

Rediscovery of *Thottea philippinensis* (Aristolochiaceae) from Naga-Kabasalan Protected Landscape, Zamboanga Sibugay including the confirmation on the occurrence of *Thottea tomentosa* in the Philippines

Mark Arcebal Naive¹, Donnafe Ancheta², Jannah Yongco², and Bea Katrina Fulgencio²

¹University of the Chinese Academy of Sciences

²Mindanao State University - Iligan Institute of Technology

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Abstract

Collecting expeditions carried out in the Zamboanga Peninsula of western Mindanao led to the rediscovery of *Thottea philippinensis*, previously known only by a single collection made 93 years ago in the Philippines. Thus, in this paper, we provide descriptions, comments on the affinities among closely related species, an updated geographical distribution, habitat information, conservation assessment, and the first-ever published photos of living *T. philippinensis* in the wild. Additionally, we include notes on confirming the occurrence of *T. tomentosa* in the Philippine archipelago.

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Keywords: Aristolochioideae, biodiversity, Plant Taxonomy, Western Mindanao, Zamboanga Peninsula

Introduction

Family Aristolochiaceae also known as birthwort is represented by over 700 species belonging to 8 genera. They are primarily tropical plant family extending to temperate regions of the Northern Hemisphere that encompass a range of plant forms, including small to medium-sized vines and lianas, geophytes that emerge from thickened rootstocks or tubers, as well as shrubs or small trees (Neinhuis et al. 2005). In the Philippines, Aristolochiaceae is poorly known represented by two genera: *Aristolochia* L. with 11 species and *Thottea* Rottb. with a single species (*T. philippinensis* Quisumbing). We suspect that future fieldwork focusing on collecting Aristolochiaceae species will probably result in the discovery of more species, either endemic or as new records from neighboring countries.

Fresh materials of unknown *Thottea* species were collected in Pasonanca Natural Park, Zamboanga City in April 2023, and in Naga-Kabasalan Protected Landscape, Zamboanga Sibugay in June 2023 as part of the authors' ongoing exploratory and conservation work on flowering plants within the Zamboanga Peninsula. The specimen collected from Zamboanga City has been identified as *Thottea tomentosa* (Blume) Ding Hou, using the key provided by Mustaqim & Putra (2020). This species is distributed in Andaman Is., Assam, Bangladesh, Jawa, Laos, Malaya, Myanmar, Nicobar Is., Sulawesi, Sumatera, Thailand, and Vietnam. In

contrast, the specimen collected from Naga-Kabasalan Protected Landscape, Zamboanga Sibugay was found matching with the long lost and poorly known species *T. philippinensis* Quisumbing. Hence, this study prompted us to provide an extended description, updated geographical distribution, habitat and a provisional IUCN conservation assessment for *T. philippinensis* and confirm the occurrence of *T. tomentosa* in the Philippine archipelago. With the inclusion of *T. tomentosa*, the Philippines now holds a total of two *Thottea* species.

Materials and methods

The measurements and descriptions were based on freshly collected materials. Multiple photographs were taken using Canon EOS 800D and coloured plates were prepared and edited in Affinity Photo software. Flowers were preserved in 70% ethanol and were subjected to stereomicroscopy. The general plant descriptive terminology follows Beentje (2016). Herbarium citations follow Index Herbariorum (Thiers 2023). Relevant specimens and literature of *Thottea* species from the Philippines and neighbouring countries were examined in different herbaria through high-resolution images from Global Plants on JSTOR accessed at <https://plants.jstor.org/> or Global Biodiversity Information Facility (GBIF) accessed from <https://www.gbif.org>. An assessment of the conservation status was carried out following IUCN (2022), based on our current knowledge and using their terminology on categories, criteria and subcriteria.

Taxonomic treatment

Thottea philippinensis Quisumbing, *Philip. J. Sci.* **41: 322. 1930**; Ding Hou, *Blumea* 27: 306. 1981; *Blumea* 29: 242. 1983; *Fl. Males. Ser.* 1, 10: 75. 1984. (**Figs. 1, 2**)

Type: PHILIPPINES. Mindanao, Lanao Province, Santo Cogon, in dipterocarp forests, elev. 150 m, 22 April 1926, *T.N. Roque 30249* (holotype: UC378498-image seen!).

Description

Erect, subshrub, up to 70 cm tall. *Stem* arising from rhizome, simple, terete, sulcate, 7–8 mm in diameter, ascending, puberulous, olive green to green, non-leafy part quite straight, leafy part flexuous. *Leaves* up to 9 per stem, 15–25 cm long, subsessile; *petiole* short, 4–6 mm long, 3–4 mm in diameter, densely pubescent, swollen, green; *lamina* lanceolate to oblanceolate, 14.6–24.6 cm long by 4.3–8.5 cm wide, coriaceous, adaxially green, glabrous, abaxially pale green, glabrous except the veins, margin entire, inconspicuously revolute, base obtuse, apex short acuminate; *midveins* slightly prominent, glabrous adaxially, distinctly raised, densely puberulous abaxially; *lateral veins* 8–13 pairs. *Inflorescence* at the basal part of the stem, touching the ground, covered with dried leaves, 6–7 cm long, bearing 1–4 flowers; *peduncle* terete, 4–5 cm long, spiciform, pubescent, brownish cream to pale brown; *bracts* dimorphic, lanceolate to elliptic, 6.0–7.5 mm long by 4–5 mm wide, striate, yellowish brown, densely pubescent, margin entire, apex acute to bifid, lobules 3–4 mm long by 1.0–1.3 mm wide. *Pedicel and ovary* terete, bent, tapering, 15–18 mm long, 2–3 mm in diameter, densely pubescent, sulcate, brownish red. *Perianth* campanulate, 1.5–1.8 cm long, 1.8–2.1 cm in diameter, corrugated, burgundy, densely pubescent outside, pale burgundy, with white hairs inside; *tube* 1.8–1.9 cm long; *lobes* broadly triangular, 1.0–1.1 cm long by 1.3–1.5 cm wide, concave, apex acute, revolute. *Stamens* in 2 whorls, upper whorl 8–10, lower whorl 12–14; *filament* 1.0–1.5 mm long, glabrous; *anthers* oblong, 1.1–1.3 mm long. *Style* column 5–7 mm long, *lobes* 4–6, glabrous. *Capsule* fusiform, 2–3 cm long, pubescent; *seeds* not seen.

Phenology

Observed flowering and fruiting in the months of May–June. According to Quisumbing (1930) and Hou (1984), this species flowers and fruits in March, April and September.

Distribution and habitat

Philippines (Lanao Province) and Borneo (4th Div, Lambir Nat. Park). At present, the species was recently found in Barangay Tilubog, Municipality of Naga, Zamboanga Sibugay province extending its distribution range where it grows in deeply shaded broad leaved forest near the trail and rubber plantation at elevation

of between 200 to 300 m a.s.l. In the type locality, the species was found growing in the dipterocarp forest at 150 m a.s.l. (Quisumbing 1930). In Sarawak, the species was found growing in dipterocarp forest and on sheltered sandstone cliff at elevations between 150–459 m a.s.l. (Hou 1984).

Vernacular name

According to Quisumbing (1930), this species is locally known in Lanao as ‘*taguibunon*’.

Proposed conservation status

Following the IUCN Standards and Petitions Committee (2022), we propose this species be provisionally treated as ‘Endangered’ (CR D). So far, the species only been found in three localities and is quite rare. In Naga-Kabasalan Protected Landscape, this species was found usually growing along the trail and near human settlement with less than 50 mature individuals. It is likely that other populations exist in neighboring mountain ranges of the area, thus extensive survey should be done to ascertain the population density of this endemic species.

Specimen examined

PHILIPPINES. Western Mindanao, Zamboanga Sibugay, Naga, Naga-Kabasalan Protected Landscape, Barangay Tilubog, elev. 220, 7 June 2023, *MAK Naive 140* (HNUL).

Taxonomic notes

Thottea philippinensis was originally described by Eduardo Quisumbing in 1930 based on specimens collected by T.N. Roque from Lanao Province in the island of Mindanao. Although it has been recollected twice in Sarawak (Hou 1984), the species have never been rediscovered in the Philippines since it was first discovered. Through our extensive fieldwork in Zamboanga Peninsula, on the island of Mindanao, the species has recently been rediscovered after a lapse of 93 years.

According to Hou (1984), *Thottea philippinensis* closely resembles *T. celebica* of Sulawesi (previously known as Celebes). However, *T. philippinensis* differs significantly in having these following characters: puberulous stem (vs. pubescent in *T. celebica*); leaves lateral veins up to 13 (vs. leaves lateral veins up to 10 in *T. celebica*); broadly triangular with acute apex perianth lobes (vs. semi-orbicular with subrotund or slightly apiculate apex perianth lobes in *T. celebica*); and 4–6 style lobes (vs. *c.* 12 style lobes in *T. celebica*).

Thottea tomentosa (Blume) Ding Hou, *Blumea* 27(2): 328, f. 48, 49 (1981); Hou, *Fl. Males.*, ser. 1, 10: 79 (1984); Yao, *Fl. Pen. Malaysia* 5: 43 (2015). – *Ceramium tomentosum* Blume, *Bijdr. Fl. Ned. Ind.* 17: 1135 (1827). – *Bragantia tomentosa* (Blume) Blume, *Enum. Pl. Javae* 1: 82 (1827); Ridley, *J. Straits Branch Roy. Asiat. Soc.* 57: 89 (1910); Ridley, *J. Straits Branch Roy. Asiat. Soc.* 59: 161 (1911). – *Apama tomentosa* (Blume) Engl. ex Soler., *Naturl. Pflanzenfam.* 3(1): 272 (1889); Backer & Bakhuizen f., *Fl. Java* 1: 162 (1964). (**Fig. 3**)

Type: INDONESIA. Java, *Herb. Blume ‘1690’* (lectotype L [L0038821], designated by Hou (1981); isolecotype L [L0038822]).

Thottea tomentosa is one of the widest-ranging species of the genus distributed from India (Assam: Manipur & S. Andaman Is.), Bangladesh (Sylhet), Burma (Moulmein), South Vietnam (Bien Hoá), Peninsular Thailand. In Malesia, it is found in the Malay Peninsula (throughout), Sumatra, West & Central Java, and the Philippines (Jayabas, Alabat I., Panay, Mindanao), but it has not yet been found in Borneo. Although it was reported to occur in the Philippines, this has become doubtful due to the *T. tomentosa* found having eight stamens instead of six, as consistently mentioned in previous studies (Hou 1981, 1984, Yao 2015, Mustaqim et al. 2022). Therefore, it is treated as *incertae sedis* in Co’s Digital Flora of the Philippines (Pelser et al. 2011 onwards). During our recent extensive fieldwork conducted in Pasonanca Natural Park, Zamboanga City, we successfully collected a *Thottea* species that possesses six stamens, perfectly matching the characteristics of *T. tomentosa*. Consequently, in this paper, we definitively affirm its presence in the Philippine archipelago, currently restricted to Zamboanga City. However, other specimens identified as *T. tomentosa*

present in other parts of the archipelago warrant further investigation, as they may potentially represent a new species.

Distribution and habitat

Andaman Is., Assam, Bangladesh, Jawa, Laos, Malaya, Myanmar, Nicobar Is., the Philippines, Sulawesi, Sumatera, Thailand, and Vietnam. In the Philippines, the species was so far only been found in Pasonanca Natural Park, Zamboanga City, Western Mindanao where it grows in shaded broad leaf forest associated with bamboo and other plants species along the riverside at approximately 150–250 m a.s.l. and was assessed as locally rare. Based on Hou (1984) observations, the species can be found in the forest characterized by shade and moisture, and sometimes in bamboo or teak forest. Occasionally, they can be also found in secondary forest, rarely on limestone, locally sometimes common, from the lowland up to 1200 m (Hou 1984).

Proposed conservation status in the Philippines

At present, the species can only be found in a single locality in the Philippines with less than 50 mature individuals observed. Following the following the Red List Criteria of the IUCN Standards and Petitions Subcommittee (2022), we herein proposed this species to be treated as Critically Endangered (CR D) in the Philippines. Although the species is widespread, it is relatively rare in the Philippines and is threatened by various anthropogenic activities.

Specimen examined

PHILIPPINES. Western Mindanao, Zamboanga City, Pasonanca Natural Park, Dos Rio BMS, elev. 170 m, DATE, MAK *Naive 139* (HNUL).

Key to the *Thottea* species in the Philippines

1. Stem puberulous; leaves glabrous on both sides; stamens arranged in 2 whorls; style column 5–7 mm long, lobes 4–6. *T. philippinensis* Quisumb.
- Stem tomentose; leaves glabrous above, densely pubescent beneath; stamens arranged in 1 whorl; style column 2 mm long, lobes 3 (or 4). *T. tomentosa* (Blume) Ding Hou

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Figure legends:

Figure 1. *Thottea philippinensis* Quisumb. A. Habit B. Stem C. Leaves (upper: abaxial leaf, lower: adaxial leaf) D. Detail of petiole E. Profile view of the inflorescence F. Front view of the inflorescence. Scale bar: B and D = 5 mm, C and E = 5 cm. Photos and prepared by: MAK Naive.

Figure 2. Reproductive parts of *Thottea philippinensis* Quisumb. A. Inflorescence, inset: bract B. Detail of pedicel and ovary C. Detail of stamens and style (profile view) D. Detail of stamens and style (top view). Scale bar: A–B = 5 mm. Photos and prepared by: MAK Naive.

Figure 3. *Thottea tomentosa* (Bl.) Ding Hou A. Habit B. Detail of stem C. Inflorescence (flower profile view) D. Inflorescence (flower front view). Scale bar: B, C and D = 5 mm. Photos and prepared by: MAK Naive.





