

Two new species, three new records and taxonomic notes of *Rhododendron* (Ericaceae) in Thailand

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ABSTRACT

Two new species, *Rhododendron trichopetalum* and *R. yalaense*, from Peninsular Thailand, are described and illustrated. Three new records of *R. jasminiflorum*, *R. klossii* and *R. robinsonii* are newly reported for Thailand, and *R. klossii* is herein reinstated. Lectotypifications were designated where required and an updated key to species, modified from the Flora of Thailand, is provided.

KEYWORDS: anatomical features, Ericales, plant taxonomy, pollen morphology, Flora of Thailand.

Accepted for publication: 7 April 2026. Published online: 10 August 2026

INTRODUCTION

Rhododendron L. belongs to the family Ericaceae, order Ericales (The Angiosperm Phylogeny Group IV [APG IV], 2016), and comprises ca 1,100–1,200 species (POWO, 2025; WFO, 2025). The genus is mainly distributed in Asia (Irving & Hebda, 1993), particularly in the tropical and subtropical regions of East and South-East Asia. China has 606 species (Fang *et al.*, 2005; POWO, 2025), India 80 (Bhattacharyya and Sanjappa, 2008), Malesia 313 (subg. *Vireya*) (Sleumer, 1960; 1966, Argent *et al.*, 1988, Argent, 2006), Bhutan 165 (Irving & Hebda, 1993), Myanmar 226 (POWO, 2025), Japan 152 (POWO, 2025), Vietnam 68 (POWO, 2025) and Thailand 14 (this paper) updating the nine of Watthana (2015).

The genus *Rhododendron* was first described by Linnaeus (1753). Since then, its infrageneric taxonomic classification has been revised several times. Sleumer (1949, 1969) recognized five subgenera comprising 11 sections. Subsequently, Chamberlain *et al.* (1996) divided the genus into

eight subgenera based on morphological, anatomical, and phytochemical studies, and Stevens (2004) retained the division into eight subgenera. However, Goetsch *et al.* (2005) proposed a reclassification recognizing only five subgenera and four sections based on molecular phylogenetic analyses. Later, Argent (2006) presented a more detailed classification system consisting of nine subgenera, 18 sections, and 59 subsections. More recently, Xia *et al.* (2022), based on phylogenomic data, support the recognition of five subgenera consistent with the classification proposed by Goetsch *et al.* (2005), indicating that molecular-based classification continues to be well-supported.

Rhododendron are trees, shrubs, or epiphytes, with simple leaves that are arranged alternately or in pseudo-whorls, covered in scales and glandular and non-glandular hairs. Inflorescences are terminal or in the axils of the branches, commonly forming racemes, umbels, or sub-umbels. The flowers are tubular, funnel-shaped, sub-funnel-shaped, campanulate, rotate or cylindrical. Typically, there

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are 5–10 stamens with dorsifixed anthers opening at apical pores. The ovary is superior and ovoid, cylindrical, fusiform, or conical. The capsule develops into a dry, dehiscent septicidal capsule filled with many winged seeds (Sleumer, 1966; Cullen, 2005; Fang *et al.*, 2005; Watthana, 2015).

In Thailand, the study of the genus *Rhododendron* was first reported by Hutchinson (1932) who listed 10 species, namely *R. arboreum* Sm., *R. ludwigianum* Hoss., *R. malayanum* Jack, *R. microphyton* Franch., *R. moulmainense* Hook., *R. oxyphyllum* Franch., *R. simsii* Planch., *R. surasianum* Balf.f. & Craib, *R. taiense* Hutch. and *R. veitchianum* Hook. Sleumer (1958, 1963, 1969) reported nine species, with *R. arboreum* later renamed and treated as a synonym of *R. delavayi* Franch.

Watthana (2015) revised Ericaceae in the Flora of Thailand using mainly morphological characters and reported nine species of *Rhododendron*, including *R. ciliicalyx* Franch., *R. delavayi*, *R. longiflorum* Lindl. var. *subcordatum* (Becc.) Argent., *R. malayanum*, *R. microphyton*, *R. moulmainense*, *R. simsii*, *R. taiense* and *R. veitchianum*. However, key characters of each species could appear to be indistinguishable in dried herbarium specimens or might have been lost during the preservation process. Despite this, many species were synonymized solely using herbarium specimens. Therefore, we emphasized the use of anatomical and palynological features to complement morphology for species clarification.

Pollen morphological characters, particularly ornamentation and aperture type are widely recognized as taxonomically significant characters in many groups of flowering plants (Suwanphakdee *et al.*, 2026). Similarly, anatomical features such as stem, leaf, stomatal type and vascular arrangement may exhibit structural variation that is not apparent from external morphology (Stuessy, 2009). During work on anatomical and palynological characters of *Rhododendron* in Thailand, we discovered several new species-specific characters and found that five taxa require taxonomic revision. In this paper, *Rhododendron trichopetalum* Tubtamat & Suwanph. and *R. yalaense* Tubtamat, Watthana & Suwanph. are newly described species and *R. jasminiflorum* Hook. and *R. robinsonii* Ridl. are new records for Thailand. Additionally, *R. klossii* Ridl. is reinstated as an accepted species.

MATERIALS AND METHODS

Fresh specimens were collected from the field under an official collection permit issued by the Department of National Parks, Wildlife and Plant Conservation, Thailand. Morphological characters were examined from fresh materials using a stereo microscope before the specimens were dried and prepared as voucher specimens deposited at the BKF and QBG herbaria (acronyms follow Thiers, 2025, continuously updated). Further herbarium specimens were examined from BKF, KKU, QBG, SING and TCD. Online images of herbarium specimens from BM, K and L were also examined using JSTOR Global Plants and the digital databases of the respective herbaria.

Standard plant techniques were used for the anatomical studies (Johansen, 1940; Walton *et al.*, 1967; Kermanee, 2008). The branch, leaves (petiole, midrib and margin) were fixed in Formalin-Acetic Acid-Alcohol 50% (FAA), dehydrated with tert-butyl alcohol (TBA) at 50%, 70%, 95% and 100%, embedded and sectioned using a rotary microtome (Leica RM 2165). The samples were stained with Safranin O and Fast Green and mounted in DePeX mounting media. The upper and lower epidermal surfaces were prepared using the peeling method and stained with Safranin O. All permanent slides were examined under a light microscope and stored at the Palynology Special Research Unit, Department of Botany, Faculty of Science, Kasetsart University, Bangkok.

Pollen grains were prepared using acetolysis techniques following Erdtman (1960), with 20 replicates per taxon. Pollen grains were examined under a light microscope (Olympus CH30) at 100X magnification. Eight pollen characters were measured following Park & Song (2010) namely: tetrad diameter, diameter of top grain, apocolpium diameter, polar axis length (P), equatorial axis width (E), colpus length, colpus width, and exine thickness. In addition, pollen shape was determined based on the ratio between the P and E. For scanning electron microscopy (SEM) observation, pollen grains were preserved in absolute ethanol, mounted on stubs, air-dried at room temperature without critical point drying (CPD), and coated with 99% pure gold. Observations were conducted using an SEM (FEI Quanta 450) at the Scientific Equipment Center,

Faculty of Science, Kasetsart University, Bangkok, Thailand. Pollen terminology follows Hesse *et al.* (2009) and Park & Song (2010).

TAXONOMIC TREATMENT

NEW SPECIES

1. *Rhododendron trichopetalum* Tubtamat & Suwanph., **sp. nov.**

This species is similar to *Rhododendron javanicum* subsp. *teysmannii* (Miq.) Argent, however, *R. trichopetalum* lacks hairs on lower leaf surfaces (vs sparsely hairy or glandular-verruculose in *R. javanicum* subsp. *teysmannii*), with the corolla tube being sparsely hairy outside (vs glabrous), and the larger capsule 2.3–2.5 cm long (vs 3.7–8 cm long).

Type: Thailand, Narathiwat Province, Waeng District, Hala Bala Wildlife Sanctuary, 890 m, 2 Nov. 2021, *M. Tubtamat 19* (holotype **BKF!** [SN272859]; isotypes **QBG!**). Figs. 1&2.

Epiphytic shrub, 3–5 m high; young branches with dense and not overlapping sub-stellate scales, ca 0.2 mm in diam., glabrous when mature, internode 2.8–4.6 cm long. *Leaves* pseudo-whorled with 2–3

leaves at the distal end of the branches, elliptic, ovate or lanceolate, 7.6–14.5 × 3.6–6 cm, coriaceous, apex acuminate, base cuneate or oblique, margin entire, revolute when dry, midrib with groove and glabrous adaxially, prominent and with dense sub-stellate scales abaxially, lateral veins 9–10 pairs. *Petiole* 0.7–1.5 × 0.3–0.5 cm, without grooves, sparse sub-stellate scales. *Flower bud* ellipsoid, 2.9–3 × 1–1.2 cm, apex acute, outer bract oblong or spatulate, 0.5–2 × 0.4–0.5 cm, apex truncate, margin entire, glabrous, inner bract oblong, 1.1–3 × 1–1.7 cm, apex acute or obtuse, margin entire, glabrous; bracteoles linear, 2–2.5 cm long, glabrous. *Inflorescence* terminal, 7–7.5 × 7.5–8.2 cm, with 1–3 flowers. *Flowers* sub-funnel-shaped, 4–4.2 × 2.8–3.9 cm; pedicel 2.5–3 × 0.2–0.3 cm. *Calyx* ring-like, margin shallowly lobed, base oblique, sparsely hairy outside. *Corolla* yellow; tube 1.2–1.5 × 0.6–1.8 cm, sparsely hairy outside, densely hairy inside; lobes obovate or spatulate, 2.5–2.7 × 0.5–1.5 cm, apex obtuse, margin repand. *Stamens* 10, unequal in length; filaments 2–2.5 cm long, hairy at base, glabrous on middle to terminal parts; anthers 5–5.3 × 3–3.3 mm, curved, yellow, disc multifid, with sparse hairs. *Ovary* cylindrical or fusiform, 0.5–0.7 × 0.3–0.4 cm, 5-loculed, densely hairy; style 0.7–1.5 cm long,

KEY TO THE SPECIES OF RHODODENDRON IN THAILAND

- | | |
|---|---|
| 1. Lower leaves with grayish hairs forming spongy-like indumentum | R. delavayi |
| 1. Lower leaves without spongy-like indumentum | |
| 2. Flowers distinctly tubular or salverform-shaped | |
| 3. Corolla tube nearly as long as corolla lobes | R. longiflorum var. subcordatum |
| 3. Corolla tube distinctly longer than corolla lobes | |
| 4. Flowers white or flushed with purple; corolla tube more than 3 cm long | R. jasminiflorum , new record |
| 4. Flowers bright red, purplish to pink; corolla tube less than 2.5 cm long | R. malayanum |
| 2. Flowers funnel or sub-funnel-shaped | |
| 5. Flowers funnel-shaped | |
| 6. Leaves with scales and without hairs beneath | R. ciliicalyx |
| 7. Capsule less than 2.7 cm long; calyx margin setose, rarely not | R. veitchianum |
| 7. Capsules longer than 2.7 cm; calyx margin glabrous or with very few long hairs at apex | |
| 6. Leaves without scales and densely hairy beneath | R. simsii |
| 8. Stamens 10; corolla red, 4–5 cm long | R. microphyton |
| 8. Stamens 5; corolla white or white-pink, up to 2.5 cm long | |
| 5. Flowers sub-funnel-shape, usually narrow and shortly tubular at base | |
| 9. Leaves without scales; flowers white | |
| 10. Pedicel with glandular hairs | R. taiense |
| 10. Pedicel glabrous | |
| 11. Ovary and capsule glabrous | R. moulmainense |
| 11. Ovary and capsule with densely hairy | R. klossii , new record |
| 9. Leaves with scales on lower surface; flowers yellow or orange | |
| 12. Corolla tube and ovary densely hairy | R. trichopetalum , sp. nov. |
| 12. Corolla tube and ovary glabrous | |
| 13. Flowers orangish; capsule cylindrical, less than 3 cm long | R. yalaense , sp. nov. |
| 13. Flowers yellow; capsule fusiform, more than 3 cm long | R. robinsonii , new record |

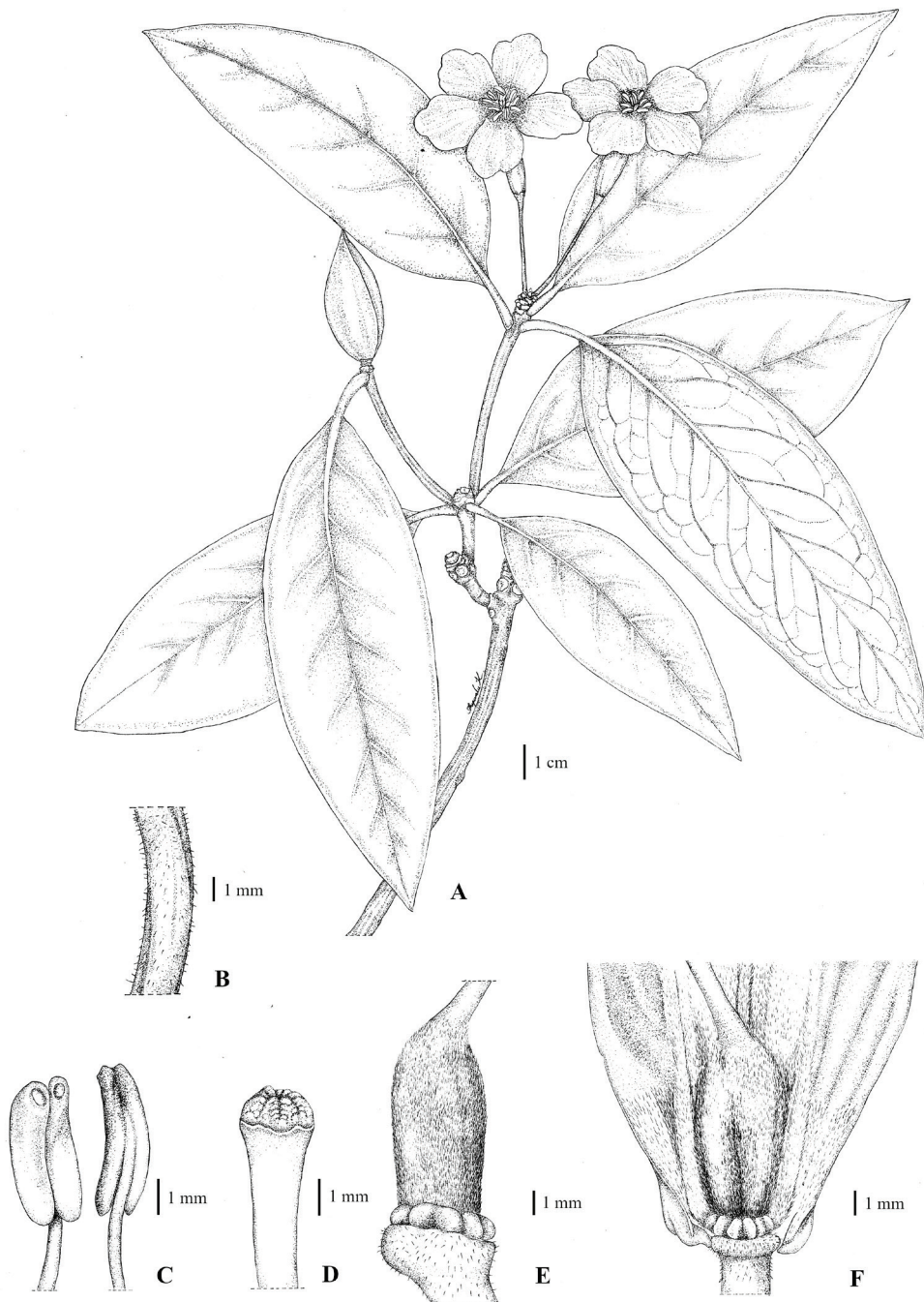


Figure 1. Line drawing of *Rhododendron trichopetalum* Tubtamat & Suwanph. A. flowering branch; B. pedicel with hairs; C. anthers; D. capitate stigma; E. ovary with dense hairs; F. ovary and corolla with hairs. Drawn by T. Khananthong.

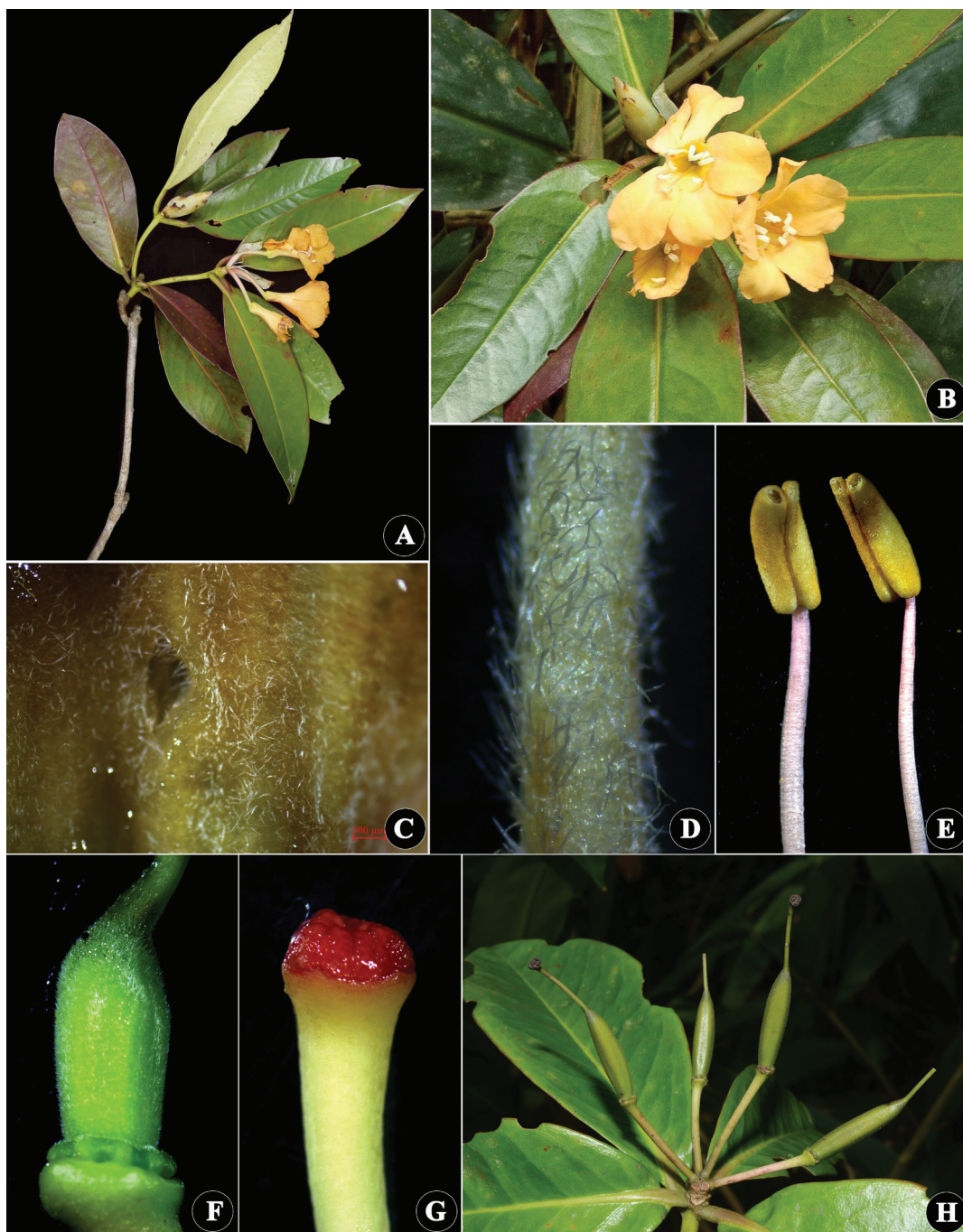


Figure 2. *Rhododendron trichopetalum* Tubtamat & Suwanph. A. flowering branch; B. flowers; C. hairs on corolla tube; D. basal filament with hairs; E. anther; F. ovary; G. stigma; H. capsule. Photographed by C. Suwanphakdee and M. Tubtamat.

curved on middle to terminal parts, glabrous; stigma red. *Capsule* fusiform, $2.3\text{--}2.5 \times 0.4\text{--}0.6$ cm, straight, base oblique, densely hairy. *Seed* $0.7\text{--}0.9$ cm long, base and apex with tail.

Thailand.—PENINSULAR: Narathiwat [Waeng District (Hala Bala Wildlife Sanctuary), 890 m alt., 2 Nov. 2021, *Tubtamat 19* (BKF!, QBG!)].

Distribution.— Endemic to Thailand.

Ecology.— In evergreen rainforest on mountain summits, at 890 m alt. Flowering: November–December; Fruiting: March–April.

Conservation status (IUCN 2024).—*Rhododendron trichopetalum* is endemic to Thailand and currently known only from small populations in Hala Bala Wildlife Sanctuary, Narathiwat Province. Field observations indicate that the species has a restricted distribution. However, additional surveys are required to determine its full distribution range, population status and potential threats. Therefore, the species is provisionally assessed as Data Deficient (DD) according to the IUCN Red List Categories and Criteria (IUCN, 2024).

Notes.— *Rhododendron trichopetalum* is distinguished by leaves with scales on the lower surface and a yellow corolla. The pedicels and corolla tubes are sparsely hairy on the outer surface

and the capsules, based on mature dehiscent fruits, are shorter than 3 cm.

In comparison, *R. javanicum* subsp. *teysmannii* has leaves with glandular-verruculose hairs, and the corolla tube is glabrous on the outer surface. The flowers are bright red to orange, rarely yellow and the capsules are longer than 3 cm (Table 1).

The pollen of *R. trichopetalum* shows tetrahedral tetrads. It is isopolar with radial symmetry and apertures are 3-colporate and possess viscin threads. Pollen has a diameter of $36.02\text{--}40.04 \pm 1.60$ μm , top grain diameter is $23.72\text{--}28.04 \pm 1.19$ μm , and apocolpium diameter is $15.11\text{--}18.89 \pm 1.25$ μm . The polar axis length is $16.08\text{--}20.23 \pm 1.14$ μm , and the equatorial axis width is $24.76\text{--}30.05 \pm 1.64$ μm . The colpus length ranges from $8.81\text{--}15.64 \pm 2.05$ μm , with a width of $1.83\text{--}3.57 \pm 0.47$ μm , and the exine thickness is $1.89\text{--}3.06 \pm 0.29$ μm . The basal grains are oblate (P/E 0.69). Pollen ornamentation is micro-fossulate on the apocolpium and fossulate on the mesocolpium. In comparison, *R. javanicum* subsp. *teysmannii* differs in having a larger tetrad with a diameter of $45.04\text{--}48.84 \pm 1.25$ μm . The top grain is larger with a diameter of $34.05\text{--}38.04 \pm 1.15$ μm , it has a longer equatorial axis ($30.23\text{--}35.95 \pm 1.46$ μm) and has granulate ornamentation on both the apocolpium and mesocolpium (Table 2 and Fig. 3).

Table 1. Comparison of morphology of *Rhododendron trichopetalum* Tubtamat & Suwanph. and *R. javanicum* subsp. *teysmannii* (Miq.) Argent.

Characters	<i>R. trichopetalum</i>	<i>R. javanicum</i> subsp. <i>teysmannii</i>
habit	epiphytic shrub, 3–5 m	epiphytic shrub, woody shrub, large shrub, 3–10 m
branchlet	sparsely scaly	sparsely scaly or glabrous
leaf length	7.6–14.5 cm	7.5–20.3 cm
leaf surface	without hairs	sparsely hairy or glandular-verruculose on lower surface
flowers	1–3 flowers	3–7 flowers
color	yellow	bright reddish, orange, rarely yellow
corolla tube indumentum	sparsely hairy outside	glabrous
capsule length	2.3–2.5 cm	3.7–8 cm

Table 2. Comparison of pollen morphology of *Rhododendron trichopetalum* Tubtamat & Suwanph. and *R. javanicum* subsp. *teysmannii* (Miq.) Argent.

Characters	<i>R. trichopetalum</i>	<i>R. javanicum</i> subsp. <i>teysmannii</i>
tetrad diameter	36.02–40.04 ± 1.60 µm	45.04–48.84 ± 1.25 µm
diameter of top grain	23.72–28.04 ± 1.19 µm	34.05–38.04 ± 1.15 µm
equatorial axis width	24.76–30.05 ± 1.64 µm	30.23–35.95 ± 1.46 µm
colpus length ornamentation	8.81–15.64 ± 2.05 µm	16.05–22.47 ± 1.68 µm
apocolpium	micro-fossulate	granulate
mesocolpium	fossulate	granulate

2. *Rhododendron yalaense* Tubtamat, Watthana & Suwanph., **sp. nov.**

This new species is similar to *Rhododendron rarilepidotum* J.J.Sm., endemic to Indonesia, but differs by having petioles without grooves (vs with grooves in *R. rarilepidotum*), corolla 3.1–3.6 cm long (vs 2–2.5 cm long), pale orange with 2.1–3.0 cm long filaments (vs purplish, dark red or white, 0.9–1.0 cm long), yellow anthers (vs purplish) and cylindrical capsule (vs fusiform capsule).

Type: Thailand, Yala Province, Bannang Sata District (Khao Pok Yok), 1,096 m alt., 15 Dec. 2021, *M. Tubtamat 24* (holotype **BKF!** [SN272860]; isotypes **QBG!**). Figs. 4&5.

Epiphytic shrub or small shrub, 1–3 m high; young branches rounded, with dense and not overlapping sub-stellate scales, ca 0.2 mm in diam., mature branches sparsely hairy and with laxly distributed sub-stellate scales. *Leaves* pseudo-whorled with 3–5 leaves at the distal end of the branches, elliptic, elliptic-lanceolate, 7.6–11.4 × 2.8–4.3 cm, coriaceous and glossy, apex rounded or acute, base cuneate, margin entire, revolute when dry, midrib with ridge and with sparse sub-stellate scales on upper surface, with flat and dense sub-stellate scales on lower surface, lateral veins 11–14 pairs. *Petiole* 0.7–1.5 × 0.3–0.5 cm, without grooves, with sub-stellate scales. *Inflorescence* terminal, 6–7.5 × 11.5–12 cm, with 3–9-flowers. *Flowers* sub-funnel-shaped, 3.1–3.6 × 2.6–3.5 cm; pedicel 1.5–2.7 × 0.1–0.2 cm, with pale orange, with sparse sub-stellate scales. *Calyx* ring-like, margin shallowly lobed, glabrous or with sparse sub-stellate scales

outside. *Corolla* orangish; tube 1.5–2.2 × 0.3–1.5 cm, with sparse sub-stellate scales outside, glabrous inside; lobes obovate, 1.9–2.4 × 0.5–0.8 cm, apex obtuse, margin repand, glabrous on both sides. *Stamens* 10, unequal in length; filaments 2.1–3 cm long, pale orange at base, red-orange on middle to terminal parts, glabrous; anthers 3–5 × 1–2 mm, curved, yellow, disc multifid, 8–10-lobed, glabrous. *Ovary* cylindrical, 4–6 × 2–3 mm, 5-loculed, glabrous; style 1.6–1.9 cm long, curved on middle to terminal parts, glabrous; stigma orange. *Capsule* cylindrical, 2–3 × 0.4–0.5 cm, straight, base oblique, green, glabrous. *Seed* 5–7 mm long, base and apex with tail.

Thailand.— PENINSULAR: Yala Province [Khao Pok Yok, Bannang Sata District, 1,096 m alt., 15 Dec. 2021, *Tubtamat 24* (**BKF!**, **QBG!**)].

Ecology.— This species is growing near a mountain summit in evergreen forest, at an elevation of 1,096 m alt. Flowering: November–December; Fruiting: January–February.

Conservation status (IUCN 2024).— *Rhododendron yalaense* is provisionally assessed as Critically Endangered [CR B2ab (iii)] according to the IUCN Red List Categories and Criteria (IUCN, 2024). The species is currently known from a single population in Yala Province, Peninsular Thailand, with an estimated area of occupancy (AOO) of 4 km². Although the population occurs in an area protected by the Royal Thai Army Television Station, the locality is situated near a community and affected by tourism activities, which may lead to a continued decline in habitat quality.

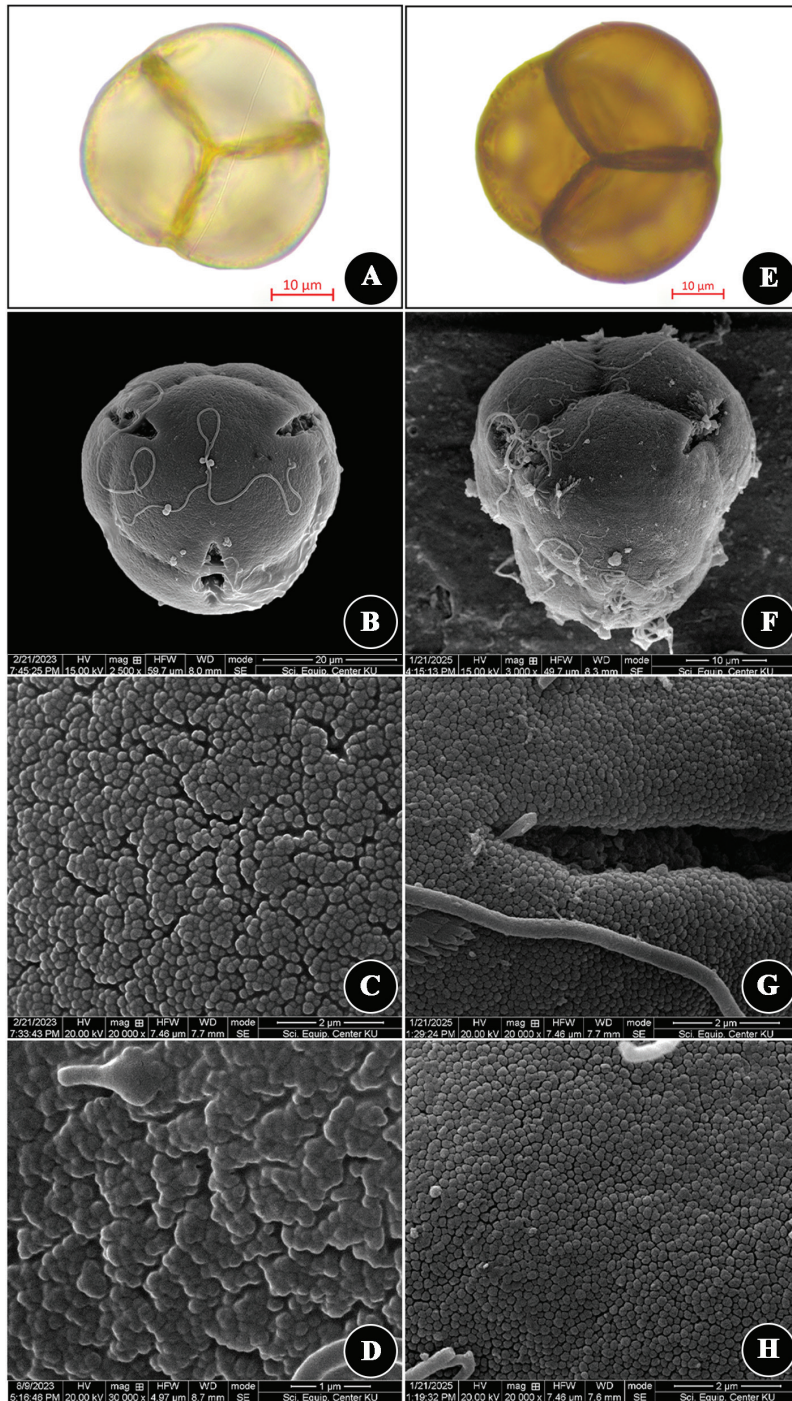


Figure 3. Pollen morphology from light microscope (LM) and scanning electron microscope (SEM) of *Rhododendron trichopetalum* Tubtamat & Suwanph. and *R. javanicum* subsp. *teysmannii* (Miq.) Argent. *Rhododendron trichopetalum* (A–D): A. tetrahedral tetrad (LM); B. tetrahedral tetrad (SEM); C. micro-fossulate on apocolpium; D. fossulate on mesocolpium; *R. javanicum* subsp. *teysmannii* (E–H): E. tetrahedral tetrad (LM); F. tetrahedral tetrad (SEM); G. granulate on apocolpium; H. granulate on mesocolpium.

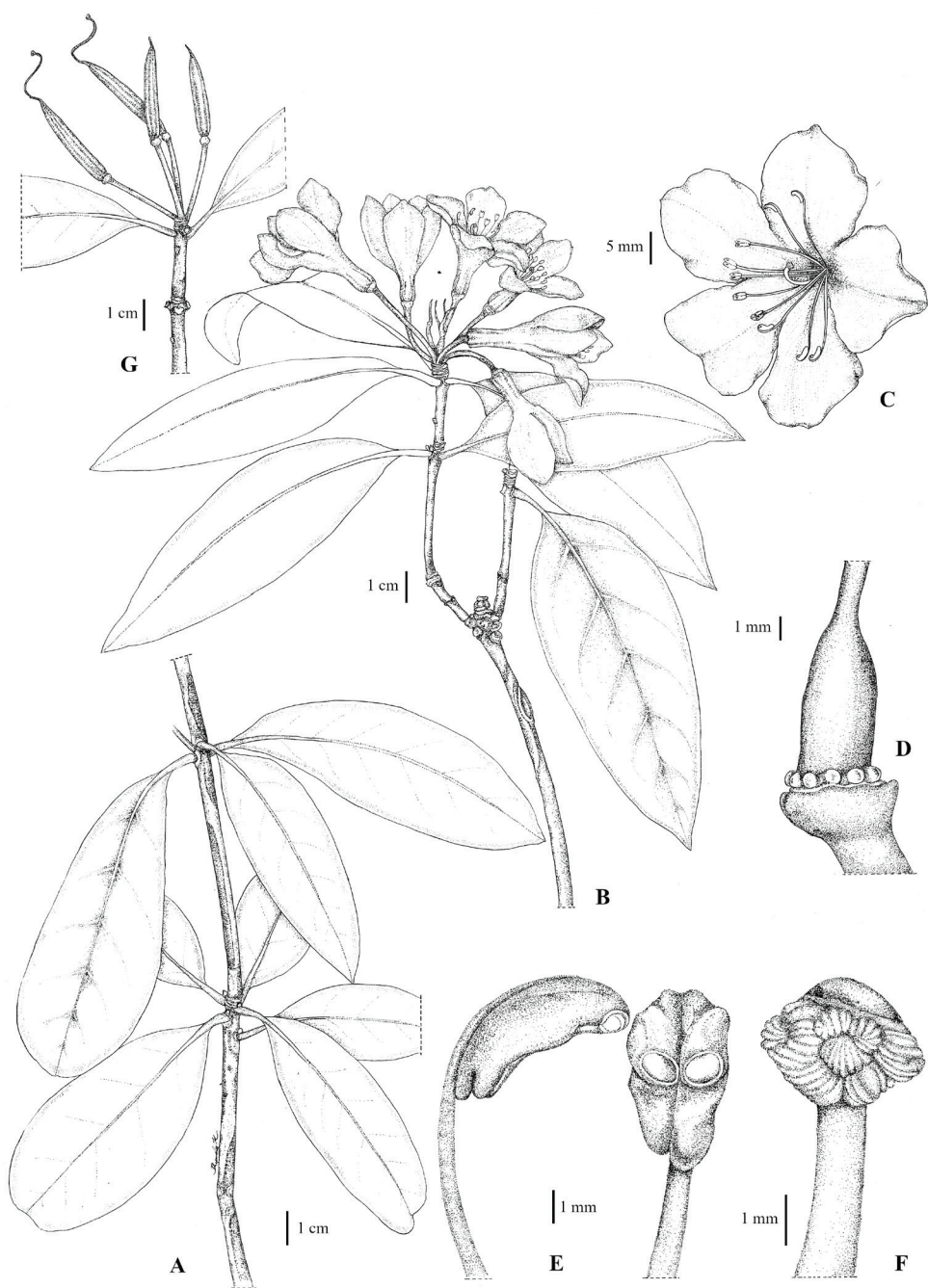


Figure 4. Line drawing of *Rhododendron yalaense* Tubtam, Watthana & Suwanph. A. leaves with pseudo-whorled arrangement; B. flowering branch; C. flower (frontal view); D. ovary; E. anther; F. stigma; G. capsule. Drawn by T. Khananthong.

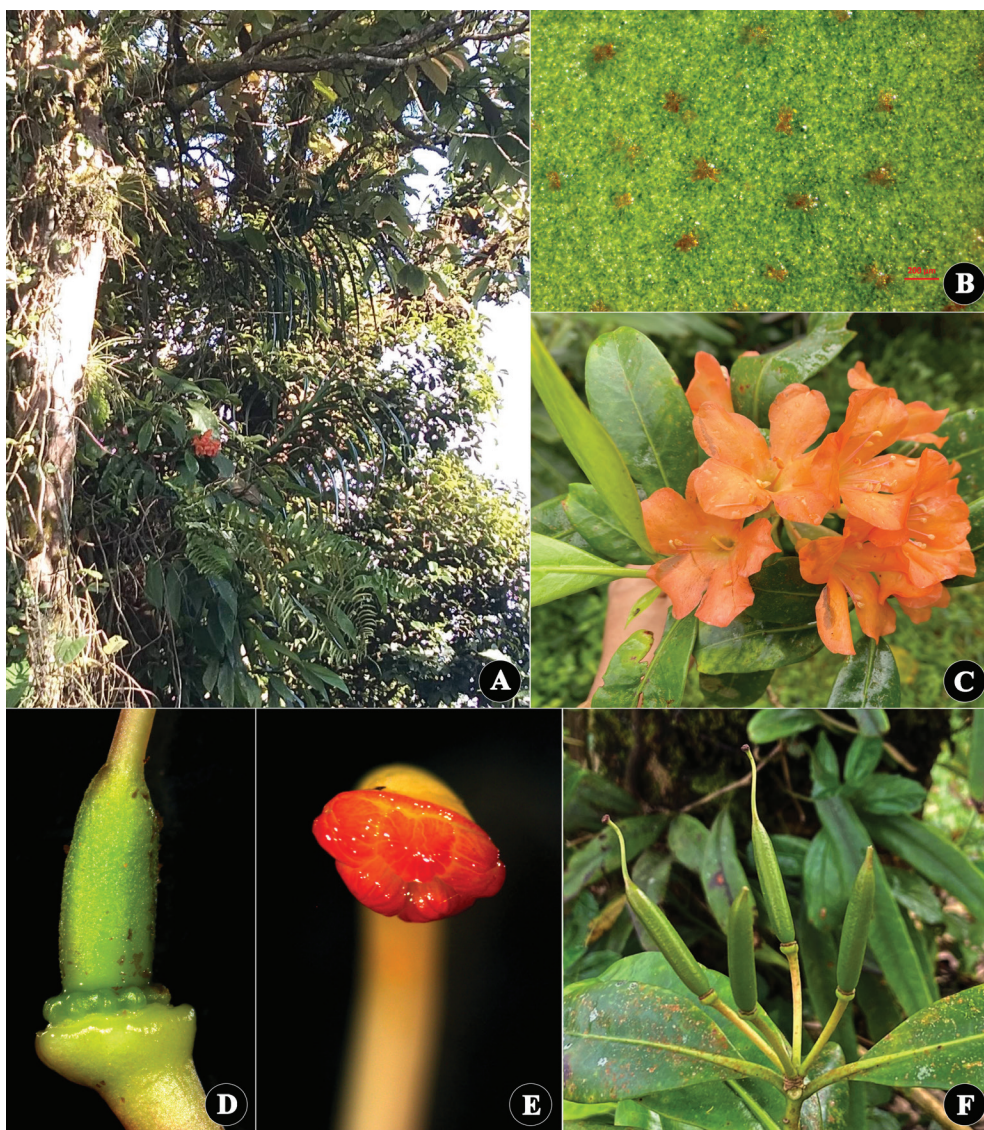


Figure 5. *Rhododendron yalaense* Tubtamat, Watthana & Suwanph. A. habit; B. scales on lower leaf surface; C. inflorescence; D. ovary; E. stigma; F. capsule. Photographed by M. Tubtamat and C. Suwanphakdee.

Notes.—*Rhododendron yalaense* is characterized by the combination of scaly branches and leaves, pseudo-whorled elliptic or elliptic-lanceolate leaves, scaly pedicels, sub-funnelform corollas, a glabrous ovary, petioles lacking grooves, corolla 3.1–3.6 cm long, and yellow anthers. It closely resembles *R. rarilepidotum* but differs in its ungrooved petioles, longer corollas, and yellow anthers (Table 3).

Rhododendron yalaense and *R. rarilepidotum* share common pollen morphology. They have tetrahedral tetrads, and each pollen grain is isopolar with radial symmetry and 3-colporate aperture. The grains are oblate (P/E) in shape and the ornamentation of both the apocolpium and mesocolpium is granulate. However, *R. yalaense* possesses distinctive features, including a tetrad diameter of $24.29\text{--}29.90 \pm 1.32 \mu\text{m}$, a diameter of top grain of $16.19\text{--}20.00 \pm 1.05 \mu\text{m}$, and an apocolpium diameter of $8.34\text{--}10.92 \pm 0.66 \mu\text{m}$ (Table 4 and Fig. 6).

NEW RECORDS

1. *Rhododendron jasminiflorum* Hook., Bot. Mag. 76: t. 4524. 1850. Type: Malaysia. Mt Ophir, 1 Apr. 1850, *Lobb s.n.* (lectotype **K** [K000675051], designated here, photo seen; isolectotype **K** [K000675052], photo seen). Fig. 7.

Epiphytic shrub or small shrub, 2–2.5 m high; young branches rounded, sparsely hairy and with dense non-overlapping stellate scales, glabrous when mature, internode 3–5 cm long. *Leaves* pseudowhorled with 3–5 leaves at the distal end of the branches, obovate, elliptic-obovate or elliptic, sometimes sub-circular, 3.5–5.8 × 2–3.3 cm, coriaceous and glossy, apex obtuse, rounded or acuminate, base obtuse, sub-truncate or cordate, margin entire, revolute when dry, midrib flat and with sparse stellate scales on upper surface, raised and with dense stellate scales on lower surface, lateral veins 6–7 pairs. *Petiole* flat, sub-sessile, 2–4 × 1.5–2 mm, with sparse stellate scales. *Flower bud* ovoid, 14–14.2 × 6–6.4 mm, green or flushed with purple, bract ovate, obovate or spatulate, 10–10.2 × 6–6.3 mm, glabrous or with sparse stellate scales on outside, glabrous

inside; bracteoles linear, 10–10.2 × 0.6–0.8 mm, glabrous. *Inflorescence* terminal, 13–13.9 × 8.3–8.5 cm, 5–15-flowers. *Flowers* salverform-shaped, 4–5.2 × 1–1.4 cm, scented; pedicel 0.8–1.2 cm long, densely hairy or with sparse stellate scales. *Calyx* triangular, apex obtuse, margin shallowly lobed, densely hairy or with sparse stellate scales outside. *Corolla* pale pink, white or pink when young; tube narrow tubular, 3–4.2 × 0.3–0.4 cm, sparsely hairy and with stellate scales outside, laxly hairy or glabrous inside; lobes obovate, 8–1.3 × 0.8–1.1 cm, apex obtuse, margin crenate, laxly distributed stellate scales or glabrous on outside, glabrous inside. *Stamens* 10, unequal in length; filaments 3.4–4.2 cm long, hairy on base to middle, glabrous at terminal parts; anthers 1.8–2 × 1–1.5 mm, brown, disc multifid, with dense hairs. *Ovary* cylindrical, 5–5.3 × 2–2.2 mm, 5-loculed, densely hairy or with laxly distributed stellate scales; style with lax stellate scales on base to middle part, laxly hairy or glabrous on terminal part; stigma obconical or subcapitate, green. *Capsule* ellipsoid, 2.8–3 × 0.4–0.5 cm, 5-ridged, sparsely hairy or with stellate scales. *Seed* unknown.

Table 3. Comparison of morphology of *Rhododendron yalaense* Tubtamat, Watthana & Suwanph. and *R. rarilepidotum* J.J.Sm.

Characters	<i>R. yalaense</i>	<i>R. rarilepidotum</i>
habit	epiphytic shrub, 1–3 m	shrubs, tree or treelets, 1–6 m
mid-vein	ridged on upper, flat on lower leaf surface	raised or smooth on upper, grooved on lower leaf surface
petiole	without grooves	with grooves
pedicel color	pale orange	dark orange
corolla color	orangish	red, dark orange-red, bright orange-red, crimson or dark scarlet
corolla length	3.1–3.6 cm	2–2.5 cm
corolla lobe width	0.5–0.8 cm	1.2–1.7 cm
stamen color	pale orange	purplish, dark red or white
stamen length	2.1–3.0 cm	0.9–1.0 cm
anther color	yellow	purplish
capsule shape	cylindrical	fusiform

Table 4. Comparison of pollen morphologies of *Rhododendron yalaense* Tubtamat, Watthana & Suwanph. and *R. rarilepidotum* J.J.Sm.

Characters	<i>R. yalaense</i>	<i>R. rarilepidotum</i>
tetrad diameter	24.29–29.90 ± 1.32 µm	41.27–48.79 ± 2.12 µm
diameter top grain	16.19–20.00 ± 1.05 µm	30.25–34.02 ± 1.53 µm
apocolpium diameter	8.34–10.92 ± 0.66 µm	20.6–24.2 ± 1.43 µm
polar axis length	11.81–15.72 ± 1.10 µm	18.63–22.15 ± 1.54 µm
equatorial axis length	17.37–23.79 ± 1.81 µm	30.32–33.95 ± 1.26 µm
colpus length	9.77–12.68 ± 0.73 µm	15.27–19.39 ± 1.25 µm
colpus width	1.12–1.98 ± 0.33 µm	2.47–3.56 ± 0.37 µm
exine thickness	0.84–1.74 ± 0.21 µm	2.56–3.33 ± 0.30 µm

Thailand.—PENINSULAR: Yala Province [Khao Hun Kut, 1,100–1,500 m alt., 26 Mar. 1998, *Niyomdham 5339* (**BKF!** (SN113345))], same locality, 17 Dec. 2021, *Tubtamat 27* (**BKF!**, **QBG!**)].

Distribution.—Malaysia, Philippines.

Ecology.—Growing in open areas near and at mountain summit, in evergreen forest at 1,100–1,500 m alt. Flowering: November–December; Fruiting: January–February.

Notes.—Hooker (1850) mentioned *Lobb s.n.* as a type of *Rhododendron jasminiflorum*. We found two specimens deposited in **K** and selected **K** [K000675051] as the lectotype because Hooker worked at Kew and the inflorescence is complete and the handwritten description was found on the herbarium sheet. We selected **K** [K000675052] as the isolectotype.

Rhododendron jasminiflorum is an epiphytic shrub with several distinctive features. Its leaves are pseudo-whorled with stellate scales. The petioles are sub-sessile and lack grooves. The flower buds are ovoid. The flowers are salverform-shaped, 4–5.2 × 1–1.4 cm, pale pink and fragrant. The outer corolla tube surface is hairy and scaly, while the inner surface is only hairy. The filaments are 3.4–4.2 cm long, with hairs at the base. The ovary is cylindrical, 5–5.3 × 2–2.2 cm and is hairy and scaly. The stigma is obconical or sub-capitate. The capsule is ellipsoid, 2.8–3 × 0.4–0.5 cm and is also hairy and scaly. This species is distributed in Malaysia, the Philippines and Thailand. In Thailand, it is found in Yala Province.

This species may have been overlooked because the area is difficult to access and located within a protected area. In addition, the locality is close to the Malay Peninsula, where floristic exploration remains incomplete. So far, only a small population has been observed. In comparison with the type specimens from Mount Ophir, Malaysia at altitudes of 1,000 m above sea level, several consistent characters were observed, including leaves measuring 3.8–5.8 cm and covered with scales, flowers measuring 3.8–4.9 × 0.2–0.5 cm, and capsules measuring 2.1–2.3 × 0.2–0.5 cm.

2. *Rhododendron klossii* Ridl., J. Fed. Mal. St. Mus. 4:43 1909. Type: Malaysia. Gunung Berumban, Nov. 1908, *H.N. Ridley 13589* (lectotype (**SING** [SING0052272], designated here, photo seen; isolectotypes **BM** [BM000996700], photo seen, **K** [K000675042], photo seen)). Figs. 8&9.

Shrub or small tree, 2–7 m high; young branches purple or green, sparsely hairy or glabrous. *Leaves* pseudo-whorled with 5–10 leaves at the distal end of the branches, elliptic, lanceolate, or ovate, 6.4–9.2 × 2.1–4.3 cm, apex acuminate, base cuneate, margin entire, revolute, midrib grooved and glabrous on upper surface, prominent and glabrous on lower surface, densely hairy when young, lateral veins 7–14 pairs. *Petiole* 0.5–1 × 0.1–0.3 cm, glabrous, grooved. *Flower bud* ellipsoid or ovoid, 1.8–2.5 × 0.8–1 cm, apex acute, bract spatulate, 2.4–2.6 × 1.1–1.4 cm, apex acute or obtuse, base truncate,

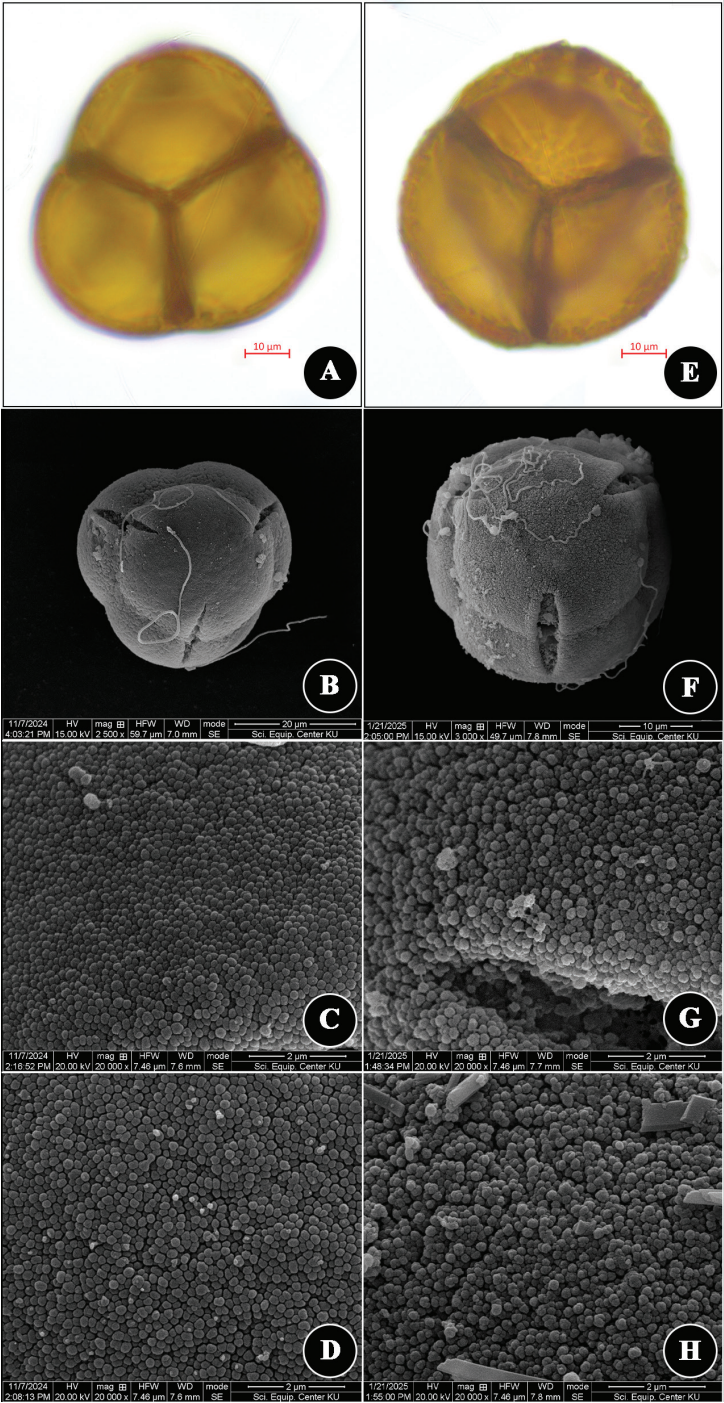


Figure 6. Pollen morphology from light microscope (LM) and scanning electron microscope (SEM) of *Rhododendron yalaense* Tubtamat, Watthana & Suwanph. and *R. rarilepidotum* J.J.Sm. *Rhododendron yalaense* (A–D): A. tetrahedral tetrad (LM); B. tetrahedral tetrad (SEM); C. granulate on apocolpium; D. granulate on mesocolpium; *R. rarilepidotum* (E–H): E. tetrahedral tetrad (LM); F. tetrahedral tetrad (SEM); G. granulate on apocolpium. H. granulate on mesocolpium.

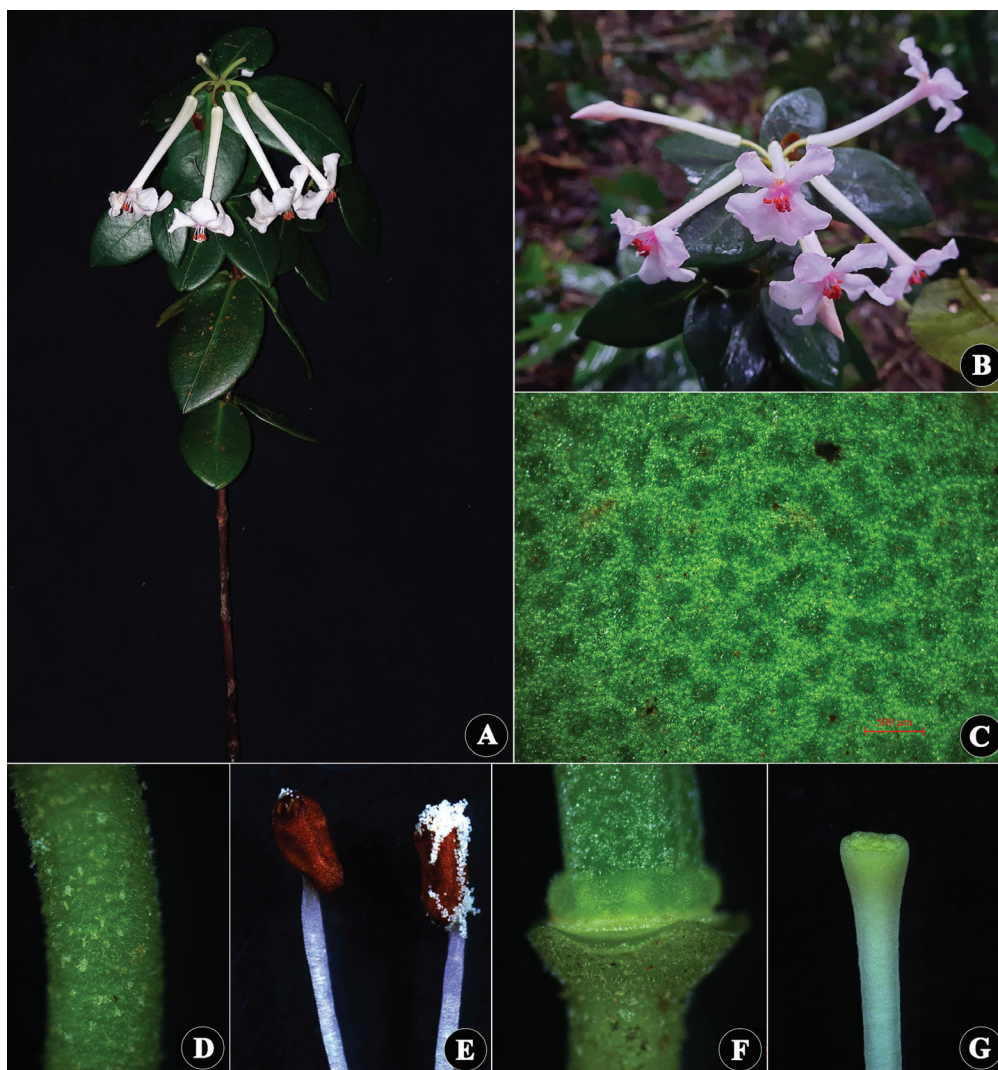


Figure 7. *Rhododendron jasminiflorum* Hook. A. flowering branch; B. inflorescences; C. scales on lower leaf surface; D. scales and hairs on pedicel; E. anthers; F. calyx, disc and ovary; G. stigma. Photographed by M. Tubtamat and C. Suwanphakdee.

sparsely hairy; bracteoles narrowly linear, 3–3.3 cm long, margin with hairs. *Inflorescence* terminal or axillary, 7.5–7.9 × 15–15.5 cm, 1–3-flowers. *Flowers* sub-funnel-shaped, 4.5–4.9 × 3.5–6.2 cm; pedicel 2–2.6 cm long, glabrous. *Calyx* triangular, 0.1–0.3 × 0.1–0.2 cm, apex acute or obtuse, margin crenate or repand, laxly hairy or glabrescent. *Corolla* white; tube 0.3–1 × 1.9–2.1 cm, glabrous on both sides; lobes elliptic or oblanceolate, 2.5–3 × 1.3–1.5 cm, apex acute acuminate or rounded, with dense yellow spots forming a patch, glabrous on both sides.

Stamens 10, unequal in length; filaments 2.5–3 cm long, hairy on base to middle, glabrous at terminal parts; anthers 1.6–1.8 × 0.8–1 mm, yellow. *Ovary* conical or cylindrical, 4–5 × 3–3.2 mm, 5–7-loculed, densely hairy; style 2–2.8 cm long; stigma green. *Capsule* cylindrical or conical, 1.5–2.2 × 0.3–0.5 cm, 5–6-ridged, slender or curved, base oblique, densely hairy, with stylar tip. *Seed* unknown.

Thailand.— PENINSULAR: Nakhon Si Thammarat Province [Khao Khao, 200 m alt., 20 Dec. 2021, *Tubtamat* 25 (BKF!, QBG!)].

Distribution.— Laos, Cambodia, Vietnam, Malaysia (POWO, 2025).

Ecology.— Growing in open areas of evergreen forest at 100–500 m from Flowering: November–January; Fruiting: February–March.

Note.— *Rhododendron klossii* was reduced to synonymy under *R. moulmainense* Hook., a species distributed from Northern to Eastern Thailand, by Fang *et al.* (2005) without explanation or justification for this taxonomic decision.

Ridley (1909) published *Rhododendron klossii* based on *H.N. Ridley 13589*. We found three herbarium sheets stored at **BM** [BM000996700], **K** [K000675042] and **SING** [SING0052272] and chose **SING** [SING0052272] as the lectotype because Ridley worked at SING and the inflorescence is well-preserved than the other sheets. We selected the others as isoelectotypes.

Rhododendron klossii is morphologically different from *R. moulmainense* by being a shrub or small tree, 2–7 m tall, and by having young leaves that are often densely hairy, becoming glabrous when mature. The flower bud is ellipsoid or ovoid and the ovary and capsule are densely hairy. In comparison, *R. moulmainense* is a tree, 2–20 m tall, with young and mature leaves that have dense hairs, the flower bud is ellipsoid, and the ovary and capsule are glabrous. Other different characters are presented in Table 5 (*R. moulmainense* based on the type specimens: *Ridley 5531* (L [L0007626], **BM** [BM000996704])).

Distinctive anatomical characters of *Rhododendron klossii* include sub-rounded branches with polygonal branches, butterfly-shaped petioles and tannin accumulation in epidermal cells. In contrast, *R. moulmainense* has rounded branches, with rounded-shaped petioles and does not accumulate tannin in epidermal cells (Table 6, Figs. 10&11). The pollen morphology of *R. klossii* shows that the apocolpium ornamentation is gemmate, and the mesocolpium ornamentation is fossulate with granulate, whereas in *R. moulmainense*, the apocolpium ornamentation is granulate and the mesocolpium ornamentation is fossulate (Table 7 and Fig. 12).

After a thorough study of both species, based on anatomical, pollen and plant morphological characters, we found them to feature multiple distinctive characters and therefore reinstate *R. klossii*.

3. *Rhododendron robinsonii* Ridl., J. Fed. Malay St. Mus. 4: 44. 1909. Type: Malaysia. Gunong Berumban, Nov. 1908, *H.N. Ridley 13588* (lecto-type **SING** [SING0052277], designated here, photo seen; isoelectotypes **BM** [BM000996730], photo seen, **K** [K000675045], photo seen). Figs. 13&14.

Epiphytic shrub or small shrub, 1–2.5 m high; young branches with dense but not overlapping scales, glabrous when mature, internodes 4–10 cm long. *Leaves* pseudo-whorled with 3–5 leaves at the distal end of the branches, elliptic, ovate or lanceolate, 6.4–14 × 3.5–6.1 cm, coriaceous, apex acuminate, base cuneate, margin entire, revolute when dry, midrib raised on base and flat near apex, with laxly distributed scales on upper surface, raised and densely scaly on lower surface, lateral veins 8–12 pairs. *Petiole* 0.7–2 × 0.3–0.5 cm long, without grooves, with sparse scales. *Flower bud* ovoid, apex acuminate, bract ovate or elliptic, 2.5–2.9 × 1.3–1.5 cm, apex acute, laxly distributed scales; bracteoles linear or sub-spathulate, 2–2.3 × 0.2–0.5 cm, glabrous. *Inflorescence* terminal, 6.2–6.5 × 9.5–10 cm, 5–12-flowers. *Flowers* sub-funnel-shaped, 3–3.5 × 3.5–4 cm; pedicel 2–4.5 cm long, with pale red or green bands, with laxly distributed scales or glabrous. *Calyx* ring-like, margin shallowly lobed, laxly distributed scales outside. *Corolla* yellow; tube 1–1.7 × 0.5–1.5 cm, glabrous on both sides; lobes elliptic or obovate, 1.5–2 × 1.2–1.5 cm, apex obtuse, margin entire, glabrous on both sides. *Stamens* 10, unequal in length; filaments 2–2.5 cm long, glabrous; anthers 3–3.5 × 1–1.5 mm, yellow, disc multifid, 10–12-lobed, laxly distributed scales or glabrous. *Ovary* conical or fusiform, 8–10 × 3–4 mm base oblique, glabrous; style 3.3–3.2 cm long, curved on middle to terminal parts, glabrous; stigma yellow. *Capsule* fusiform, 3–3.2 × 0.6–0.8 cm, base oblique, curved, glabrous. *Seed* unknown.

Thailand.— PENINSULAR: Narathiwat Province, Sukhirin [Hala Bala Wildlife Sanctuary, 22 Oct. 2003, *Poopath SN9* (**BKF!** (SN190368)); Chiang Mai, Queen Sirikit Botanical Garden, Cultivated, 18 July 2005, *Suksathan 3550* (**QBG!** (QBG25893))].

Distribution.— Malaysia.

Ecology.— Open slopes in mossy evergreen forest at 1,400 m alt. Flowering: November–December; Fruiting: January–February.

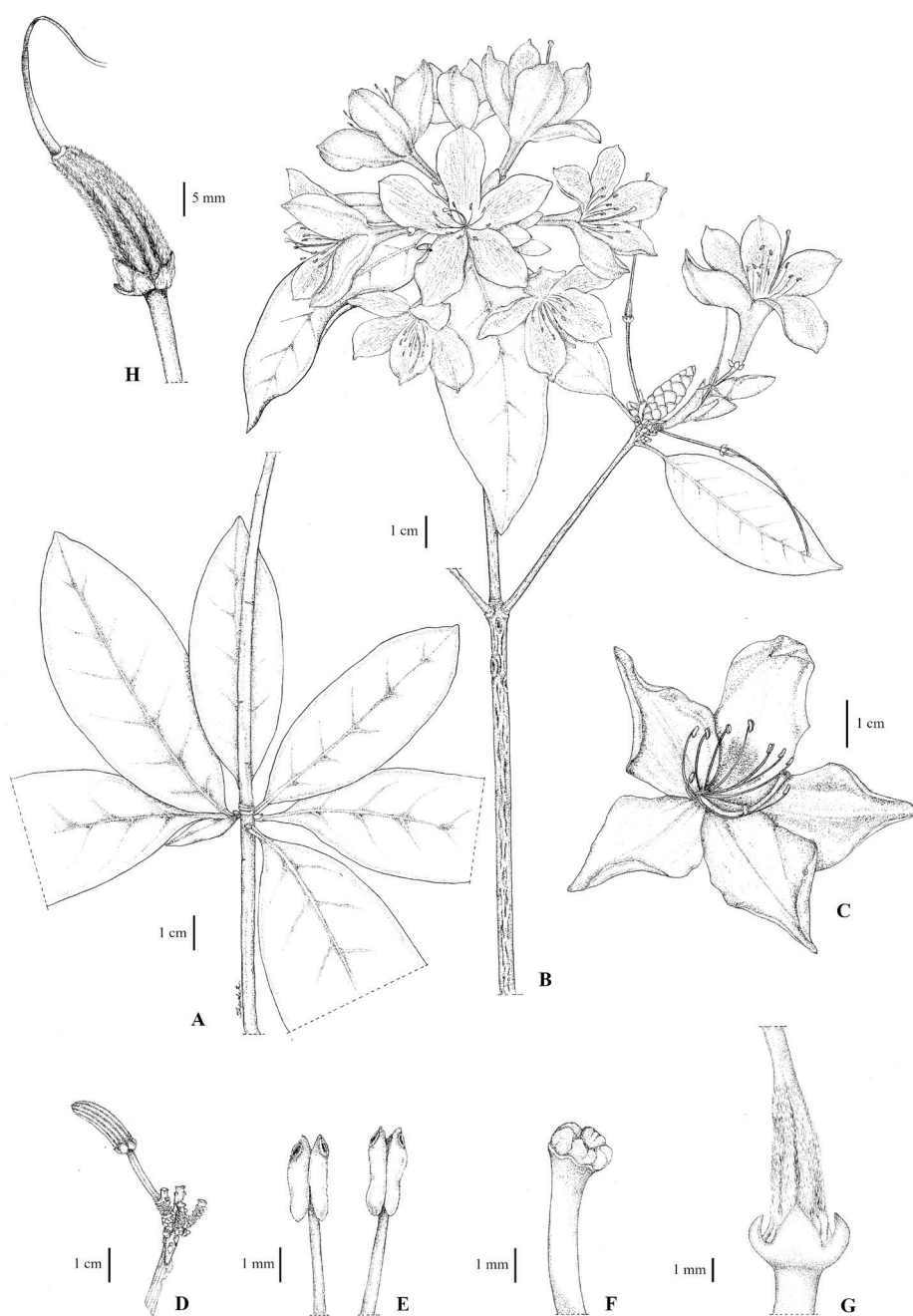


Figure 8. Line drawing of *Rhododendron klossii* Ridl. A. leaves with pseudo-whorled arrangement; B. flowering branch; C. corolla; D. capsule densely hairy without stylar tip; E. anther; F. stigma; G. ovary densely hairy; H. capsule densely hairy with stylar tip. Drawn by T. Khananthong.

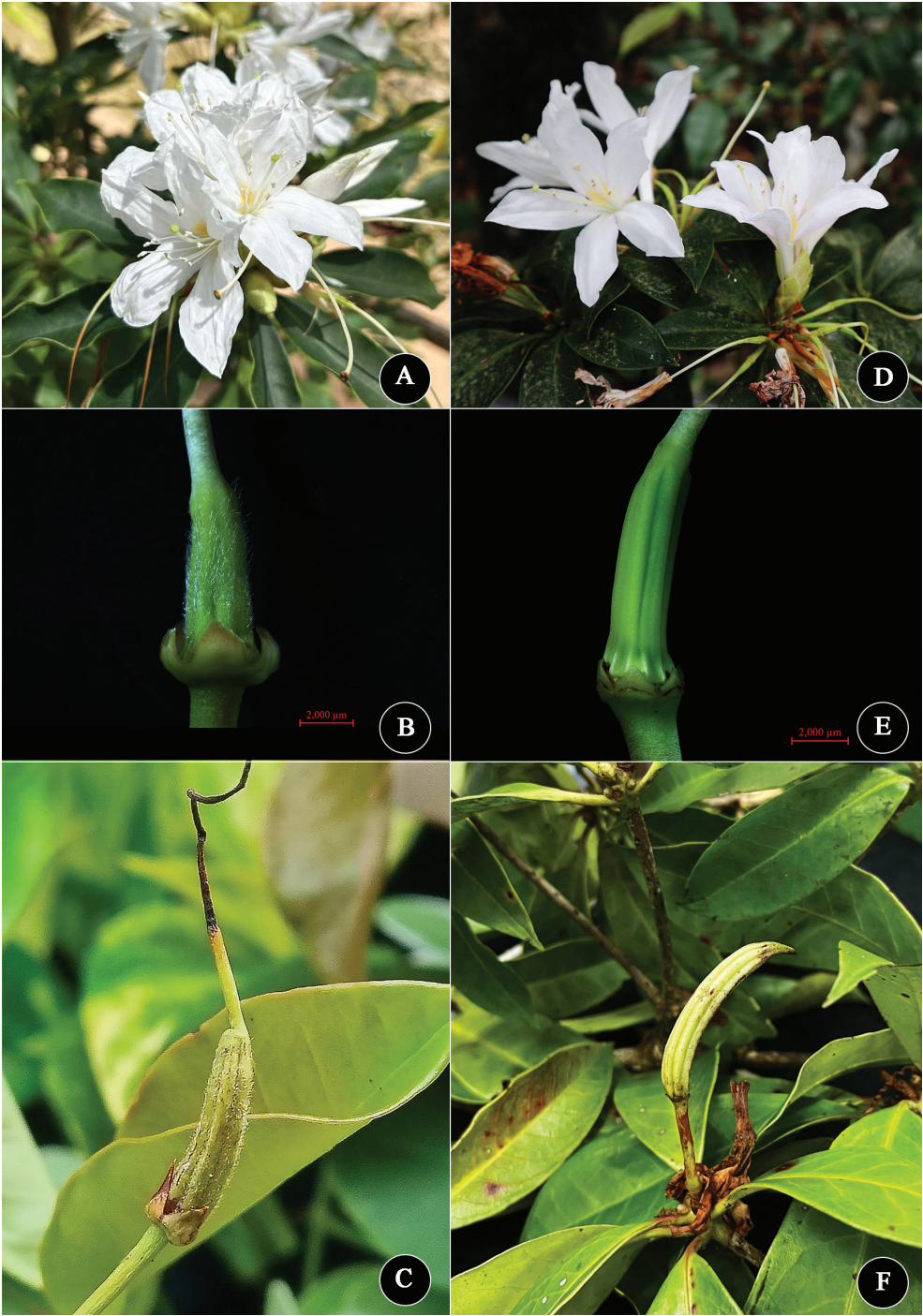


Figure 9. Morphological characters of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook. *Rhododendron klossii* (A–C): A. inflorescence; B. ovary with dense hairs; C. capsule densely hairy with stylar tip; *R. moulmainense* (D–F): D. inflorescence; E. ovary glabrous; F. capsule glabrous without stylar tip. Photographed by M. Tubtamat and C. Suwanphakdee.

Table 5. Morphological character comparison of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook.

Characters	<i>R. klossii</i>	<i>R. moulmainense</i>
habit	shrub or small tree, 2–7 m tall	tree, up to 20 m tall
leaf indumentum	young leaves with densely hairy, mature glabrous	young and mature leaves with densely hairy
bract shape	spathulate	elliptic, ovate or obovate
bract length	2.4–2.6 cm	1.2–1.8 cm
bracteole length	3–3.3 cm	2–2.5 cm
corolla lobe shape	elliptic or oblanceolate	oblong or elliptic
anther size	1.6–1.8 × 0.8–1 mm	2–2.5 × 1–1.2 mm
ovary indumentum	densely hairy	glabrous
capsule length	1.5–2.2 cm	2.5–3 cm
capsule indumentum	densely hairy	glabrous

Table 6. Anatomical character comparison of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook.

Characters	<i>R. klossii</i>	<i>R. moulmainense</i>
Branch		
shape	polygonal, 7–9-lobed	rounded
epidermal cell shape	irregular	irregular
Leaves		
petiole		
shape	butterfly	rounded
epidermal cell shape	rounded	square
midrib		
epidermis	accumulate tannin	do not accumulate tannin
indumentum	glabrous	multicellular trichome, 1–14 cell
epidermal cell shape		
upper surface	irregular	jigsaw with prismatic and raphide crystals

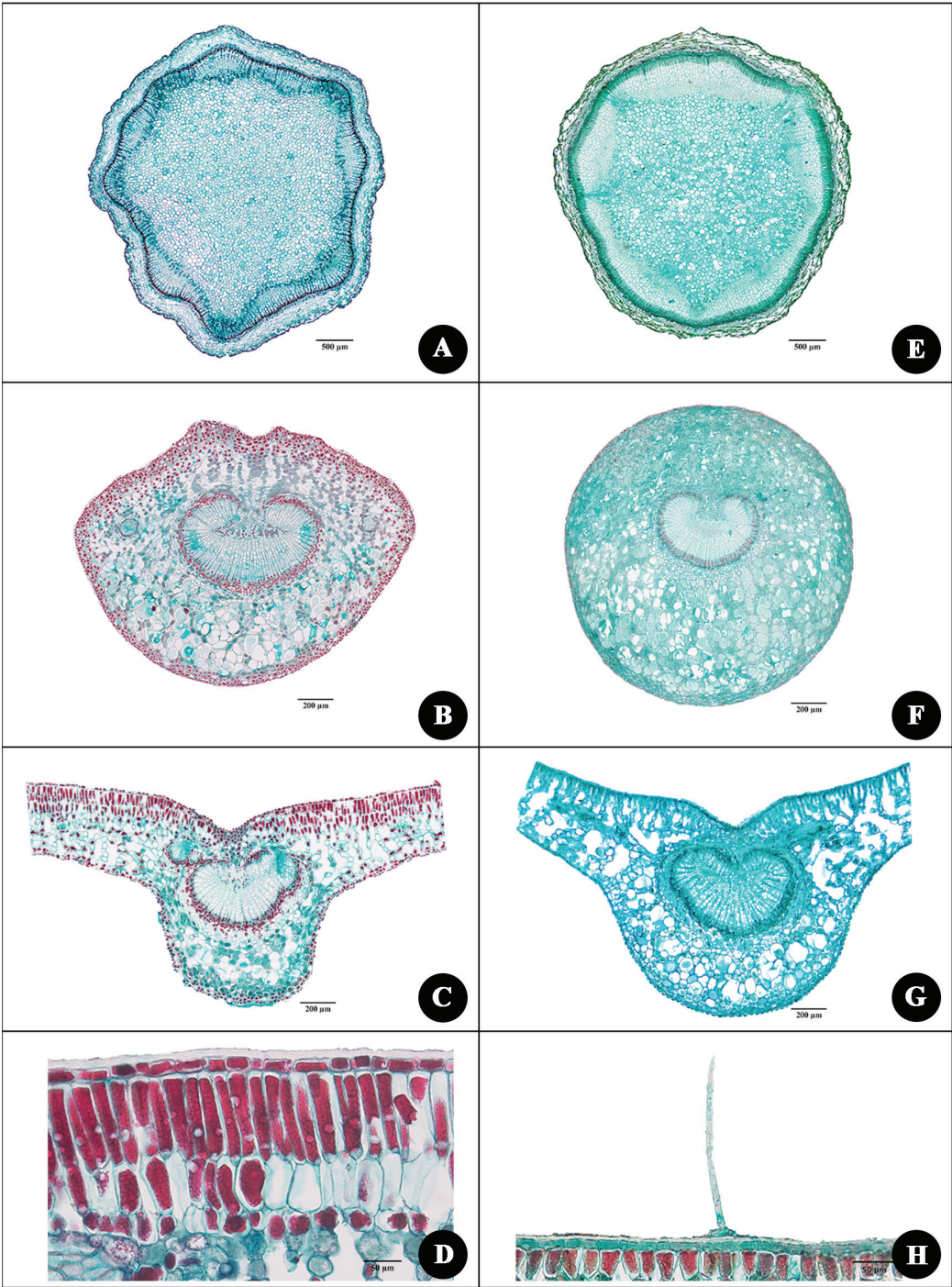


Figure 10. Anatomical characters of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook. *Rhododendron klossii* (A–D): A. polygonal branch; B. petiole butterfly-shape; C. midrib; D. upper epidermis glabrous; *R. moulmainense* (E–H): E. rounded branch; F. rounded-shape petiole; G. midrib; H. multicellular trichome on upper epidermis.

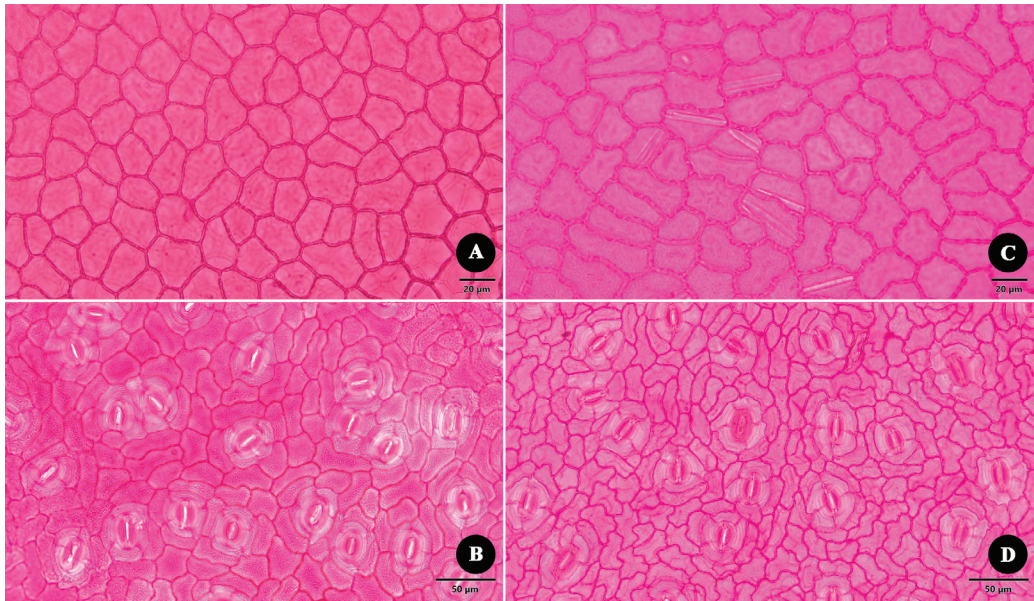


Figure 11. Anatomical characters. *Rhododendron klossii* Ridl. and *R. moulmainense* Hook. *Rhododendron klossii* (A–B): A. irregular shape on upper epidermis; B. lower epidermis (anisocytic, tetracytic cyclocytic and staurocytic stomata); *R. moulmainense* (C–D): C. jigsaw with prismatic and raphide crystals on upper epidermis; D. lower epidermis (anisocytic, tetracytic and cyclocytic stomata).

Table 7. Comparison of pollen morphologies of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook.

Characters	<i>R. klossii</i>	<i>R. moulmainense</i>
apocolpium diameter	9.55–11.52 ± 1.00 µm	11.38–15.77 ± 1.33 µm
ornamentation		
apocalpium	gemmate	granulate
mesocalpium	fossulate with granulate	fossulate

Notes.—Ridley (1909) published *Rhododendron robinsonii* based on Ridley 13588. We found three specimens stored at **BM**, **K** and **SING** and selected **SING** [SING0052277] as the lectotype because it is a complete specimen with well-developed flowers, and because Ridley worked at SING. The specimens at **BM** [BM000996730] and **K** [K000675045] are isolectotypes, respectively.

Rhododendron robinsonii is newly recorded for Thailand based on specimens collected from Narathiwat Province. Previously, the specimen was

known only from Peninsular Malaysia. The record extends the known distribution of the species Peninsular Thailand and is characterized by being an epiphytic shrub with elliptic, ovate or lanceolate scaly leaves. The petioles are not grooved above. The flowers are sub-funnel-shaped, 3–3.5 × 3.5–4 cm long and yellow. The calyx is ring-like and the corolla tube is glabrous. There are 10 stamens and the filaments are glabrous and 2–2.5 cm long. The ovary is conical or fusiform and the stigma is capitate. The capsule is fusiform, 3–3.2 × 0.6–0.8 cm long and glabrous.

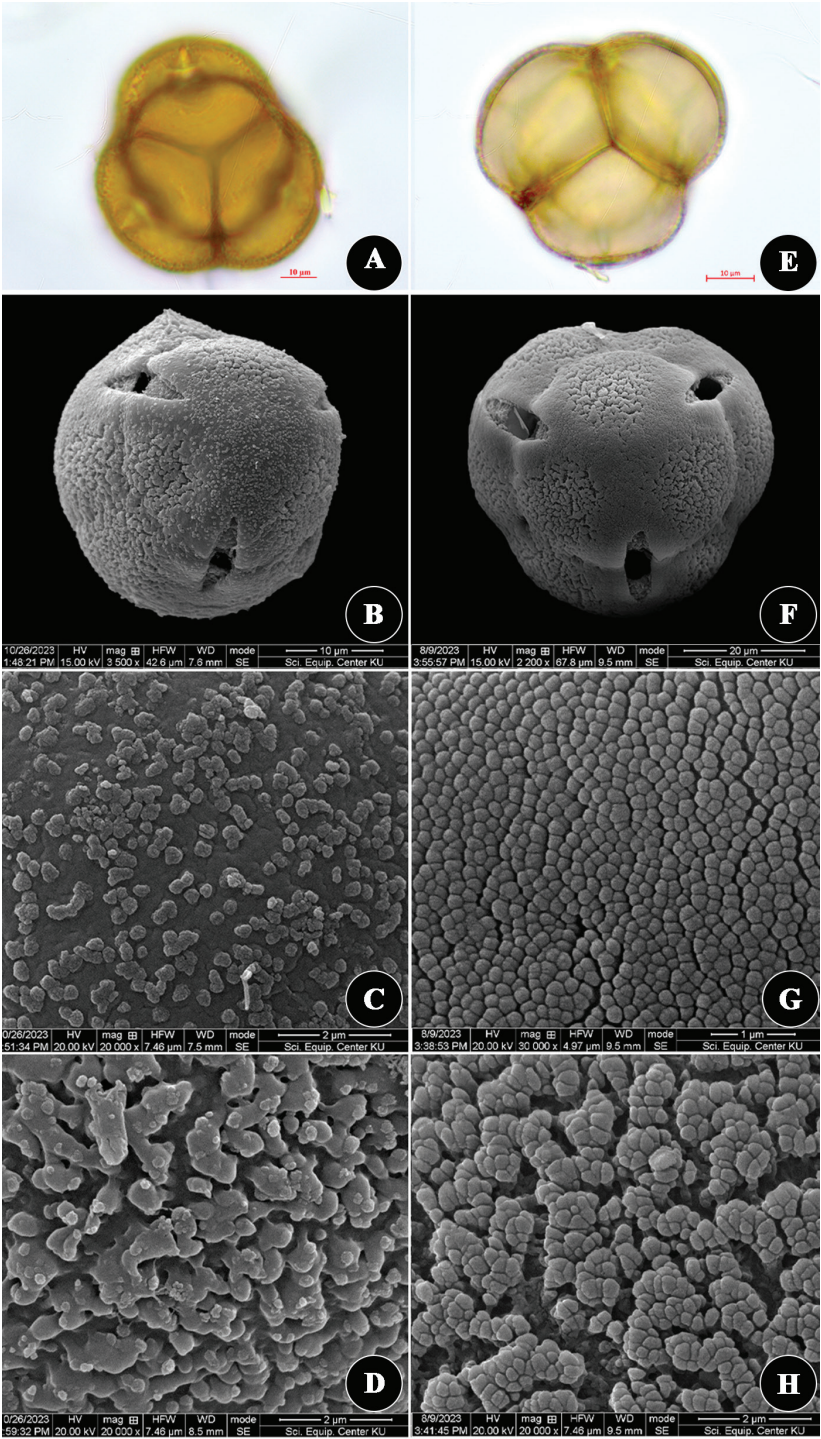


Figure 12. Pollen morphology from light microscope (LM) and scanning electron microscope (SEM) of *Rhododendron klossii* Ridl. and *R. moulmainense* Hook. *Rhododendron klossii* (A–D): A. tetrahedral tetrad (LM); B. tetrahedral tetrad (SEM); C. gemmate on apocolpium; D. fossulate with granulate on mesocolpium; *R. moulmainense* (E–H): E. tetrahedral tetrad (LM); F. tetrahedral tetrad (SEM); G. granulate on apocolpium; H. fossulate on mesocolpium.

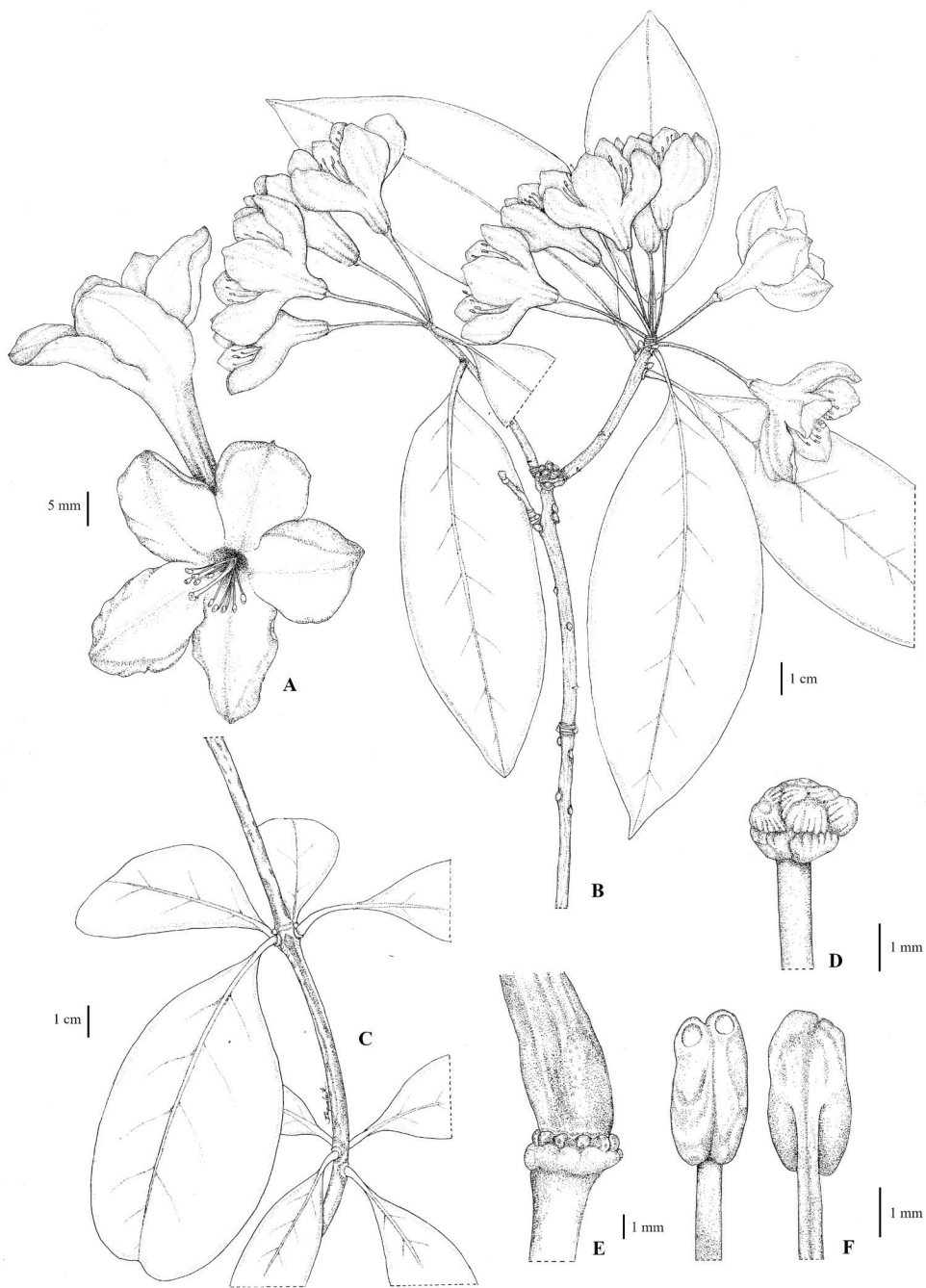


Figure 13. Line drawing of *Rhododendron robinsonii* Ridl. A. corolla; B. inflorescence; D. stigma; E. ovary; F. anther. Drawn by T. Khananthong.



Figure 14. *Rhododendron robinsonii* Ridl. A. inflorescence; B. anthers; C. ovary (lower part); D. stigma. Photographed by M. Tubtamat and C. Suwanphakdee.

ACKNOWLEDGEMENTS

The authors would like to express their sincere appreciation for the valuable comments and suggestions provided by the editors and anonymous reviewers. Our sincere thanks are also extended to the curators and staff of the BKF, BM, K, KKU, L, QBG, SING and TCD herbaria and the Department of National Parks, Wildlife and Plant Conservation for their facilitation and kind permission to study and collect specimens. The authors would also like to thank Thepwalee Khananthong for the line drawings and Madeleine Clough for assistance in revising and improving the manuscript. Finally, special appreciation is expressed to Wilaiwan Kulpholmuang, Kesanee Kuaphu, Thanyarut Suddeepong and the other members of the laboratory for their support. This research is funded by Faculty of Science, Kasetsart University through the Graduate Fellowship Program.

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