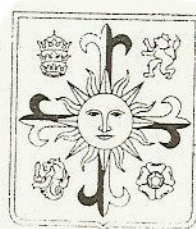


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# *Rafflesia magnifica* (Rafflesiaceae), A New Species from Mindanao, Philippines

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**Abstract.** *Rafflesia magnifica* Madulid, Tandang & Ago, a new species from Maragusan, Compostela Valley, Mindanao, Philippines, is described and illustrated. Its outstanding features include its big size, a diaphragm devoid of warts and lighter in color than the perigone lobes, very dense ramenta covering the entire inner side of the diaphragm and perigone tube, and numerous and variedly shaped processes on the disk arranged in four distinct zones.

**Keywords:** Rafflesiaceae, Philippines, Mindanao, Compostela Valley, threatened plant, endemic plant

## INTRODUCTION

*Rafflesia magnifica* is the fourth species to be described from the Philippines. It is the largest living flower in the country as the other species, *R. schadenbergiana*, with flower diameter of about 80 cm, could not be located anymore in its original habitat in Mt. Apo, Mindanao. The species is morphologically similar to *R. speciosa* but differs in having bigger flowers and the inner sides of the diaphragm and perigone tube densely covered by longer and filiform ramenta. The disk is also distinct in having four discrete zones of processes: outer zone composed of tiny, short and slender processes, the second zone composed of radially arranged flattened processes, the third zone composed of

flattened processes perpendicular to the outer ring, and a central cluster of short processes. Unlike *R. speciosa*, the diaphragm is paler in color and devoid of warts. Flowers reaching a diameter of about 80 cm have been reported by some local residents but this has to be confirmed.

It is known to be found only along the mountain ranges in the vicinity of Maragusan, Compostela Valley. This municipality was formerly known as San Mariano and created from Davao del Norte by Republic Act 8470 in 7 March 1998.

Based on the Corona's classification of Philippine climate, the region falls under Type IV where rainfall is more or less evenly

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distributed throughout the year [1]. The soil in Maragusan is comprised of limestone, clastics, and basaltic flows with some elements of serpentinite and the partly serpentinized ultramafic rocks [2].

The existence of *R. magnifica* was first made known to the public when it was shown in a television program hosted by Margie Moran in 2003. She featured the habitat and open flowers of this parasitic plant but its specific identity was not known then. In September and October, 2005, two trips were made by the authors to Maragusan, Compostela Valley. The trips were exploratory in nature and were aimed at finding the plant in the forests and investigate its biology and habitat. Apparently the species can also be found in other parts of the mountain range and efforts are now being made to document their occurrences in these places.

## RESULTS AND DISCUSSION

In the revision of Rafflesiaceae by Meijer [3] and the monograph of Nais [4], two species of *Rafflesia* are recorded for the Philippines. *R. manillana* Teschem. is the smallest of the *Rafflesias*, with flower diameter about 20 cm and found in Luzon, Samar, and Leyte Islands. It is easily distinguished by its very wide open diaphragm and exposed perigone tube. The second species, *R. schadenbergiana*, was first collected from Mt. Apo, Mindanao Island in 1882 but has not been recollected since. It is the largest flower for the Philippines with a diameter of about 80 cm and has white coalesced warts which cover more than the red-colored part of the perigone lobes.

In 2002, a third species, *Rafflesia speciosa*, was documented and described from the forests in Central Panay [5]. The species is endemic to the island but is widely distributed. It has small warts on the perigone lobes with sparsely distributed and short ramenta on the inner surface of the perigone tube and diaphragm. When open, the flower emits a putrid odor that can be detected several meters away.

*R. magnifica* is distinguishable from all the other species by the peculiar characteristic of the processes on the disk (see Table 1). There are four distinct forms of processes which are distributed in distinct zones. Very prominent is the second zone of processes which are large, flattened like blades, and arranged radially on the disk. Perpendicular to these radially distributed processes is another distinct zone of smaller, but similarly flattened processes, some coalesced and partly cleaved, and bordering the inner part of the disk.

The ramenta on the inner surface of the diaphragm and perigone tube is very dense and of varied lengths and tips. It is similar to *R. kerrii*, *R. arnoldii*, and *R. schadenbergiana* in being filiform. Unlike *R. speciosa*, a related species, the diaphragm of *R. magnifica* is light creamy orange and is paler in color than the perigone lobes. It has a thin, dark red margin when the flower is newly opened and turns creamy orange as the flower matures. Its diaphragm also has no warts or circular dots which characterize *R. speciosa*. Instead, it has oval shaped crater-like markings which are impressions of the warts on the perigone lobes from the bud stage.

Except for *R. magnifica*, the Philippine species of *Rafflesia* are all found within nationally declared protected areas. This raises the concern for the effective conservation of *R. magnifica* as it is presently exposed to anthropogenic threats. The municipal officials of Maragusan headed by its Mayor Arsenio Yanong Jr., fully supports the conservation of this species. A management and conservation plan is presently being developed for this species in consultation with the local residents, provincial and national government agencies. The plan includes formulation and implementation of legislation, education and information campaign, ecotourism and research.

Table 1. Comparison of *R. magnifica* with other Philippine *Rafflesia* species.

Characters	<i>R. manillana</i>	<i>R. schadenbergiana</i>	<i>R. speciosa</i>	<i>R. magnifica</i>
Size (diam in cm)	to 20	to 80	to 56	58-60
Perigone lobes (cm)	4-6 x 5-7	25-26	10-20 x 14-22.5	28-30 x 24-25
Warts	distinct	coalesced	distinct	distinct
Diaphragm (cm)	9-10	25-30	18-20	25-30
Diaphragm color	same as lobes	same as lobes	darker than lobes	paler than lobes
Circular dots on diaphragm	dense	not known	2 rows	none
Diaphragm opening (cm)	7	13-14	9.5-14.3	12-13
Ramenta length (mm), shape	0.5-1.0, multi-lobed	4-5	2, tuberculate	5-10, filiform
Processes	14-30	30-50	20-27, in 2-3 concentric rings	numerous, of various forms and sizes in 4 zones
Windows	present, 1cm below diaphragm	not known	none	none
Anthers	10-15	26-40	19-24	20-22

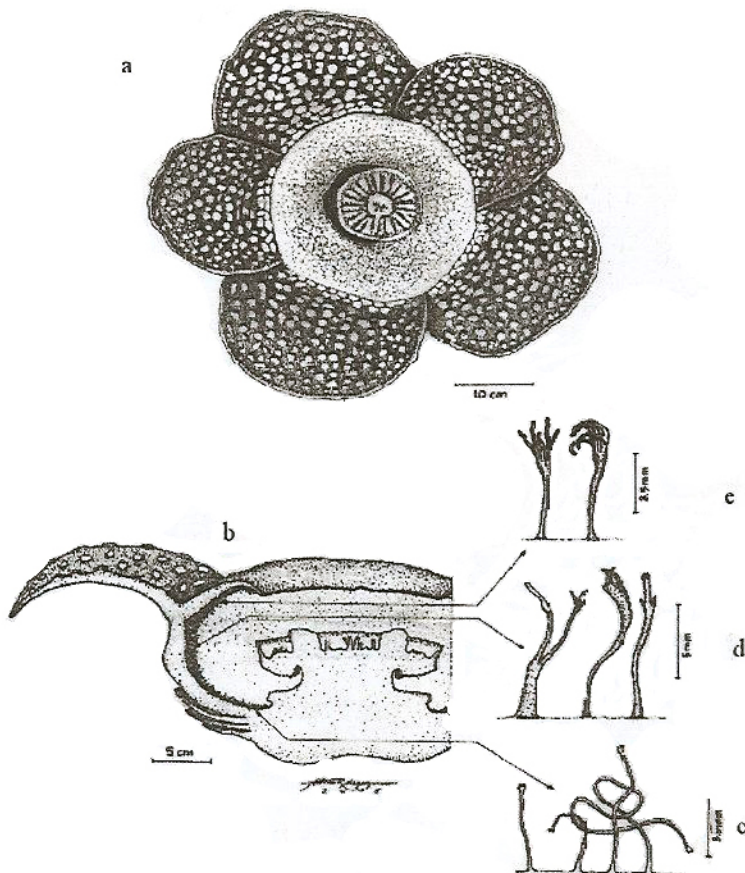
## TAXONOMIC TREATMENT

*Rafflesia magnifica* Madulid, Tandang & Ago *spec. nov.* Figures 1, 2 & 3

*Rafflesia speciosae similis, sed magnitudine floris major, diaphragma magis pallida lobis perigoniis verrucis destituta, amicta ramentis condensates super interiori diaphragma atque perigonetubis, cum processibus multis diversarum formarum magnitudinumque, in quattuor zonis diversis super orbe differt.* — *Typus:* Badilla 001 (PNH, Holo). Philippines, Mindanao, Compostela Valley, Maragusan, 16 October 2005.

*Mature bud* 20-25 cm diam. *Open flower* 58-60 cm diam, 15-20 cm high. *Scales* 15-18 by 12-13 cm. *Perigone lobes* 5, to 28-30 by 24-25 cm; light to dark orange color; *warts* white, large circular or oval shaped, 13-16 along the median part of the lobes. *Diaphragm* 6-7 cm broad, 25-30 cm diam; upper surface pale creamy orange, with shallow depressions; distinct red lining along the inner margin; windows absent on the undersurface;

opening to about 12-13 cm diam. *Perigone tube* 6-8 by 24-27 cm at widest part. *Ramenta* dense, covering the entire inner side of the diaphragm and perigone tube; lower part of perigone tube covered with filiform ramenta, 5-7 mm long, the apices slightly swollen; becoming more dense and longer at the middle part, 8-10 mm long, the column splitting to thin branches at the apices; becoming less dense and filiform, sometimes branched, towards the rim or opening of the diaphragm. *Annulus* prominent, 0.5 cm thick. *Column* 3-4 by 7-9.5 cm. *Disk* 13-14 cm diam, 1.5-2 cm thick, rim 1-2 cm high, raised to thin, wing-like appendage pointing outward, somewhat crenulate. *Processes* in 4 distinct zones; outermost c. 230-250, 0.5-1.2 cm high; in second zone 21-22, 1.5-2.2 by 1.3-3 cm, flattened, arranged radially in a ring, the upper margins lined with short bristles; in third zone 28-30, 1-1.2 by 0.2-0.8 cm, flattened and coalesced, some cleaved from top to mid-part, bordering central part of disk, the upper margins lined with short bristles; in central zone 10-13, 0.8-1.4 cm high,



**Figure 1.** *Rafflesia magnifica* Madulid, Tandang & Agoos. a. flower; b. longitudinal section of flower showing ramenta at inner side of diaphragm and perigone tube, disk and processes; c. ramenta on lower part of perigone tube, d. ramenta on mid-part of perigone tube, e. ramenta on undersurface of diaphragm (*Badilla 001*, *PNH 173371*).

columnar, the tip with short bristles. *Male flowers* with 20-22 anthers, each anther 1.7-2 mm. *Female flowers* not seen.

**Distribution** — Mt. Candalaga, New Albay, Maragusan, Compostela Valley, Mindanao. Endemic.

**Habitat & Ecology** — Lowland evergreen forest, at 880-900 m above sea level. Flowers in September to November. The newly opened flowers do not emit strong putrid odor unlike *R. speciosa*.

**Host plant:** *Tetrastigma tuberculatum* (Blume) Latiff, (Vitaceae), a woody liana (*Badilla 003* (PNH 173373))

**Etymology:** The specific epithet *magnifica* is derived from the Latin word *magnificus* which means magnificent, splendid, or elegant. This epithet is adopted to highlight the outstanding form and pattern of the processes on the disk which are remarkably different from all the other *Rafflesia* species.

**Conservation Status** — Critically Endangered (CR).

**Notes** — This species has a very limited distribution, and apparently is confined to the mountain range near New Albay, Maragusan. There are just a few buds, ca. 3-5, seen on the forest floor on the localities visited by the authors. The bloom lasts only

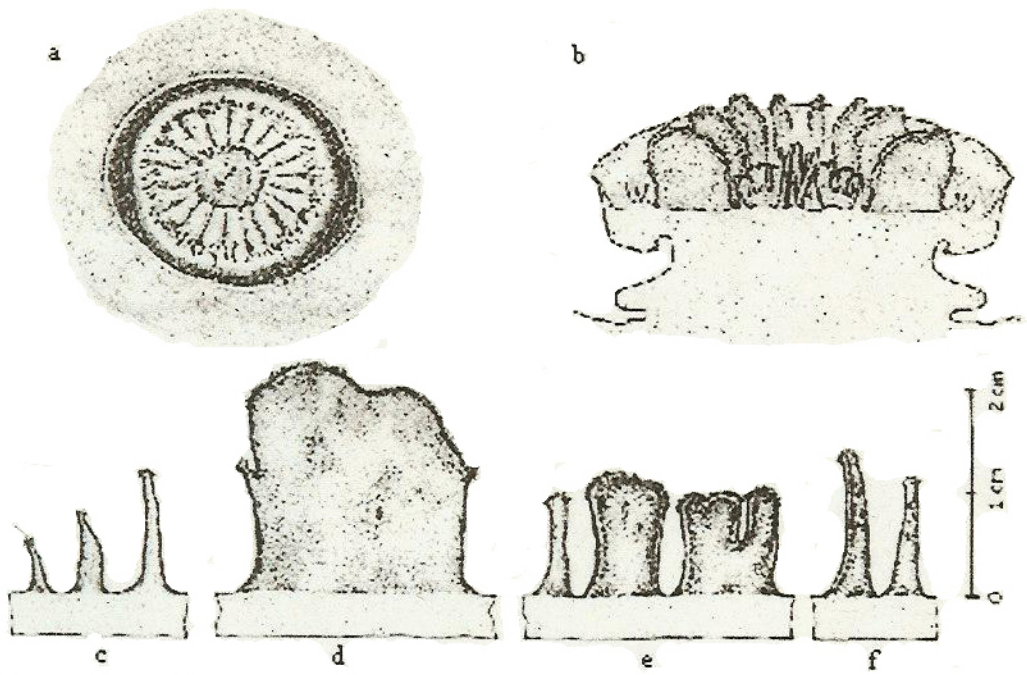
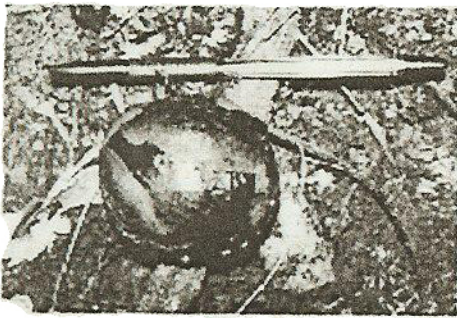
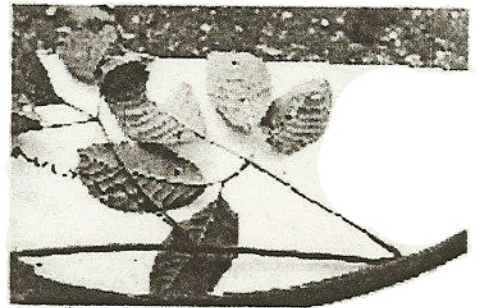


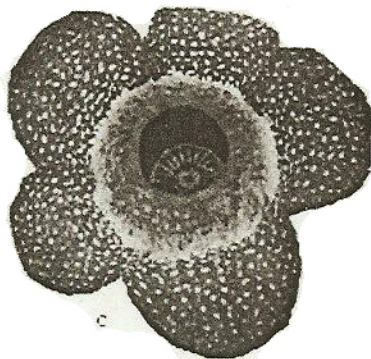
Figure 2. *R. magnifica*. a. top view of diaphragm opening showing disk with processes; b. longitudinal section of disk showing processes; c.-f. details of processes from outermost to innermost zone (*Badilla 001*, *PNH 173371*).



a



b



c

Figure 3. a. *R. magnifica* bud in its natural habitat (photo by D. A. Madulid); b. host plant: *Tetragium tuberculatum* (photo by D. A. Madulid; identification by A. Latiff Mohamad); c. habit of flower (photo by H. Hernandez, Jr.).

visited by the authors. The bloom lasts only 3 to 4 days after which they start to decompose. The species is threatened by habitat destruction particularly by *kaingin*, cutting of the host vines (*Tetrastigma tuberculatum*), and from feral animals such as wild boars, etc. Specimens examined – Philippines: Badilla 001 (PNH 173371), 002 (PNH 173372). Mt. Candalaga, 16 October 2005.

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our guide and resource person for the location of *Rafflesia* sites in the Maragusan forests. Forester Emmanuel Isip, Regional Technical Director, and Leonilo R. Rivera, Chief, PAWD, (DENR Reg. XI), Forester Ferdinand Bautista (MENRO), Maragusan and Mayor A. Yanong, Jr. facilitated the issuance of permits for the collection and transport of the specimen. We thank Abner de Guzman, Scientific Illustrator, Botany Division, National Museum for his illustration of the plant.

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