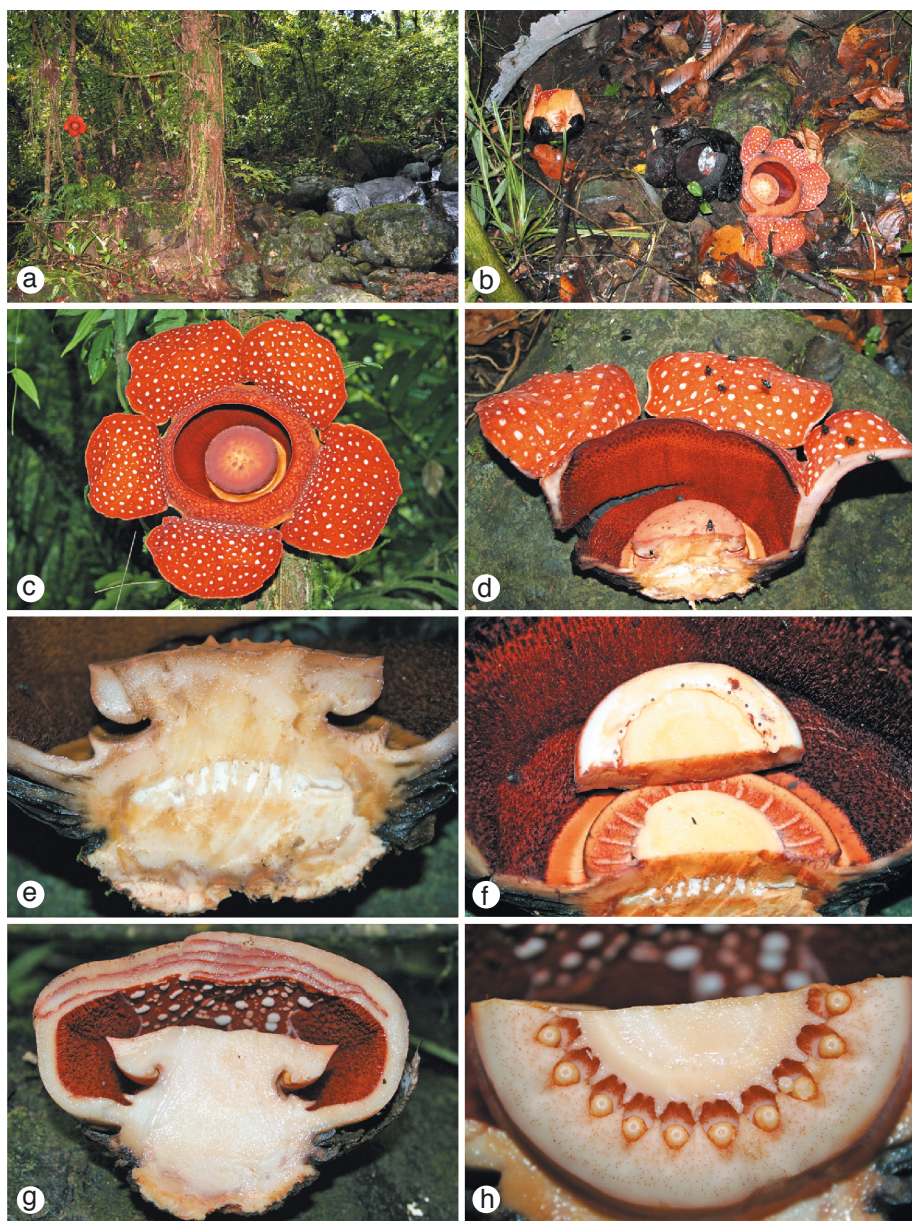


Plate 1. *Rafflesia leonardi* Barcelona & Pelsner. a. Aerial habit of an open flower on trunk of the host plant (*Tetrastigma* cf. *loheri*) growing along a streambank; b. flowers in different stages of development emerging from the roots of the host plant; c. male flower showing perigone lobes with auriculate bases and sinuate margins; d–f. longitudinal section of a female flower, showing: e. ovary and f. stigmatic surface (disk cut off); g. longitudinal section of a male bud; h. minutely pubescent undersurface of the disk corona showing anthers deeply immersed in sulci (a, c: *Barcelona et al.* 3355 (holotype); d–f: *Barcelona et al.* 3354; b, g, h: *Barcelona et al.* 3355 (isotypes)). — Photos: J.F. Barcelona.

a height of c. 10 m above the ground. In the Philippines, three other species, *R. lobata*, *R. manillana*, and *R. speciosa* exhibit this aerial habit. *Rafflesia leonardi* is sympatric with *R. manillana*, known from Luzon, Samar, and Leyte. At one site for instance, a population of *R. leonardi* is located less than 10 m from a population of *R. manillana*. Populations of both *Rafflesia* species in the Cagayan area rely on *Tetrastigma* cf. *loheri* as a host. Other species of *Tetrastigma* appeared to be absent from the areas where *Rafflesia* populations have been found. *Tetrastigma loheri* was also reported as the host of *R. mira* of Compostela Valley in Mindanao. Common canopy trees in the area are *Dillenia philippinensis*, *Dipterocarpus validus*, *Pterospermum niveum*, *Shorea contorta*, *S. palosapis*, and *Terminalia foetidissima*. The understory layer is composed of *Astronia* spp., *Ficus* spp., *Leea congesta*, *Leptonychia banahaensis*, *Saurauia klemmei*, and *Syzygium curranii*. Rattans and *Freycinetia* spp. also abound. The herbaceous layer consists of the angiosperm genera *Begonia*, *Cyrtandra*, and *Donax cannaeformis*, and the fern genera *Asplenium*, *Microsorium*, *Pleocnemia*, and *Tectaria*.

Morphological affinities — *Rafflesia leonardi* is similar in habit to *R. lobata*, *R. manillana*, and *R. speciosa* in that it blooms from both the roots and aerial portions of the host. It is further similar to *R. lobata* and *R. manillana* in perigone colour (different hues of reddish orange) and the shape and density of the perigone warts, but mostly in the relatively wide diaphragm opening, which is much narrower in all other *Rafflesia* species. The diaphragm is reminiscent of *R. speciosa*. The colour and morphology of the rammenta are very similar to those of *R. banahawensis*, which are maroon, variably branched, and stouter and more densely clustered in the diaphragm than in the perigone tube. The white spots or windows inside the perigone tube and diaphragm, typical in both *R. lobata* and *R. manillana*, are absent in *R. leonardi*. *Rafflesia leonardi* differs from all other Philippine *Rafflesia* species in the overall size of the open flower which is intermediate between the small-sized *R. baletei*, *R. banahawensis*, *R. lobata*, and *R. manillana*, and the medium-sized *R. mira* and *R. speciosa*. It is also different in characters of the disk, which is nearly flat to slightly dome-shaped and devoid of or with few processes, somewhat resembling the disk of *R. rochussenii* from Indonesia.

Conservation — The presence of two species of *Rafflesia* in the Cagayan area, the only case of sympatry in *Rafflesia* ever recorded in the Philippines, supports previous studies emphasizing the uniquely high yet poorly understood biological diversity in this part of the Sierra Madre mountain range (Danielsen et al. 1994; Co et al. 2006). This discovery strengthens proposals for the establishment of a Protected Area system currently being initiated by CAVAPPED and partner Peoples' Organizations (POs), Non-governmental Organizations (NGOs) and Local Government Units (LGUs). The dipterocarp forests in this portion of northern Luzon, although logged-over, are still in good condition. Small-scale rattan gathering by the local community was observed. Timber poaching for premium hardwood, such as narra (*Pterocarpus indicus*), was also evident. Slash-and-burn (kaingin) seems to be the most significant threat to *Rafflesia* populations in Cagayan. Although currently there are only a few small kaingin patches in adjacent areas, we predict that its impact will increase as these patches become larger and more numerous with the growing population in the area.

Specimens studied:

PHILIPPINES. Luzon, Cagayan Valley Prov., Gattaran and Lal-lo Municipalities, Barangay Bolos Point, Sitio Kanapawan: Barcelona et al. 3355 (holo PNH; iso L, PUH, US); Barcelona et al. 3354 (PNH).

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