



Three new species and new records of *Thismia* (Thismiaceae) in The Solomon Islands

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ABSTRACT: *Thismia* (Thismiaceae), whose distributions are currently known from Asia, Australia, and South America, is newly recorded in the Solomon Islands. Through extensive field explorations, three new species of *Thismia* were discovered in the rainforest of the Solomon Islands and are herein delineated as *T. occasa*, *T. chicoreoides*, and *T. solomonensis*, all belonging to sect. *Sarcosiphon*. Comprehensive species descriptions, line drawings, and color plates are furnished for each species, accompanied by a distribution map delineating their respective ranges.

KEY WORDS: biodiversity, Burmanniaceae, endemism, mycoheterotrophic, *Sarcosiphon*, tropical rainforest, taxonomy.

INTRODUCTION

Thismia Griff. (Griffith, 1844) constitutes a genus of mycoheterotrophic plants, currently acknowledging ca. 100 species (Siti-Munirah and Dome, 2023). Exhibiting significant morphological diversity and a notable proportion of endemics, this small-sized herb is distributed across Asia, Australia, and America, spanning tropical to subtropical and temperate regions (Merckx *et al.*, 2013; Dančák *et al.*, 2020), and is most commonly found in tropical rainforests, the Malay Peninsula and Borneo are two of the main centers of *Thismia* diversity in Southeast Asia (Dančák *et al.*, 2020).

A distinct group, sect. *Sarcosiphon* (Blume) Jonker (Jonker, 1938), is predominantly found in the Malay Archipelago. All members of this section share several defining characteristics, such as coralliform roots, three floral bracts enfolding the flower base, diminished outer perianth lobes, and fused inner tepal lobes forming a mitre (Hroneš *et al.*, 2015; Sochor *et al.*, 2018). Sochor *et al.* (2018) conducted a comprehensive review of the section, integrating morphological and molecular studies, and enumerating 19 species, including 4 novel additions. The immense species richness of the tropical rainforests in Southeast Asia and Oceania makes complete sampling coverage difficult, particularly in remote mountainous areas. In recent years, botanical exploration of inaccessible regions has led to the discovery of many new species of *Thismia*. A total of nine new taxa within the sect. *Sarcosiphon* have been discovered from 2020 to the present (Hroneš *et al.*, 2015; Sochor *et al.*, 2018; Dančák *et al.*, 2020; Siti-Munirah *et al.*, 2021; Siti-Munirah and

Dome, 2022; Luu *et al.*, 2024).

The Solomon Islands, comprising six major islands and over 900 minor ones, are situated between the eastern region of Papua New Guinea and the northwestern vicinity of Vanuatu. Ranked among the world's least-developed nations, vast swathes of the Solomon Islands remain botanically unexplored, with scant knowledge of its biological diversity. This context catalyzed the inception of the 'Census and Classification of Plant Resources in the Solomon Islands' project, designed to safeguard its unique biodiversity.

During the initial field expedition to several Islands, three distinct *Thismia* species were unearthed, exhibiting morphological traits aligning with conventional characteristics utilized to classify sect. *Sarcosiphon*. Following meticulous scrutiny of field-collected specimens, coupled with exhaustive comparison against herbarium archives and pertinent literature, the authors confirmed that the collections are new species. In addition, the genus *Thismia* has not previously been recorded in the Solomon Islands, thus this discovery presents a new distributional record for this genus.

MATERIAL AND METHODS

Morphological analyses of the novel species were conducted through field studies, a review of relevant literature (Beccari, 1877; Smith, 1909; Jonker, 1938; Merckx *et al.*, 2013; Hroneš *et al.*, 2015; Sochor *et al.*, 2018; Dančák *et al.*, 2020; Siti-Munirah *et al.*, 2021; Siti-Munirah and Dome, 2022; Luu *et al.*, 2024). Fixed materials and dried voucher specimens of the new species

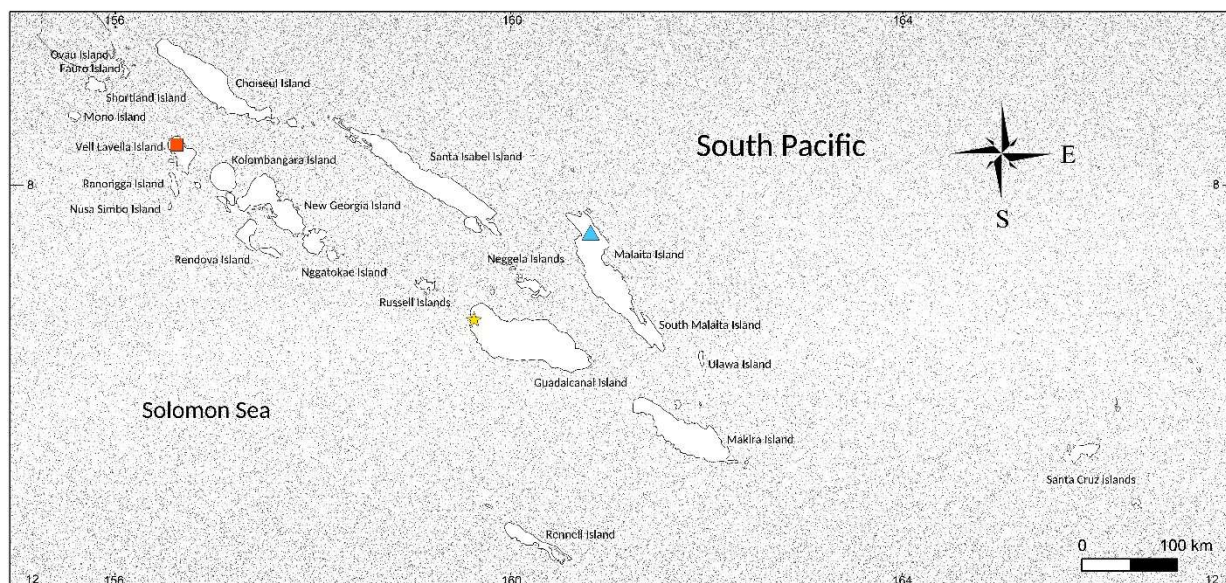


Fig. 1. Distribution map of *T. occasa* (orange square), *T. chicoreoides* (blue triangular), and *T. solomonensis* (yellow star) in the Solomon Islands.

were deposited in TAIF and TNM herbarium. Additionally, photographs documenting the habitat and habits were taken during field observations. Morphological characters were measured using a ruler and vernier caliper. The terminology employed in the description follows Beentje (2016). The assessment of conservation status is inferred from the IUCN guidelines (IUCN, 2024).

TAXONOMIC TREATMENT

Thismia occasa T.C.Hsu, S.W.Chung & C.W.Lin, *sp. nov.* **Type:** THE SOLOMON ISLANDS: Western Province, Vella Lavella Island, Eel camp to Mt. Tabisala, 7°39'12.7"S, 156°36'14.2"E, 312–775 m alt., 28 October 2013, Tian-Chuan Hsu, Cheng-Wei Chen & Moffat *Fanerii* SITW04393 (holotype: TAIF!; isotype TNM!).

Figs. 2 & 3

Diagnosis: Among the species in *Thismia* sect. *Sarcosiphon*, *T. occasa* is most similar to *T. crocea* in habit and flower colour, but it is different in its larger mitre approximately 1/2.5 (vs. 1/3–1/4) the length of the whole flower, mitre with 3 impressed sutures (vs. nearly connate), annulus formed by 6 low rectangular lobes (vs. 6 rounded, bilamellate lobes), stamens pendent from the apical margin of the floral tube (vs. sunken inside the floral tube), and lateral appendage bilobed (vs. more or less truncate).

Terrestrial achlorophyllous herbs, 3–8 cm or taller. **Roots** short, clustered, coralliform, light beige to pale brown. **Stem** 20–50 mm long, creeping, ascending to erect, unbranched, pale yellowish-brown. **Leaves** 2–6 below the first flower, spirally arranged, scalelike, triangular, acute, entire, slightly keeled, 2–3.8 × 1–2.3 mm, of the same colour as stem. **Floral bracts** 3, of the

same shape and colour as leaves, but larger up to 8 × 3 mm. **Pedicel** indiscernible during anthesis, elongating during fruit maturing to ca. 1 cm. **Flowers** 3–5 per stem, actinomorphic, 10–11 mm long, 3.5–5 mm wide below top of floral tube; floral tube narrowly urceolate, widest at its upper quarter, often with slight narrowing above the middle; outer surface pale brownish-yellow to pale orange, with 12 longitudinal, orangish-yellow and impressed stripes, prominently raised between stripes giving floral tube a ribbed appearance; outer perianth lobes absent; inner perianth lobes bent upwards, connate at top and forming mitre with 3 holes; holes rounded triangular to semicircle, ca. 2 mm wide, 1.1–1.5 mm high; mitre with 3 impressed sutures, 2 longitudinal ribs and obtuse processes on the top, 3.7–4 mm tall, reddish-orange to vermilion with paler base (columns). **Annulus** formed by 6 low rectangular lobes, hairy. **Stamens** 6, pendent from the apical margin of the floral tube; filaments flat and rather broad, ca. 0.7 mm wide, short, hairy, pale orange; connectives flattened, laterally connate to form a tube, sparsely puberulous in the apical half, turning subglabrous toward basal half, ca. 2 mm long, orangish-white to beige; interstaminal glands not prominent, widely oblong, ca. 0.4 mm across, placed between bases of lateral appendages; apical end of individual connective bearing several irregular short processes, sometimes puberulous, far exceeding lateral appendage; lateral appendage large, subglabrous above, puberulous toward margins, beige, skirt-like, bilobed, lobes rounded, with concavely curved lower margin with puberulous, apex acute. **Style** short, ca. 0.6 mm, pale brown; stigma 3-lobed, creamy white, beige, papillose, lobes triangular, straight, entire, apex acute to obtuse. **Capsule** cup-shaped, longitudinally ribbed, pale brown to

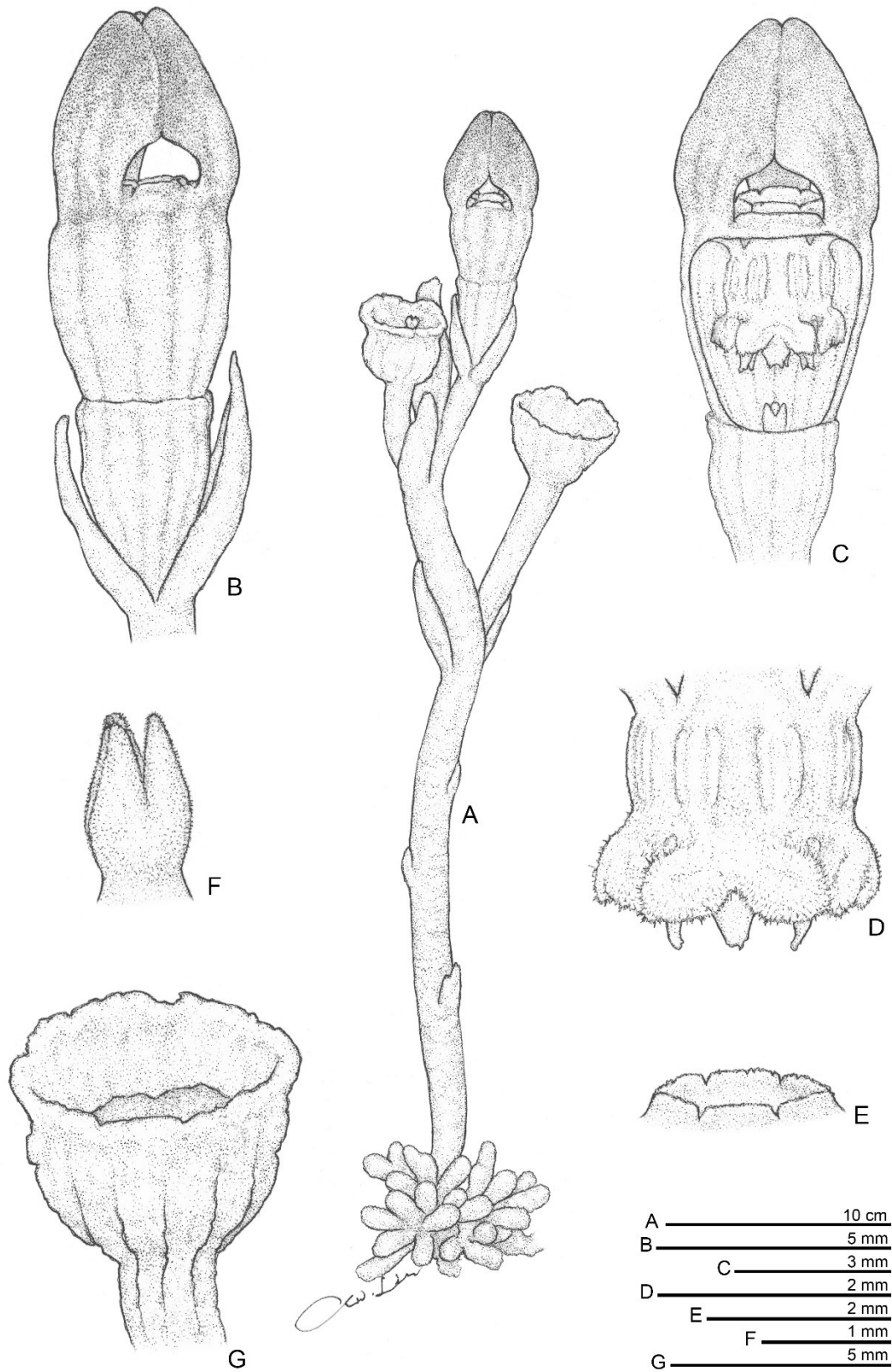


Fig. 2. *Thismia occasa* T.C.Hsu, S.W.Chung & C.W.Lin. **A.** Habit; **B.** Flower; **C.** Longitudinal section of flower with outer view of stamens; **D.** Stamens with lateral appendages and thecae, outer view; **E.** Annulus; **F.** Stigma; **G.** Capsule.



Fig. 3. *Thismia occasa* T.C.Hsu, S.W.Chung & C.W.Lin. **A, B.** Plants in natural habitats; **C, D.** Detail of flowers, also showing capsules; **E.** Longitudinal section of flower inner view of connectives tube; **F.** Top view of flower; **G.** Stamens with lateral appendages and thecae, outer view; **H.** Stigma; **I.** Capsules.



orangish-beige, *ca.* 5 mm in diameter, on elongated pedicel. **Seeds** pale brown, ellipsoid, *ca.* 0.3 × 0.2 mm.

Distribution and ecology: *Thismia occasa* is currently known only from Mt. Tabisala, located to the north of Vella Lavella Island. It grows in the deep leaf litter of submontane rainforests at an elevation of approximately 312–775 meters. Its flowering season is observed in October.

Etymology: The specific epithet "*occasa*" is derived from the orange-red flower that imparts a sunset hue.

Conservation: This species is known only from a single location, the type locality on Mt. Tabisala, Vella Lavella Island. The existing population would be negatively affected by an increase in human activities. Due to its very restricted known distribution, associated small AOO (less than 10 km²), and the presence of mature individuals numbering fewer than 20, it is assessed as Critically Endangered (CR B2ab(iii)+C2a(ii)) following criteria proposed by the IUCN Red List Categories and Criteria Version 16 (IUCN, 2024).

Notes: *Thismia crocea* (Becc.) J.J.Sm. is among the most distinctive species in the sect. *Sarcosiphon*, known for its flower colour ranging from bright orange to vermilion, contrasting vividly against the dark ground (Beccari, 1877; Smith, 1909). The new species, *T. occasa*, resembles *T. crocea*, but it can be easily distinguished by several characteristics: its widest part of the flower at the mitre (vs. below the top of the floral tube), larger mitre approximately 1/2.5 (vs. 1/3–1/4) the length of the whole flower, mitre with 3 impressed sutures (vs. nearly connate), annulus formed by 6 low rectangular lobes (vs. 6 rounded, bilamellate lobes), and lateral appendage bilobed (vs. more or less truncate).

Thismia chicoreoides T.C.Hsu, S.W.Chung & C.W.Lin, *sp. nov.* **Type:** THE SOLOMON ISLANDS: Malaita Province, Malaita island, Elifolo village, 8°33'51.7"S, 160°47'03.0"E, 150–350 m alt., 22 July 2015, *Hsin-Chieh Hung, Cheng-Wei Chen & Moffat Fanerii SITW07813* (holotype: TAIFF!; isotype TNM!).

Figs. 4 & 5

Diagnosis: Similar to *Thismia viridistriata* as it possesses a blackish-brown-tinged flower adorned with verrucose or finger-like protrusions, however, *T. chicoreoides* is different in its perianth inside with 12 vertical flat (vs. partly detached from its surface) ribs, apical end of individual connective slightly verrucose (vs. several hairs *ca.* 0.15–0.2 mm long), lateral appendage central lobe being largest (vs. smallest) and stigma lobes triangular (vs. inverted trapezoid).

Terrestrial achlorophyllous herbs, up to 5 cm or taller.

Roots short, densely clustered, coralliform, light beige to pale orangish-yellow. **Stem** 1.5–10 mm long, creeping, ascending or erect, unbranched, creamy white to beige. **Leaves** 2–4, spirally arranged, scale-like, narrowly ovate, elliptic to ovate-triangular, acute, entire, 1–4.5 mm long

and 0.4–1.5 mm wide at base, of the same colour as stem. **Floral bracts** 3, of the same shape and colour as leaves, but larger up to 6 × 2.5 mm. **Pedicel** indiscernible or very short during anthesis (rarely up to 13 mm long), elongating markedly during fruit maturing up to *ca.* 13 cm. **Flowers(immature)** 1 per stem, actinomorphic, *ca.* 7 mm long, 4 mm wide in the widest point; floral tube urceolate; outer surface dusky brown to blackish, with 12 blackish-brown or greyish-black longitudinal stripes; perianth inside with 12 dark brown vertical ribs corresponding to the pattern on outer surface, ribs flat; the surface between ribs prominently reticulate with pale brown, raised reticulum; outer perianth lobes absent, inner perianth lobes bent upwards, connate at top and forming mitre with 3 holes; holes transversely elliptic to oblong, *ca.* 1.5 × 0.8 mm; mitre nearly hemispherical, verrucose or covered by finger-like protrusions, densely on the 3 central ribs, basal part of mitre blackish-brown, upper part darker, brownish-black. **Annulus** thin, often markedly raised, divided into 6 shallowly crescent-shaped lobes. **Stamens** 6, pendent from the apical margin of the floral tube; filaments free, glabrous adaxially, covered by strigose on abaxially, blackish-brown to dark purplish-red; connectives broad and flattened, laterally connate to form a tube, *ca.* 2 mm long, adaxially, apically and abaxially below lateral appendage densely covered by short transparent hirsute, greyish-brown to dark brown; interstaminal glands *ca.* 0.6 mm long, hidden under their lateral appendages; apical end of individual connective bilobed, slightly verrucose, triangular, far exceeding lateral appendage; lateral appendage not reaching the connective apex, distinctly 3-lobed, central lobe being largest, apex truncate and irregular denticulate, hirsute, lateral lobes obtuse triangular to crescent-shaped, hirsute on margins. **Style** short, *ca.* 0.8 mm, white to pale brown; stigma 3-lobed, white, beige, papillose, lobes triangular, straight, apex retuse to obtuse. **Capsule** cup-shaped, longitudinally ribbed, pale brown to beige, *ca.* 5 mm in diameter, on elongated pedicel. **Seeds** pale brown, ellipsoid, *ca.* 0.3 × 0.15 mm.

Distribution and ecology: *Thismia chicoreoides* is presently confined to a mountainous region located north of Malaita Island. It grows on thick layers of leaf litter on gentle slopes in deeply shaded areas of montane rainforest. Observations indicate that this species flowers during July.

Etymology: The specific epithet "*chicoreoides*" refers to the verrucose flower, which resembles the appearance of some species of *Chicoreus*, such as *C. paini* Houart.

Conservation: The habitat of *Thismia chicoreoides* is relatively remote and rarely visited by humans, so it is unlikely to pose an immediate threat. Despite its inconspicuous appearance and a very short period of active growth, which may easily be overlooked in botanical surveys, the total population size is estimated to be less than 50 mature individuals at the present state of

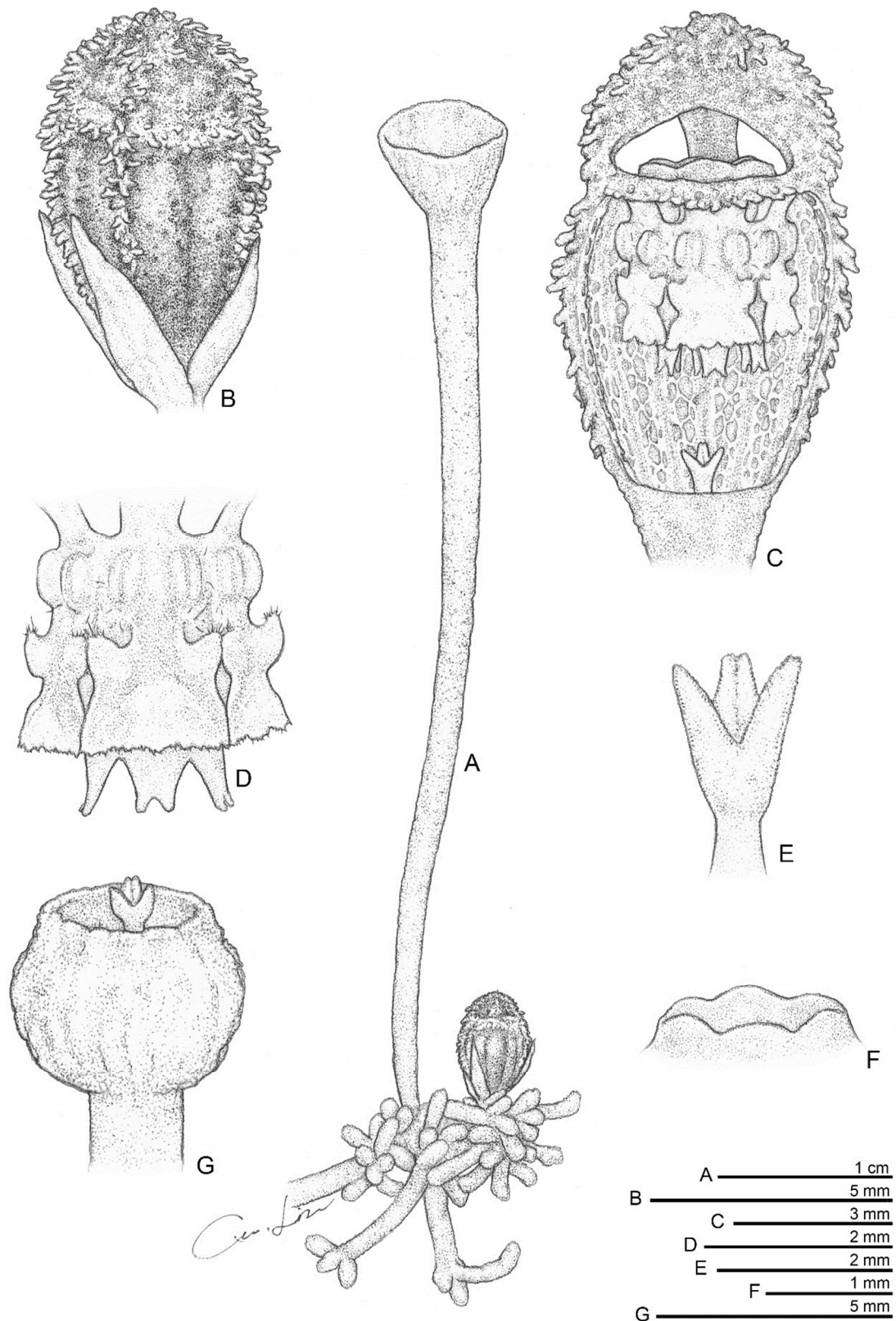


Fig. 4. *Thismia chicoreoides* T.C.Hsu, S.W.Chung & C.W.Lin. **A.** Habit; **B.** Immature flower; **C.** Longitudinal section of flower with outer view of stamens (based on incomplete flower); **D.** Stamens with lateral appendages and thecae, outer view; **E.** Stigma; **F.** Annulus; **G.** Immature capsule.



Fig. 5. *Thismia chicoreoides* T.C.Hsu, S.W.Chung & C.W.Lin. **A, B.** Plants in natural habitats, **A.** showing mature capsule on elongated pedicel, **B.** showing a flower bud; **C, D.** Immature flowers, **C.** side view, **D.** top view; **E, F.** Longitudinal section of immature flowers, **E.** showing stamens and stigma, **F.** showing inner surface of floral tube; **G.** Stamens with lateral appendages and thecae, outer view; **H.** Flower bud; **I.** Capsule, showing seeds.

TABLE 1. Comparison of *Thismia chicoreoides*, *T. viridistriata* and *T. latiffiana*.

	<i>T. chicoreoides</i> (Figs. 4, 5)	<i>T. viridistriata</i>	<i>T. latiffiana</i>
Roots	clustered	very densely clustered	loosely coralliform
Flora bracts (abaxially)	smooth	verrucose	smooth
Perianth and mitre outside	glabrous	glabrous	golden trichomes
Perianth inside			
ribs	flat	prominent and partly detached	pyramidal protuberances
Connective			
color	greyish-brown to dark brown	greyish-green or pale pink	sometimes blackish-brown
Lobes			
shape	triangular	shallowly triangular	narrowly transversely oblong
apex	bilobed, slightly verrucose	unlobed, several hairs	bilobed, each lobe terminating in a needle-like trichome
Lateral appendage	central lobe being largest	central lobe being smallest	central lobe being largest
central lobe	truncate and irregular denticulate	rounded, hairy	shallowly dentate and sparsely hairy
Stigma lobes	triangular, straight	inverted trapezoid, straight	spatulate, curved inwards
Capsule color	pale brown to beige	pinkish, light brown to greyish-brown	dark brown to blackish-brown

knowledge. Therefore, we suggest evaluating the species as Critically Endangered (CR C2a(i, ii)+D) based on the IUCN Red List Categories and Criteria Version 16 (IUCN, 2024).

Notes: *Thismia chicoreoides* bears a resemblance to *T. viridistriata* Sochor, Hroneš & Dančák (Sochor *et al.*, 2018) and *T. latiffiana* Siti-Munirah & Dome (Siti-Munirah and Dome, 2022) in overall appearance, including a blackish-brown tinged flower and coverage with verrucose or finger-like protrusions.

However, *T. chicoreoides* differs from *T. viridistriata* in its perianth inside with 12 vertical flat (vs. partly detached from its surface) ribs, apical end of individual connective slightly verrucose (vs. several hairs *ca.* 0.15–0.2 mm long), lateral appendage central lobe being largest (vs. smallest) and stigma lobes triangular (vs. inverted trapezoid). The new species is distinct from *T. latiffiana* in several characters: the outer surface of the floral tube and mitre are glabrous (vs. covered by golden trichomes), the inside of the perianth is reticulate (vs. covered by pyramidal protuberances), the apex of the connective lobes is slightly verrucose (vs. each lobe terminating in a needle-like trichome), and the capsule is pale brown to beige (vs. dark brown to blackish-brown). A comparison of the salient characters of the three species is presented in Table 1.

Thismia solomonensis S.W.Chung, T.C.Hsu & C.W.Lin, *sp. nov.* **Type:** THE SOLOMON ISLANDS: Guadalcanal Province, Guadalcanal Island, Vunga Tabu, 9°28'08"S, 159°37'1.0"E, 100–500 m above sea level, 27 July 2014, *Shih-Wen Chung, Wen-Liang Chiou, Cheng-Wei Chen, Moffat Fanarii & Peter Kosui SITW05581* (holotype: TAIF!; isotype TNM!).

Figs. 6 & 7

Diagnosis: *Thismia solomonensis* resembles *T. nigra* in vegetative characters. However, the new species differs

from the latter in its shorter stem, 2–12 mm tall (vs. up to 80 mm), yellowish-bronze perianth coloration (vs. blackish-tinged), unlobed individual connectives (vs. 2 small lobes), and a glabrous apex (vs. several long hairs in the middle).

Terrestrial achlorophyllous herbs, up to 7 cm or taller. **Roots** short, clustered, coralliform, pale yellow. **Stem** 2–12 mm long, creeping, ascending to erect, unbranched, pale beige. **Leaves** 2–4, spirally arranged, scalelike, ovate-triangular to lanceolate-ovate, acute, entire, 1.5–2.3 × 1–1.5 mm, of the same colour as stem. **Floral bracts** 3, of the same shape and colour as leaves, but slightly larger up to 3 × 1.8 mm. **Pedicel** indiscernible during anthesis, elongating during fruit maturing up to 6.5 cm. **Flowers** 1 per stem, actinomorphic, *ca.* 10 mm long, 4.5 mm wide below the top of floral tube; floral tube narrowly urceolate, outer surface pale yellowish-bronze to orangish-brown, with 12 longitudinal, yellowish-bronze to dusky yellow impressed stripes, slightly prominently raised between stripes; inner perianth lobes well developed, bent upwards, connate at top and forming mitre with 3 holes; holes elliptic to rounded, *ca.* 2.5 mm wide, 2 mm high; mitre acuminate, 3 ribs, perfectly connate into a short obtuse processes on the top, *ca.* 3.5 mm tall, yellowish-bronze to pale brown with paler base and margins of holes. **Annulus** thin, often markedly raised, divided into 6 shortly rectangular lobes. **Stamens** 6, pendent from the apical margin of the floral tube; filaments free, curved downwards, greyish-brown, pale orangish-yellow to brownish-yellow; connectives laterally connate to form a tube, sparsely hirsute, *ca.* 1.5 mm long, grey to pale brownish-yellow; interstaminal glands not prominent, hidden under their lateral appendages; apical end of individual connective not exceeding lateral appendage, shallowly triangular, glabrous; lateral appendage whiteish to pale beige, composed of 3 lobes, central lobe trapezoid, apex irregularly dentate and hirsute margin,

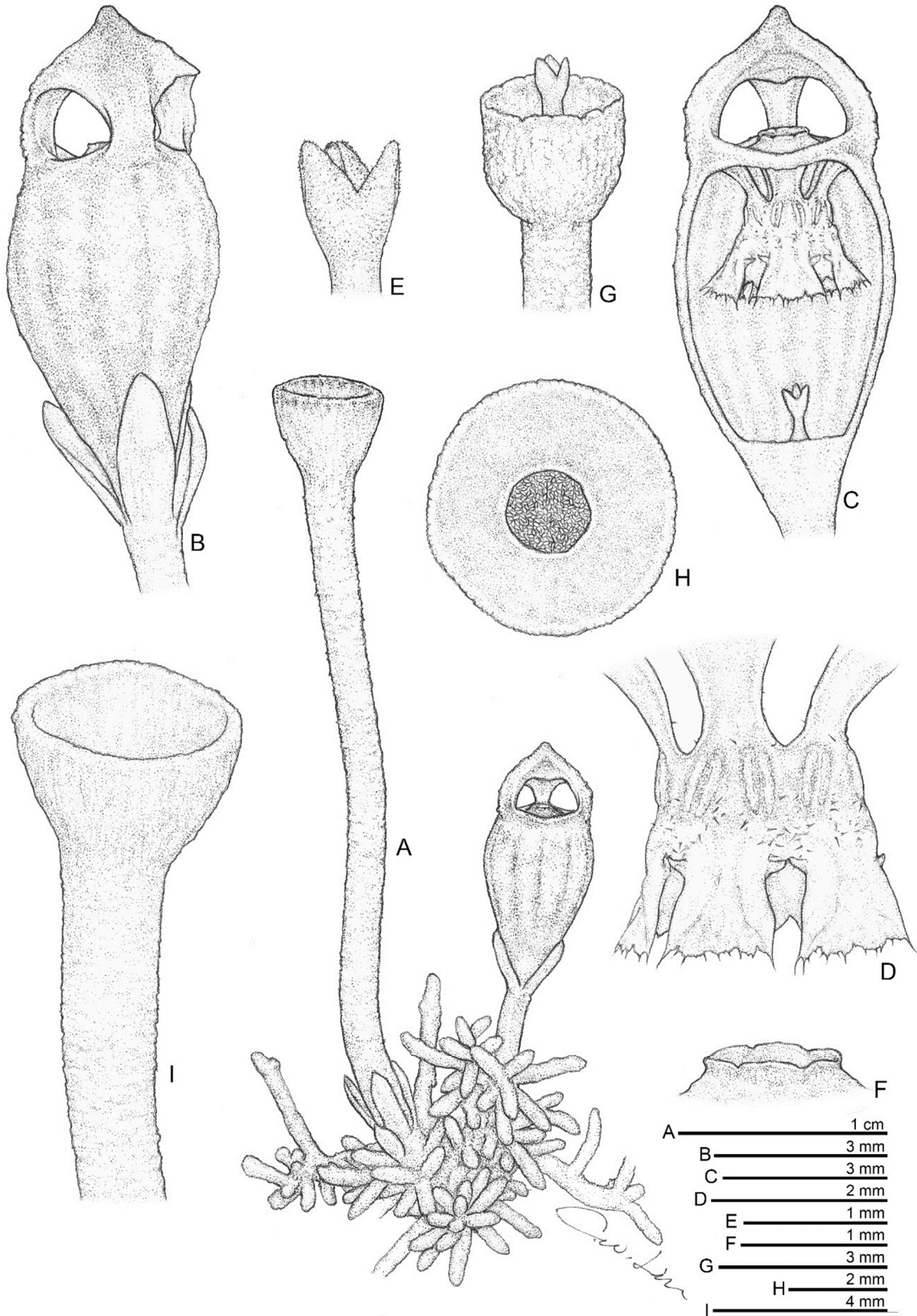


Fig. 6. *Thesium solomonensis* S.W.Chung, T.C.Hsu & C.W.Lin. **A.** Habit; **B.** Flower; **C.** Longitudinal section of flower with outer view of stamens; **D.** Stamens with lateral appendages and thecae, outer view; **E.** Stigma; **F.** Annulus; **G.** Immature capsule, **H, I.** Capsule, **H.** top view, **I.** side view.



Fig. 7. *Thismia solomonensis* S.W.Chung, T.C.Hsu & C.W.Lin. **A.** Plants in natural habitats; **B.**, **C.** Mature flowers, **B.** top view, **C.** side view; **D.**, **E.** Stamens with lateral appendages and thecae, outer view; **F.** Stigma; **G.** Capsule.

TABLE 2. Comparison of *Thismia solomonensis*, *T. nigra* and *T. brunneomitra*.

	<i>T. solomonensis</i> (Figs. 6, 7)	<i>T. nigra</i>	<i>T. brunneomitra</i>
Stem length (mm)	2–12	up to 80	45–65
Number of flower	1 per each stem	1–4 per each stem	1 or 2 per each stem
Color of perianth	yellowish-bronze to orangeish-brown	dark greenish-grey	pale brown to brown
Connective			
color	grey to pale brownish-yellow	blue	pale blue to pale purple
lobes apex	unlobed, shallowly triangular, glabrous	bilobed with several long hairs	two tufts of glandular hairs on adaxial side and three lobes on free apical margin
Lateral appendage			
margin of central lobe	hirsute	long hairs	glandular hairs
Color of capsule	yellowish-bronze to pale brown	pinkish-brown to dark brown	brown to dark brown

lateral lobes obtuse triangular, slightly recurved. **Style** rather short, *ca.* 0.6 mm, orangeish-yellow; stigma 3-lobed, white, papillose, lobes triangular, straight, apex truncate to retusecor. **Capsule** cup-shaped, longitudinally ribbed, yellowish-bronze to pale brown, *ca.* 5 mm in diameter, on elongated pedicel. **Seeds** pale yellowish-brown, ellipsoid, *ca.* 0.3 × 0.15 mm.

Distribution and ecology: This species is presently exclusive to Mt. Vunga Tabu on Guadalcanal Island, Solomon Islands. Discovered within the leaf litter of a tropical forest, this new species inhabits a broadleaf forest with a dense canopy. Within this habitat, can also find *Sciaphila secundiflora* Thwaites ex Benth. And *Corybas mirabilis* (Schltr.) Schltr.

Etymology: The specific epithet refers to the Solomon Islands, where the new species was discovered.

Conservation: This species is known only from a single location, the type locality in Vunga Tabu on western Guadalcanal Island. The collection site is remote and rarely visited by humans. Therefore, until more extensive collection efforts reveal otherwise, we must assume that this species has a very restricted range. With an extremely small area of occupancy (AOO), we suggest evaluating the species as Critically Endangered (CR C2a(i)+D) according to the Guidelines for using the IUCN Red List categories and criteria, version 16 (IUCN 2024). This indicates that the population occupies a very restricted area or number of locations and is highly susceptible to stochastic events in the near future. Such events could precipitate its critical endangerment or even extinction.

Notes: *Thismia solomonensis* is a typical member of the sect. *Sarcosiphon*, bearing connate perianth lobes, forming mitre-like flowers, and dense coralliform rhizomes. It is morphologically most similar to *T. nigra* Dančák, Hroneš & Sochor, which was described in Sarawak (Sochor *et al.*, 2018). Both species share similarities in their flower shapes, being obtuse on top, and having an annulus that is flat with six low rectangular lobes. The lateral appendage exceeds the connective apex, margins have hairs, and the stigma is 3-lobed, with each lobe deeply divided into 2 triangular lobes. However, the new species is distinct from *T. nigra* due to its shorter

stem 2–12 mm (vs. up to 80 mm) tall, yellowish-bronze flower colour (vs. blackish tinged), individual connectives unlobed (vs. with 2 small lobes), and glabrous apex (vs. several long hairs in the middle). In the overall appearance of the perianth and the lateral appendage exceeding the connective apex, it also resembles *T. brunneomitra* Hroneš, Koblrová & Dančák (Hroneš *et al.*, 2015), but it is distinct in its yellowish-bronze coloration (vs. dark brown to nearly black), individual connectives trilobed (vs. unlobed), and hirsute margins of the lateral appendage (vs. lined with glandular hairs).

Additionally, the new species is endemic to the Solomon Islands in the South Pacific, whereas all other related species are distributed in Borneo. A comparison of the phenotypic characteristics of the three species is presented in Table 2.

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