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A new species of *Rigiolepis* (Ericaceae: Vaccinioideae) from the Gayo Plateau, Aceh Province, Indonesia

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Abstract. A new species of Ericaceae from the Gayo Plateau, Aceh Province, Indonesia is described. *Rigiolepis gayoensis* resembles *R. lanceolata* but differs by having shorter leaves, non-protruding basal leaf glands, longer flowering pedicels, a glabrous hypanthium, and a dark red or maroon corolla. A detailed morphological description, ecological notes, conservation status, and photographs are presented. The new species represents the third species of *Rigiolepis* found in the island of Sumatra. A key to the species of *Rigiolepis* in Sumatra is provided.

Keywords: epiphyte, *Rigiolepis*, Sumatra, taxonomy, Vaccinioideae.

INTRODUCTION

Rigiolepis is a genus of Malesian Ericaceae originally described by Hooker (1873). However, Smith (1935) treated some species of *Rigiolepis* as belonging to *Vaccinium*, citing strong resemblance between the two genera. Consequently, as part of Sleumer's (1936) treatment for the Ericaceae of Flora Malesiana, he relegated *Rigiolepis* as a section of *Vaccinium*. Argent (2019) later reinstated *Rigiolepis* as a genus of Malesian Ericaceae through his treatment of *Rigiolepis* and *Vaccinium* of Borneo. As per this treatment, including the more recent discovery of *R. argentii* Mustaqim & Ardi (Mustaqim and Ardi 2021), the number of species recognized for this genus stands at 26. *Rigiolepis* sensu Argent (2019) is characterized as shrubs, usually epiphytic with a sprawling or hanging habit, with a short corolla (up to 4 mm long or rarely slightly longer), anthers opening by long oblique slits, an inferior ovary that

is truly 10-locular, and yellowish or orange immature fruits that turn red at maturity. *Rigiolepis* has a center of distribution in the island of Borneo, with some species also found in Peninsular Malaysia, including the Indonesian islands of Java, Sulawesi, and Sumatra (Argent 2019; Mustaqim and Ardi 2021). The island of Sumatra is hitherto known as the westernmost distribution of *Rigiolepis* in Malesia with confirmed occurrence of *R. lanceolata* (Blume) J.J.Sm. and *R. leptantha* (Miq.) J.J.Sm. (Sleumer 1966–1967; Argent 2019; POWO 2023).

During fieldwork in the tropical mountains of Sumatra Island, some unknown specimens of *Rigiolepis* were documented and vouchered from areas in the mid-montane vegetation of the Gayo Plateau, Aceh Province, Indonesia. This region is a component of the northern montane region of Sumatra in Aceh Tengah Regency. The vouchered specimens were examined and compared with those of closely similar species. Relevant literature (e.g., Smith 1935; Sleumer 1936, 1961, 1966–1967; Vander Kloet 2005; Argent 2019; Mustaqim and Ardi 2021) was also consulted. From the initial data and observation of the plant *in situ*, we concluded that this plant is a species new to science.

TAXONOMIC TREATMENT

Rigiolepis gayoensis Mustaqim, M.N.Tamayo & P.W.Fritsch, **sp. nov.** (Figure 1).

Type: Indonesia. Sumatra, Aceh Province, Aceh Tengah Regency, Linge, Kute Robel, Bur Ni Lintang, 4°31'50.7"N 96°50'44.7"E, 1850 m elevation, 17 October 2022, *W.A. Mustaqim 2563* (holotype LGS; isotype MEDA).

Diagnosis

Rigiolepis gayoensis closely resembles *R. lanceolata* (Blume) J.J.Sm. but differs by having shorter leaves [4.6–5.5 cm vs. c. 9.0 cm (or longer)], non-protruding basal leaf glands (vs. protruding), longer flowering pedicels (c. 11 mm vs. 2–3 mm), a glabrous hypanthium (vs. densely hairy), and a dark red or maroon corolla (vs. creamy white).

Description

Epiphytic shrubs, terrestrial, evergreen clambering, subdensely branched, c. 1 m tall, branches weak, flexuose. Roots or stem swollen at base, subglobose, 3–7 cm diam. Young branchlets reddish green, white-hirsutulous, with simple erect trichomes 0.2–0.3 mm long and stipitate trichomes 0.5–0.6 mm long. Mature branchlets grayish brown or gray, glabrescent or with occasional simple erect and stipitate trichomes, 1.0–3.5 mm wide, sparsely lenticellate; perennating buds triangular, 2–3 mm long, with several obscurely overlapping scales, scales with margin entire, minutely ciliolate, apex acuminate. Leaves persistent on older branchlets, laxly crowded, alternate, distichous; petiole white and waxy when young, reddish green at maturity, 2.0–4.0 × 1.0–2.0 mm, with simple erect trichomes same as branchlets and occasional stipitate glands, in cross section abaxially rounded, adaxially flat; leaf blade ovate or lanceolate, convex, larger leaves on each branchlet 4.6–5.5 × 2.2–2.5 cm, coriaceous, adaxial surface glossy green, glabrous, abaxial surface whitish and covered with a waxy coat when young, pale green at maturity, sparsely white-hirsutulous at ½ length from petiole, base rounded to shallowly cordate, margin entire, thinly revolute, apex acuminate, acumen 5–10 mm long, the very tip with an inconspicuous gland, marginal glands 1 per side, c. 1–2 mm from petiole, sunken, 0.3–0.4 mm diam., midvein raised abaxially, sunken adaxially or nearly so, secondary veins 3 or 4 (or 5) on each side of midvein with first two or three pairs arising from base and remainder along midvein, arc-ascending, obscure on both surfaces, tertiary veins inconspicuous. Inflorescences axillary, racemose, developing beyond confines of perennating bud, 1 per axil, 1.5–2 cm long, 4- or 5-flowered, with ± persistent, broadly triangular scales at base; peduncle green or reddish green, 8–10 mm long, pubescent, trichomes and glands same as young branchlets, rachis green or reddish green, 8.0–8.5 mm long, non-ridged, pubescent, trichomes and glands same as peduncle; bracts light brown or reddish, triangular-ovate, subtending pedicels, ± persistent until anthesis, 1.0–1.5 × 0.5–0.6 mm, margin minutely ciliolate, apex acuminate, marcescent, cucullate. Flowers red or maroon, articulated at junction with pedicel, 1.5–1.7 cm long. Pedicel light green with a tinge of red, turning red towards the dilated junction with hypanthium, nodding, 6.0–10.5 × 0.8–1.0 mm at anthesis, with trichomes and glands same as rachis up to ½ to $^{3}/_{5}$ of its length; bracteoles 2, ± persistent until anthesis, borne at 1.0–1.3 mm from pedicel, light brown or reddish, acicular or narrowly elliptic, 0.8–1.0 × 0.3–0.4 mm, margin entire, minutely ciliolate, apex acuminate. Hypanthium green or yellowish green, cupuliform, 2.0–2.5 × 2.0–2.3 mm, glabrous, occasionally covered with a waxy coat; calyx limb 1.0–1.2 mm long, glabrous; calyx lobes broadly triangular, 0.8–1.0 × 1–1.5 mm, glabrous, margin entire, apex acute or obtuse, sessile terminal gland absent. Corolla dark red or maroon, broadly urceolate, shallowly 5-sulcate, 3.0–4.0 × 3.0–4.0 mm, glabrous on both surfaces; corolla lobes 5, recurved

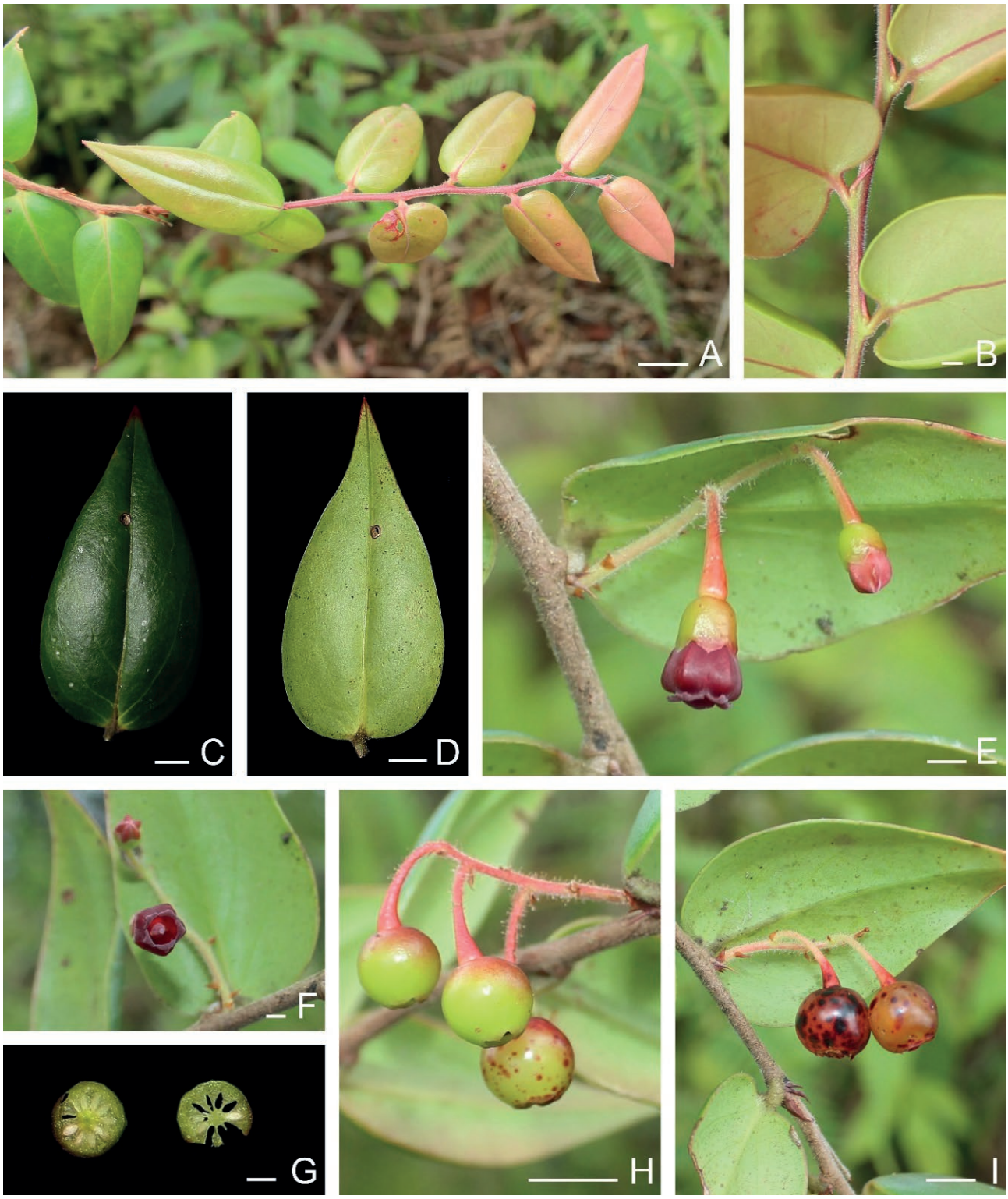

Figure 1. *Rigiolepis gayoensis* Mustaqim, M.N.Tamayo & P.W.Fritsch. A. Leafy branchlet. B. Portion of stem showing indumentum, perennating buds, and cordate leaf blade base. C. Adaxial leaf surface. D. Abaxial leaf surface. E. Inflorescence. F. Anterior view of flower. G. Ovary cross-section. H. Immature fruits. I. Mature (left) and submature (right) fruits. Scale bar: A = 1 cm, B, G = 2 mm, C, D, H, I = 5 mm, E = 2 mm, F = 1 mm. Photographs by Wendy A. Mustaqim. A–F, H, I from the holotype *W.A. Mustaqim 2563*; G from *W.A. Mustaqim 2575*.

at anthesis, 1.0–1.2 × 0.8–1.2 mm, apex obtuse. Stamens 10, monomorphic, distinct, 1.5–1.7 mm long; filaments undulate, dilated at base, 0.8–1.0 mm long, glabrous, anthers 1.3–1.5 mm long, cells 0.8–1.2 mm long, minutely echinulate, *tubules* parallel, erect, cylindric, 0.5–0.6 mm long, opening by oblique laterally oriented apical pores, pore apex oblong, spurs present, erect to slightly upcurved, 0.5–0.6 mm long. Ovary 5-locular but appearing pseudo-10-locular; *ovules* in two columns per locule, each column separated by false partition; *disk* annular, non-bulky, with ridges on margin, 1.0–1.2 mm × 0.5–0.6 mm, glabrous; *style* tubular, slightly dilated at the middle, not exserted from corolla, 2.8–3.0 mm long, glabrous, stigma truncate, with minute papillae. Fruiting pedicels 8–11 mm long, trichomes persistent. Mature fruit red or orange, fleshy and shiny, glabrous, globose, 7.0–7.5 × 7.5–8.0 mm, with dark irregularly-sized blotches, sweet to taste.

Etymology

The epithet *gayoensis* is derived from the Gayo Plateau, the name of the area where the species was found.

Phenology

Flowering in June and October; fruiting in January, June, and October.

Distribution and Habitat

Rigiolepis gayoensis is endemic to the Gayo Plateau, Aceh Province, Indonesia (Figure 2). It was observed growing in tropical mid-montane rainforests at 1770 to 1998 m elevation.

Conservation status

Rigiolepis gayoensis is only known from four unprotected areas in the northern Gayo Plateau. All localities are threatened by logging, forest conversion for coffee plantations, and clearing for development and maintenance of provincial roads. However, since the surrounding vegetations of the areas are poorly explored, we believe that other populations can be discovered once botanical explorations are conducted. Here, we provisionally assess the conservation status of *R. gayoensis* as Data Deficient (DD) (IUCN SPC 2022), as nearby areas with the same elevation and vegetation could harbor additional occurrences of this species. Further detailed population survey highly likely warrant in a threatened status.

Notes

Rigiolepis lanceolata is a variable species, especially its leaf morphology, which caused Smith (1935) to pro-

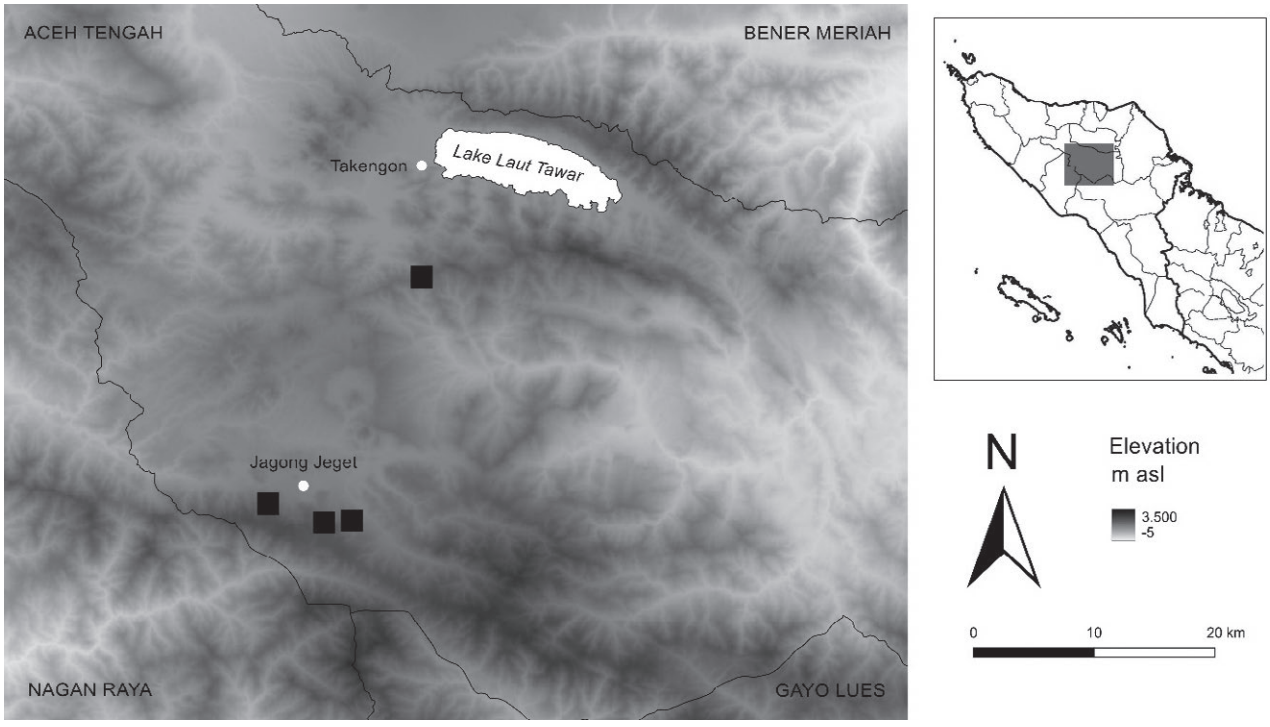

Figure 2. Distribution map of *Rigiolepis gayoensis* in northern Gayo Plateau, Sumatra.

pose three forms; later, two of them were retained by Sleumer (1966–1967), i.e.: (1) f. *marapiense* (J.J.Sm.) Sleumer mainly in having more coriaceous but smaller leaves and (2) f. *ellipticum* (J.J.Sm.) Sleumer mainly in having elliptic leaves, acuminate or subacute apex, and obtuse base. *Rigiolepis gayoensis* differs from the former by having an ovate (vs. lanceolate) and broader leaf blade (ca. 22 mm vs. ca. 20 mm), and from the latter by having an ovate (vs. oblong-elliptic or unequally elliptic) and smaller leaf blade (46–55 × 22–25 mm vs. 70–130 × 25–47 mm) with rounded to subcordate (vs. obtuse) leaf blade base. Furthermore, *R. gayoensis* grows at a higher elevation compared to *R. lanceolata* (1770–1998 m vs 360–1400 m).

Aside from *Rigiolepis lanceolata*, the other species of *Rigiolepis* to occur in Sumatra is *R. leptantha* var. *leptantha* (Argent 2019). *Rigiolepis gayoensis* is distinct from *R. leptantha* var. *leptantha* by having shorter leaves (4.6–5.5 cm vs. 4.5–15 cm), a rounded to shallowly cordate leaf blade base (vs. cuneate), more flowers per inflorescence (4–5-flowered vs. 10–15-flowered) and a dark red or maroon corolla (vs. yellow or cream). In the key to the Bornean species of *Rigiolepis* (Argent 2019), *R. gayoensis* best keys to *R. lobii* var. *lobii*; however, *R. gayoensis* is distinct by having thicker petioles (ca. 2 mm vs. c. 0.5 mm), larger leaves (4.6–5.5 × 2.2–2.5 cm vs. 2.0–5.0 × 0.8–2.0 cm), longer pedicels (10.5 mm vs. 1 mm), and a glabrous corolla (vs. pubescent).

Argent (2019) strongly argued for a truly 10-locular ovary for *Rigiolepis*; a character that greatly supports its generic reinstatement next to *Vaccinium*. However, previous fieldwork by PWF reveals that *Rigiolepis uroglossa* has a pseudo-10-locular ovary (P.W. Fritsch, unpubl. data). This character is also observed for *R. gayoensis* (Figure 1G). Thus, it appears that this character might not be stable to determine generic status of *Rigiolepis*. Although *R. gayoensis* would exhibit such placentation, we recognized it as belonging to *Rigiolepis* through other characters divergent from *Vaccinium* [i.e., mostly epiphytic or climbing shrubs, rarely > 4 mm long flowers (corolla), yellow or orange immature fruits turning red when ripe]. A more detailed morpho-anatomical investigation of the ovary of *Rigiolepis* across varying stages of development (flower buds to ripe fruits) will be essential in evaluating this crucial characteristic.

In recognizing *Rigiolepis* as a separate genus, Argent (2019) also used the frequent presence of a fusiform swollen stem bases or roots (vs. usually absent in *Vaccinium*). *Rigiolepis gayoensis* possesses a subglobose swollen stem base or root (Figure 3). The function of this organ is likely an adaptation to an epiphytic lifestyle, e.g. storing water (see Harsberger 1908; Benzing 1987).

Additional specimens examined (paratypes)

INDONESIA. Paratypes. Sumatra: Aceh Province, Aceh Tengah Regency, Jagong Jeget Subdistrict, Jeget Ayu village, Pengairan (4°20'52.5"N 96°46'30.6"E), 1998 m elevation, 11 January 2023, *W.A. Mustaqim 2575* (LGS); *ibid*. Jagong Jeget Subdistrict, Paya Dedep vil-

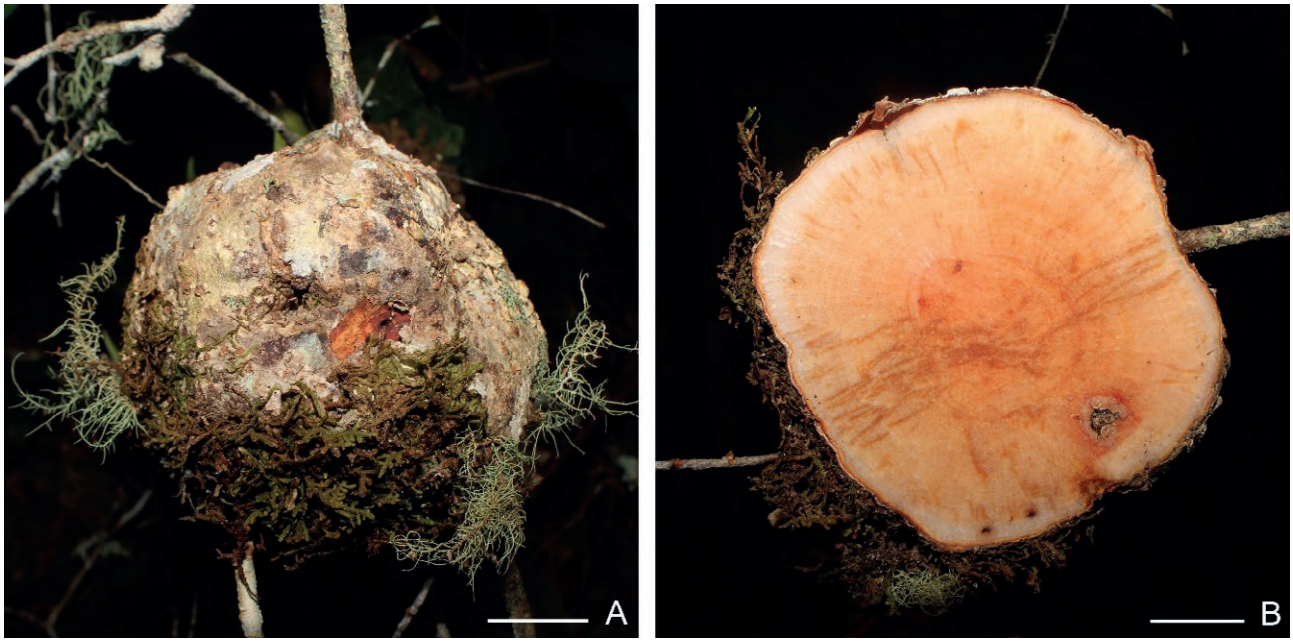

Figure 3. The subglobose swollen stem base or roots of *Rigiolepis gayoensis*. A. Outer surface. B. Cross-section showing growth rings.. Scale bar: 2 cm. All from *W.A. Mustaqim et al. 2475*.

lage, road to Bur Ni Paya (4°21'48.5"N 96°43'58.1"E), 1860 m elevation, 15 June 2023, *W.A. Mustaqim et al. 2724* (LGS); *ibid*. Linge Subdistrict, Gemboyah village (4°21'00.7"N 96°47'48.5"E), 1770 m elevation, 17 June 2023, *W.A. Mustaqim et al. 2745* (LGS).

Key to the species of *Rigiolepis* in Sumatra

1a. Corolla white, yellow or cream; hypanthium pubescent; anther spurs shorter than tubules, c. 0.3 mm long..... 2

1b. Corolla dark red or maroon; hypanthium glabrous; anther spurs as long as tubules, 0.5–0.6 mm long ..... ***R. gayoensis***

2a. Pedicels stout, 4–8 mm long; hypanthium > 0.5 mm long; basal leaf glands protruding..... ***R. lanceolata***

2b. Pedicels slender, 2–3 mm long; hypanthium c. 0.5 mm long; basal leaf glands sunken.....***R. leptantha*** var. ***leptantha***

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