

Thismia singeri (Thismiaceae), an augmented description and first record for Brazil

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Abstract *Thismia singeri*, is described for the first time for Brazil, being the first record of this family for Pará State and the third record for this rare species in nature. In Pará state, northern Brazil, this species was found growing in Itaituba municipality near the River Tapajós, in a well preserved submontane rain forest with a dense canopy. Due to the holotype is incomplete, we provide a more comprehensive description for this species based on complete individuals, thus clarifying some aspects of its morphology such as the parietal placenta, the root system, and tepal morphology. This is the second species of Thismiaceae described for Amazonia. *Thismia hyalina*, the other Amazonian species, is easily distinguished from *T. singeri* by its tubers, leaves inserted just below the flower, the latter with two tepal whorls, the upper one clawed, reniform and erect, and the lower one linear triangular.

Keywords Biodiversity · Dioscoreales · Monocots · Mycotrophic · Neotropics

Introduction

Thismia Griff. consists of ca. 47 mycotrophic herbaceous species, typically growing among leaf litter in shady wet

forest ground. The genus is pantropical, concentrated mainly in the Malay Peninsula (Maas 1986; Li and Bi 2013). Thirteen species have been described until now for the New World, most in the Brazilian Atlantic Rain Forest (Maas 1986; Mancinelli et al. 2012).

Although traditionally classified in Burmanniaceae (Angiosperm Phylogeny Group 2009), the studies of Merckx et al. (2006, 2009, 2010), suggested that *Thismia* is sister to the *Tacca* clade, and not to the *Burmanniaceae* sensu stricto clade, therefore supporting the recognition of Thismiaceae.

Thismia singeri (de la Sota) Maas (1986), was first described as *Mamoreia singeri* in 1960 from a specimen from Bolivia (Beni, Mamoré river) collected at 150 m. in March 1956 (*de la Sota* 883, isotype US). 25 years later, a new specimen was collected at Napo, Ecuador (*Balslev* 60638, AAU). Until our collection, the species was known only in those locations.

As stated by Maas 1986, because the type collection of this species lacked underground parts and the incomplete descriptions of the tepals, stamens, and ovary, the exact position of *T. singeri* in their monographs of the group for Flora Neotropica could not be established. Consequently, the authors placed this species in *Thismia* section *Pyramidalis*, based on vegetative and stigma features.

During a botanical field trip near the River Tapajós (4.16°S–55.59°W), municipality of Itaituba, Pará State in January 2013, we discovered individuals of Thismiaceae which represent the first records of this family for the State. Based on the monograph of Maas (1986), we concluded that these individuals are the first record of *T. singeri* for Brazil. Due to the quality of these individuals, we were able to make complete descriptions of this species and confirm its sectional position within the genus in the Neotropics.

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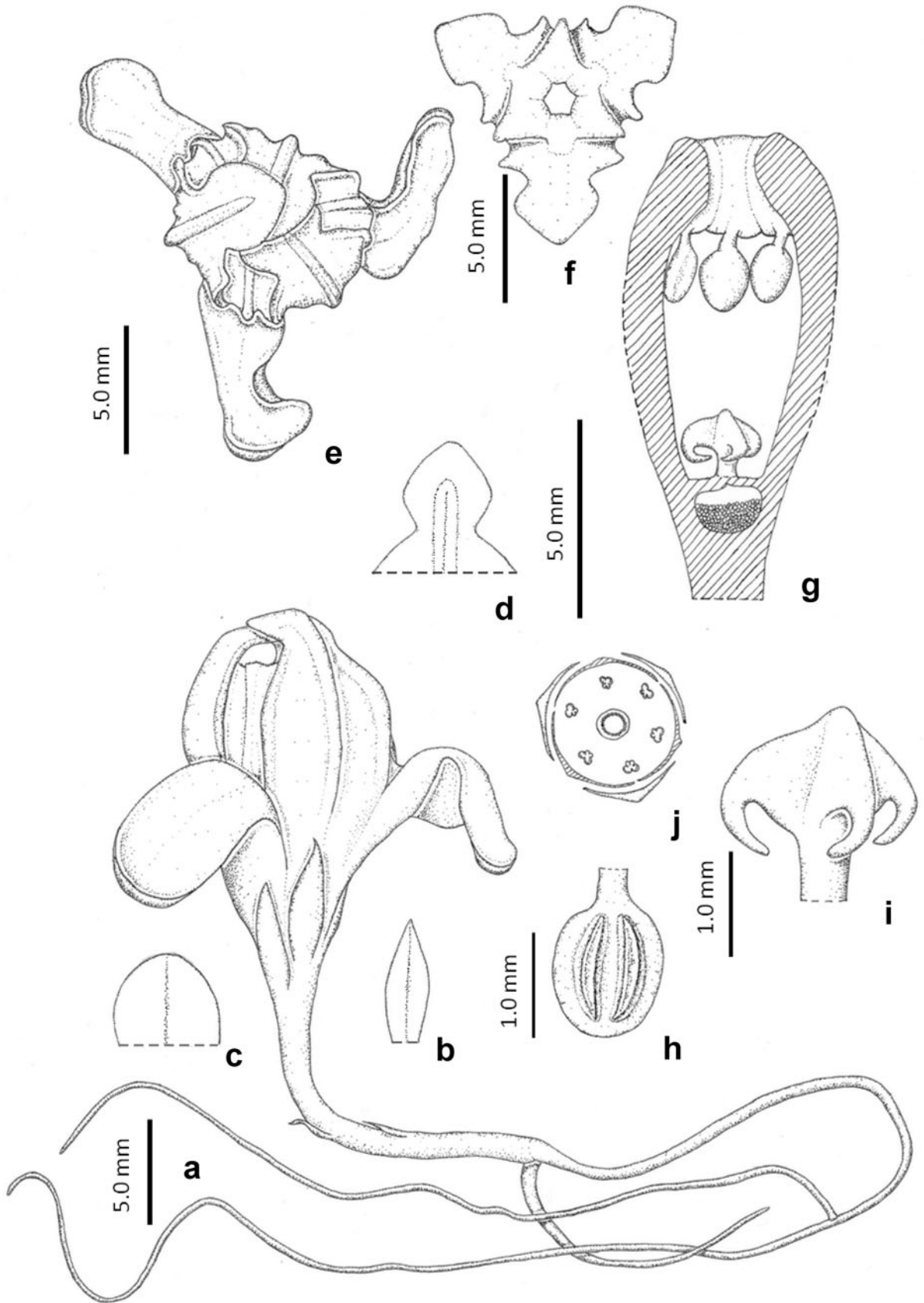


Fig. 1 Line drawing of *T. singeri*. Habit (a). Bract-like leaves (b). Outer tepals (c). Inner tepals (d). Flower from above, showing inner tepals overlapping each other (e). Inner tepals batting showing the hexagonal throat (f). Floral tube in longitudinal section, showing throat, stamens, style, stigmas, and ovary (g). Anthers (h). Style (i). Floral diagram (j) (E. C. Smidt and Voloschen T. D. 1069)

Taxonomic treatment

Thismia singeri (de la Sota) Maas (1986). Figures 1a–j, 4, 5.

Saprophytic herb, 30–33 mm tall. Roots cylindrical ca. 14.5–68 mm. Stem ca. 15–18 × 1–2 mm, smooth, pale yellow. Leaves bract-like, adpressed, navicular, narrowly ovate, 2–5 × 1–2 mm, arranged spirally, along the stem 2–3 small (2–2.5 × 1 mm) and sparsely arranged, below the flower 4–5 imbricate and large (4–5 × 2 mm). Flower yellow, actinomorphic; floral tube ca. 15 × 10 mm, urceolate, outer surface smooth. Tepals 6, inserted in two whorls, outer tepals ca. 14.5 × 5 mm, inserted above the

middle of floral tube, ovate, 1-veined, reflexed, membranaceous, apex rounded; inner tepals 11.5–15 × 6 mm, inserted at the top of floral tube, ascending, overlapping each other over the throat, oblong, 1-veined, apex constricted, rounded, smooth; annulus, ca. 1 mm wide, hexagonal, without any appendage. Stamens filaments inserted just below the throat, ca. 0.5 mm long.; connectives not dilated; anthers broadly ovoid, 1.5 × 1.1 mm; interstaminal lobes absent. Gynoecium stigma 3-sided, shallowly pyramidal, 2 mm high, apex truncate, basal lobes curved down toward the style, acute; style cylindrical, 1 mm long; ovary ovoid, 1.5 × 2 mm; placenta inserted parietally from the base up to the middle of the ovary. Fruit and seeds not seen.

Material examined—Brazil. Pará: Itaituba, 4 km from Tapajós river, 118 m alt., 4.16°S, 55.59°W, 27 Jan 2013, E. C. Smidt and Voloschen T. D. 1069 (UPCB, RB).

Geographic distribution and ecology—the vegetation and topology of the site where the individuals were found

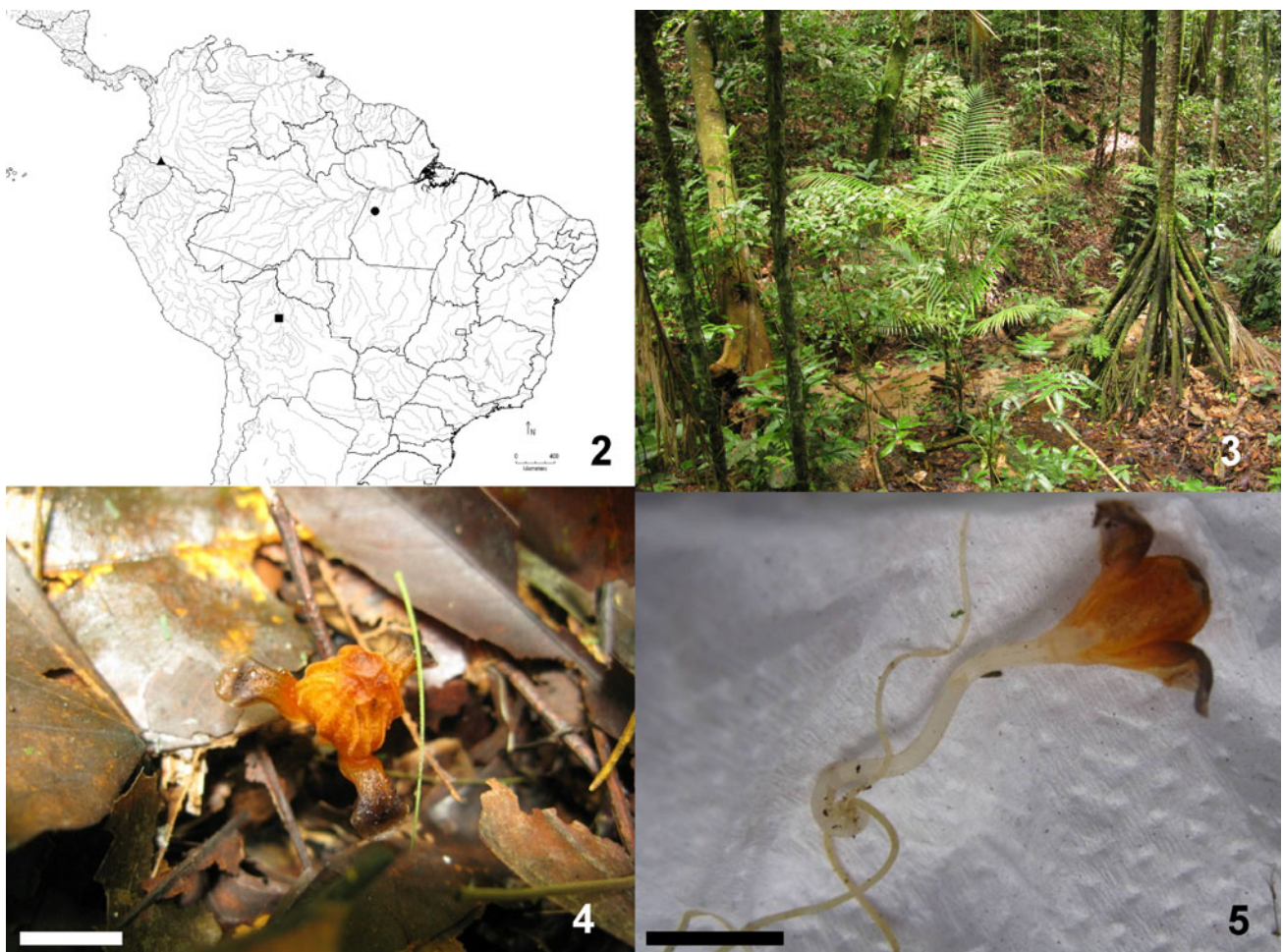


Fig. 2–5 Photographs of *T. singeri*. Three sites where the species is found (Brazil. Pará: Itaituba—black circle, Ecuador. Napo—black triangle and Bolivia. Beni: Mamoré river, type specimen—black

square) (2). Natural habitat (3). Flower detail from above in natural habitat (4). Specimen collected (5) (E. C. Smidt and Voloschen T. D. 1069). Scale bars 10 mm (4), 15 mm (5)

is submontane rain forest, on an abruptly sloped hillside (Fig. 3). It is currently a well preserved area, with a dense canopy divided into two predominant strata, and with clearings present. The average depth of the litter is 3 cm. The soil is stony, sandy-clay, and yellow in color, with dry drainage. The climate is Am (Tropical monsoon climate—Köppen 1948) with minimum temperature exceeding 18 °C and relative humidity values above 80 % in almost every month of the year. Rainy seasons coincide with the months from December to June and the least rainy months from July to November.

Conservation status—the only two localities where the species occurs are 1,500 km distant from each other (Figs. 2–5), and in both Brazilian and Bolivian Amazonia there is a lack of precise information on the preservation of the vegetation between these two sites. According to the IUCN (2001) criteria, this species can be considered Data Deficient (DD).

Taxonomic remarks—our specimens show that this species, as suggested by Maas (1986), is part of *Thismia* subgen. *Ophiomeris* since it possesses parietal placentation, anthers free from each other and united thecae. In this subgenus, of the three sections currently accepted, *T. singeri* is part of *Thismia* Sect. *Pyramidalis* due to the non-dilated connective, tepals in two whorls, absence of inter-staminal lobes, pyramidal stigma, leaves scattered along the stem, and cylindrical roots. In Amazonia, only *Thismia hyalina* (Miers) F. von Muller was known before this new record (Maas and Maas 2010). These two species are easily distinguished since *T. hyalina* possesses tubers, and leaves inserted just below the flower, flowers with two tepal whorls, the upper one clawed, reniform and erect, and the lower one linear triangular.

References

- Angiosperm Phylogeny Group (2009) An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Bot J Linn Soc* 161:105–121. doi:10.1111/j.1095-8339.2009.00996.x
- International Union for the Conservation of Nature—IUCN (2001) IUCN Red List Categories and Criteria Version 3.1. <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>. Accessed Dec 2012
- Köppen W (1948) *Climatologia com un estudio de los climas de la Tierra* (trans: Peres PRH). Fondo de Cultura Economica, Mexico
- Li H-Q, Bi Y-K (2013) A new species of *Thismia* (Thismiaceae) from Yunnan, China. *Phytotaxa* 105:25–28
- Maas H, Maas PJM (2010) Thismiaceae in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro, Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2010/FB110675>). Accessed 2013
- Maas PJM, Maas-van de Kamer H, Van Benthem J, Snelders HCM, RübSamen T (1986) *Flora Neotrop* 40:1–189
- Mancinelli WS, Blum CT, Smidt EC (2012) *Thismia prataensis* (Thismiaceae), a new species from the Brazilian Atlantic rain forest. *Syst Bot* 37:879–882
- Merckx V, Schols P, Maas-van de Kamer H, Maas PJM, Huysmans S, Smets E (2006) Phylogeny and evolution of Burmanniaceae (Dioscoreales) based on nuclear and mitochondrial data. *Am J Bot* 93:1684–1698
- Merckx V, Bakker F, Huysmans S, Smets E (2009) Bias and conflict in phylogenetic inference of myco-heterotrophic plants: a case study in Thismiaceae. *Cladistics* 25:64–77
- Merckx V, Huysmans S, Smets E (2010) Cretaceous origins of myco-heterotrophic lineages in Dioscoreales. In: Seberg O, Petersen G, Barfod AS, Davis JI (eds) *Diversity, phylogeny, and evolution in the monocotyledons*. Aarhus University Press, Århus