



Phreatia tinukariensis (Orchidaceae: Thelasiinae), a new species from Sulawesi, Indonesia

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Key words

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Mekongga Mountain
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Phreatia
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Abstract A new species of *Phreatia* sect. *Caulescentes* from Sulawesi, Indonesia, *Phreatia tinukariensis* is described and illustrated. It closely resembles *P. navicularis*, described from Maluku (Seram, Indonesia), but differs in the shape of the labellum, in particular its basal part and the position of the circular thickenings on the labellum blade. A comparison between the two is presented in a table. A key to the Indonesian species of sect. *Caulescentes* is provided.

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INTRODUCTION

Phreatia Lindl. (Lindley 1830) is a large genus of about 221 species (POWO continuously updated) distributed from Sri Lanka and India to SE Asia, throughout Malesia to NE Australia and Tahiti. Most species occur in New Guinea, from where 139 species have been recorded (Ormerod 2017). *Phreatia* species are primarily epiphytes found in tropical and subtropical forests, bearing axillary inflorescences with many small flowers with 8 pollinia, leaves more than one per stem, if only one stem then swollen into pseudobulbs, inflorescences at least 10 cm long (Comber 1990, Ormerod 2005). Two basic growth forms are found in the genus, one group has creeping rhizomes and bears pseudobulbs, and another group has leafy stems of varying length. The flowers of *Phreatia* species are usually white (though shades of green and yellow are known) and quite small (sepals 1–3 mm long). The species within the genus are usually narrowly defined, often based on minute differences in their floral morphology.

Indonesia has 75 recorded species of *Phreatia*, most of these (43) are found in Papua Province (Ormerod 2017). A new taxon from Sulawesi was found in the herbarium material. Sulawesi has a rich variety of habitats suitable for species of *Phreatia*, but in spite of that only ten taxa have been reliably recorded from the island (Thomas & Schuiteman 2002, Ormerod 2005). The new taxon was collected from Mekongga Mountain National Park, near Tinukari Village. Since the plant possessed elongated

stems, it was recognised as a member of sect. *Caulescentes* J.J.Sm., a group of about 21 species distributed from the Philippines to Vanuatu, and most diverse in New Guinea, where 17 species are found.

A comparison of the Sulawesi collection with other species in sect. *Caulescentes* revealed that it was most similar to *P. navicularis* J.J.Sm. from Buru in the nearby province of Maluku, but differed in details of the flowers. Thus, this paper proposes a new species from Sulawesi complete with high resolution photographs and a line drawing supporting the description and diagnostic characters. Its conservation status is also discussed.

MATERIALS AND METHODS

Herbarium specimens and spirit-preserved material deposited in BO of *Phreatia* from throughout Sulawesi were examined. Morphological studies of members of sect. *Caulescentes* were conducted using an Olympus stereomicroscope Z61 connected to an LC micro photo imager at the Biosystematic Laboratory at Herbarium Bogoriense. Used were herbarium specimens (listed in the additional specimens examined below) and the online repositories of BM (type of *Phreatia montana* Ridl. on JSTOR: https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000532930?searchUri=filter%3Dname%26so%3Dps_group_by_genus_species%2Basc%26Query%3Dphreatia%2Bmontana), K (<https://data.kew.org>), and L (<https://www.naturalis.nl/en/science/bioportal>) and protologues (Smith 1910, 1911, 1928a, b, Van Royen 1979, Ormerod 2005).

The values of the Extent of Occurrence (EOO) and Area of Occupancy (AOO) were calculated using Geocat (<https://sis.iucn.org/apps/org.iucn.sis.server/SIS/index.html>). The conservation status was proposed based on guidelines by the IUCN Red List Categories and Criteria version 15.1 (IUCN 2022).

The identification key for the Indonesian species of *Phreatia* sect. *Caulescentes* is based on protologues, and the already

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mentioned references and herbarium specimens available at Herbarium Bogoriense and online sources. There are nine species of *Phreatia* from sect. *Caulescentes* in Indonesia including the novelty. They are *P. millikenii* Ormerod (Ormerod 2005), *P. montana* Ridl. (Ridley 1916), *P. navicularis* J.J.Sm. (Smith 1928b), *P. procera* Ridl. (Ridley 1916), *P. rupestris* J.J.Sm. (Smith 1911), *P. schoenorchis* J.J.Sm. (Smith 1928a), *P. semiorbicularis* J.J.Sm. (Smith 1910), *P. subalpina* P.Royen (Van Royen 1979), and *P. tinukariensis* sp. nov. (see below).

TAXONOMIC TREATMENT

Phreatia tinukariensis Juswara & Wibowo, sp. nov. — Fig. 1, 2, 3

Most similar to *Phreatia navicularis* J.J.Sm. but differs in the flowers having the labellum with obtuse, weakly retrorse basal lobules (vs basal lobules subacute, patently to obliquely truncate), and two circular glands on the base of the junction of the labellum blade with the claw (vs on the claw). A detailed comparison is presented in Table 1. — Type: *Suyadi, Hamzah & Widjaja* 9337 (holo BO), Indonesia, Southeast Sulawesi Prov., North Kolaka District, Rante Angin Subdistrict, Tinukari village, Mekongga Mountain, to the top of the mountain, subalpine zone 2658 m, 26 Nov. 2010.

Etymology. The species epithet is based on the village of Tinukari, which is the nearest inhabited settlement to the type locality.

Epiphytic herb. *Roots* filiform, glabrous. *Stem* erect, terete, basal 2/3–4/5th covered by remnant leaf sheaths, upper 1/3–1/5th subdensely foliose, 60–180 mm long, c. 2 mm diam. *Leaves* closely spaced, distichous, linear-ligulate, to 35 by 3 mm, apex unequally obtusely bilobed, glabrous. *Leaf sheaths* tubular, 14–17 mm long, persistent. *Inflorescence* axillary, 50–75 mm long; peduncle bearing 3 sheaths, up to 27 mm long; rachis c. 48 mm long, carrying up to 13 flowers, distance between flowers 2–4 mm. *Floral bracts* lanceolate, shorter than the flower, 2–4 by 1.1–1.3 mm. *Flowers* non-resupinate, c. 2 mm diam, glabrous, white. *Pedicel* with ovary clavate, glabrous, c. 3.1 mm long. *Dorsal sepal* obliquely ovate, c. 1.5 by 1.1 mm, apex obtuse, 1-veined. *Lateral sepals* ovate-elliptic, c. 2 by 1.5 mm, apex obtuse, 1-veined. *Petals* obliquely ovate-elliptic, c. 1.9 by 1.2–1.3 mm, apices obtuse, recurved, 1-veined; mentum absent. *Labellum* subhastate-ovate, c. 1.9 by 1.7 mm, clawed, claw c. 0.5 by 0.5 mm, blade c. 1.4 by 1.7 mm, basal lobules weakly retrorse, apex obtuse, 3-veined, base of the blade with two circular low thickenings of 0.2–0.3 mm diam. *Column* short, stout, up to 0.8 mm long; foot very short, free

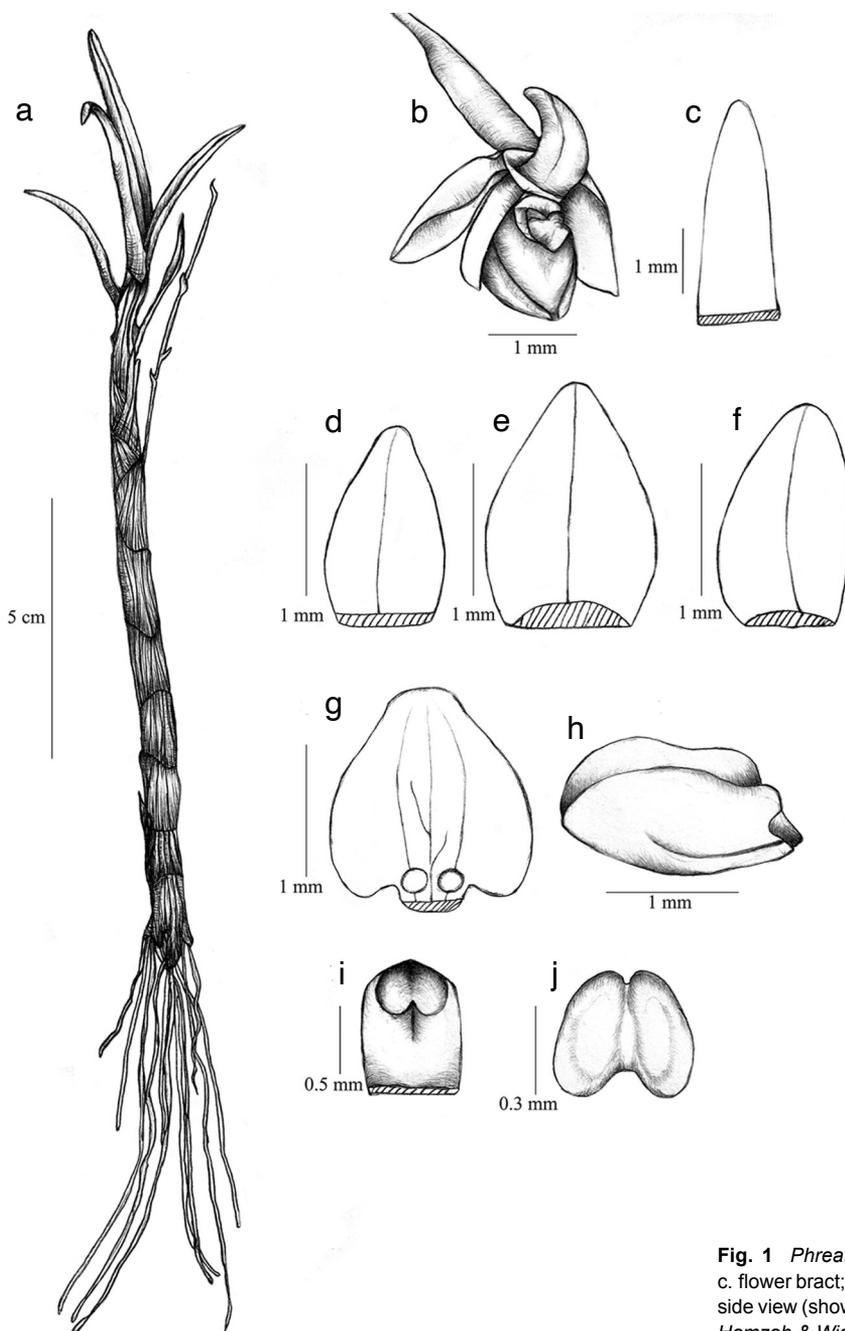


Fig. 1 *Phreatia tinukariensis* sp. nov. a. Habit; b. flower, oblique view; c. flower bract; d. dorsal sepal; e. lateral sepal; f. petal; g. lip, flattened; h. lip, side view (showing the claw of the labellum); i. column; j. anther cap (*Suyadi, Hamzah & Widjaja* 9337, BO). — Drawn by Aninda Retno Utami Wibowo.

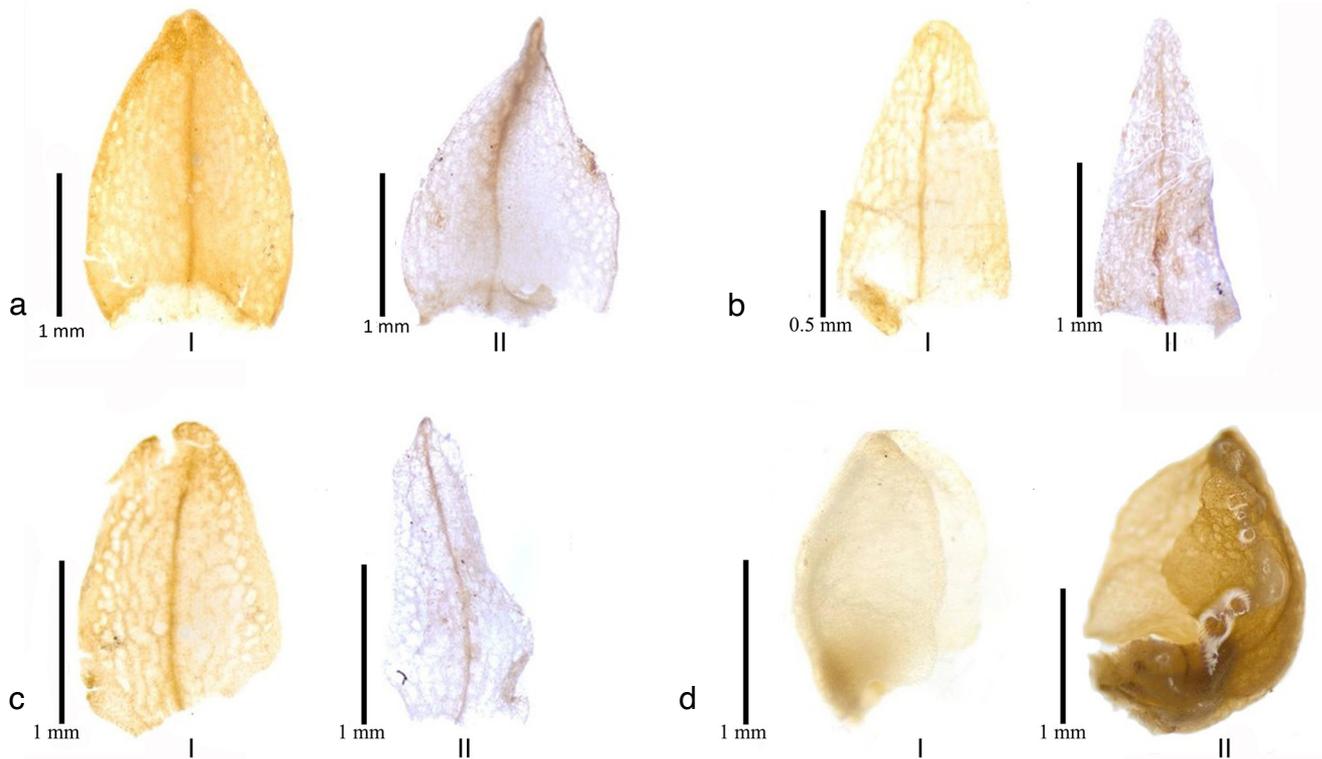


Fig. 2 Comparison of floral part differences between *P. tinukariensis* (I) and *P. navicularis* (II). a. Lateral sepal obtuse in I, acute in II; b. dorsal sepal obliquely ovate in I, ovate-oblong in II; c. petal obliquely ovate-elliptic in I, obliquely ovate-obtuse in II; d. labellum (side view) weakly curved in I, strongly curved almost half round in II (I: Suyadi, Hamzah & Widjaja 9337, II: Kornassi 1479, all BO).

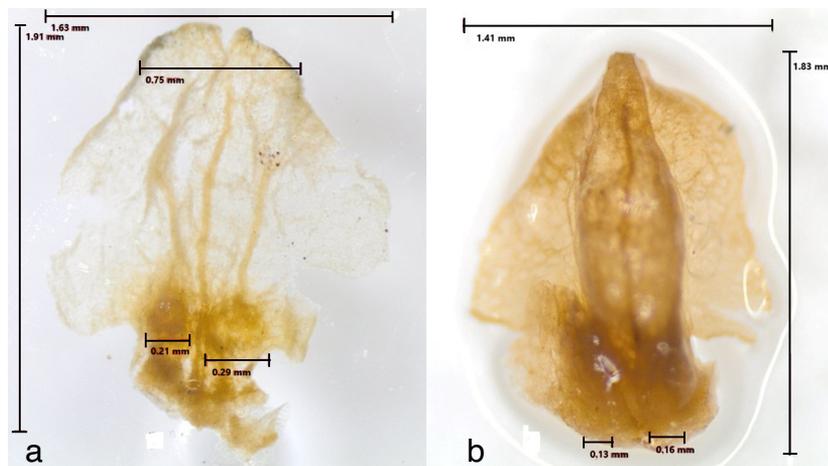


Fig. 3 Comparison of labellum between *P. tinukariensis* (a) and *P. navicularis* (b). a. Labellum shape broadly ovate, basal margins retorse-lobulate, labellum apex obtuse; b. labellum shape triangular, basal margins truncate, labellum apex acute (a: Suyadi, Hamzah & Widjaja 9337; b: Kornassi 1479, all BO).

part c. 0.3 mm long. *Stigma* transversely elliptic. *Anther* cordate, c. 0.6 by 0.7 mm.

Distribution — Indonesia (Sulawesi), only known from the type locality.

Habitat & Ecology — Epiphyte in subalpine vegetation of a mountain summit, elevation c. 2658 m. Flowering: November.

Conservation status — The assessment of the proposed conservation status for *Phreatia tinukariensis* was determined

based on Criterion B (IUCN 2022). The value of AOO is 4 km² (CR) and EOO 0 km² (CR). However, there is no information whether the population was severely fragmented (B1), continuing to decline (B2) and/or in extreme fluctuation (B3). Currently, the species appears under little threat because it occurs in a remote protected area in Mekongga National Park and it is of no horticultural value. Thus, with the information from EOO and AOO without any other information from the survey in the

Table 1 Comparison of morphological differences between *Phreatia tinukariensis* sp. nov. and the strongly resembling *Phreatia navicularis* J.J.Sm.

Character	<i>Phreatia tinukariensis</i>	<i>Phreatia navicularis</i>
Lateral sepal	Ovate-elliptic, obtuse at the tip	Obliquely ovate-elliptic, acute at the tip
Dorsal sepal	Obliquely ovate	Ovate-oblong
Labellum shape	Broadly ovate, slightly curved, retuse at the base, tip obtuse	Triangle strongly curved, truncate at the base, tip acute
Position two circular labellum thickenings	At the base	At the claw

fields, we decided that the conservation status of the species *Phreatia tinukariensis* is Critically Endangered (CR) without any subcategory.

Note — The new species belongs to sect. *Caulescentes*, of which only one other species has been recorded from Sulawesi, viz. *P. millikenii*. The latter is a much larger plant (stem 17–31 cm long), with larger leaves (90–110 by 9–12 mm), flowers with larger mentum (c. 1 mm long), and a labellum that is softly furfuraceous (vs glabrous) above. *Phreatia tinukariensis* appears to be the most similar to *P. navicularis*.

KEY TO THE SPECIES OF PHREATIA SECTION CAULESCENTES IN INDONESIA

1. Plant tall, stem 175–600 mm long 2
1. Plant small, stem 60–230 mm long 5
2. Peduncle at least 50 mm, but can be up to 100 mm long 3
2. Peduncle very short (nearly absent) *P. procera*
3. Rachis shorter than peduncle; dorsal sepal acute 4
3. Rachis longer than peduncle; dorsal sepal obtuse
. *P. semiorbicularis*
4. Labellum spade-shaped; flowers c. 2.5 by 1.3–1.4 mm; petals elliptic, acute *P. millikenii*
4. Labellum triangular; flowers c. 2 by 1.3 mm; lateral petals obliquely ovate, obtuse *P. schoenorchis*
5. Pedicel much shorter than the flower (ratio flowers: pedicel > 2.4), flowers 1–1.7 mm long, pedicel 0.1–0.7 mm long 6
5. Pedicel longer than flower (ratio flowers: pedicel < 1), flowers 1.8–2 mm long, pedicel c. 3 mm long 8
6. Labellum ovate to obovate, calceolate to rounded, 1.5–2 by 1.2–1.8 mm, apex obtuse; inflorescence 55–115 mm long, flowers 12 to many; peduncle 35–55 mm long, terete; rachis terete 7
6. Labellum 5–7-angled, broadly orbicular when spread out, 1.7–2 by 1.5–1.8 mm, apex shortly apiculate; inflorescence 70–80 mm long, flowers many; peduncle 35–40 mm long, lower part terete, upper part trigonous; rachis trigonous *P. subalpina*
7. Inflorescences 65–115 mm long, with many flowers (> 30); labellum obovate, obtuse, rounded, c. 1.5 by 1.2 mm long, mentum very short, less than 0.5 mm high *P. montana*
7. Inflorescence 55–95 mm long, with 12–30 flowers; labellum ovate, calceolate, obtuse, 1.7–2 by 1.5–1.8 mm, mentum with column foot 2–2.3 by 1.2–1.5 mm *P. rupestris*
8. Labellum triangular, strongly curved, making labellum saccate, basal margins truncate on each side, apex acute, basal calli on the claw *P. navicularis*
8. Labellum broadly ovate, slightly curved, labellum almost flat, basal margins retrorse-lobulate on each side, apex obtuse, basal calli on nexus of claw *P. tinukariensis*

Additional specimens examined

Phreatia millikenii Ormerod: *W. Milliken 1125* (holo K; iso BO), Indonesia, Sulawesi, Dumoga Bone National Park, Distr. Bolaang-Mongondow, vicinity of Gunung Sinumbayuga, 1750 m, 28 Sept. 1991.

Phreatia montana Ridl.: *C.B. Kloss s.n.* (type BM), Indonesia, West New Guinea, Bandarong Valley, Camp XI-XII, probably in montane forest, 2520–1500 m, 19 Jan. 2013.

Phreatia navicularis J.J.Sm.: *Kornassi 1479* (type BO), Indonesia, Maluku, Central Seram Island, Mt Moerkele, 2000–2500 m, 1 July 1918.

Phreatia rupestris J.J.Sm., *A.C. de Kock 57* (type BO), Indonesia, Papua Prov., Mt Goliath, 3000 m, Mar. 1911.

Phreatia schoenorchis J.J.Sm.: *L.J. Toxopeus s.n.* (L), Indonesia, Boeroe, Fat'Koton, 1350 m, 2 Mar. 1922.

Phreatia semiorbicularis J.J.Sm.: *L.S.A.M. von Roemer 713* (type BO), Indonesia, Papua Prov., between Alkmaar and the Hubrecht Range, Oct. 1909.

Phreatia subalpina P.Royen: *L.J. Brass 9086* (L), Indonesia, New Guinea, Lake Habbema, in moss cushions in subalpine forest, 3225 m, Aug. 1938.

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