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Two new species and one new record of *Dichapetalum* (Dichapetalaceae) in Thailand

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ABSTRACT

Two new species and one new record of *Dichapetalum* (Dichapetalaceae) are reported for Thailand. *Dichapetalum khaoluangense* from Khao Luang National Park, Nakhon Si Thammarat Province and *D. ranongense* from Khlong Na Kha Wildlife Sanctuary, Ranong Province are described and illustrated. *Dichapetalum cambodianum* is recorded in Trat Province.

KEYWORDS: Flora of Thailand, Khao Luang National Protected Area, Khlong Na Kha Wildlife Sanctuary, taxonomy.

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INTRODUCTION

Dichapetalaceae are a medium sized family containing three genera mostly distributed in tropics. While two of them, *Stephanopodium* Poepp. & Endl. and *Tapura* Aubl., with a total of 44 spp., are confined to Africa including Madagascar and the New World, *Dichapetalum* Thouars itself is much larger, with about 124 to 160 species distributed throughout the tropical and subtropical zones except for Polynesia and Micronesia, with the centre of diversity in Africa. Most of them are locally endemic in tropical and subtropical regions of Africa (Baillon, 1886; Leenhouts, 1957, 1972; Breteler, 1986; Chen & Prance, 2008; Prance, 2014; Grote, 2018).

Since the Dichapetalaceae of Thailand were first treated in Florae Siamensis Enumeratio by Craib (1931), with three species mentioned, namely *Dichapetalum helferianum* Pierre, *D. gelonioides* (Roxb.) Engl. and *D. longipetalum* Craib (synonym: *D. kerrii* Craib), taxonomic studies on this genus have not been published for Thailand until recently. Grote (2018) treated this family in the Flora of Thailand and enumerated four species including the above-mentioned three and one unnamed species (*Dichapetalum* sp. 1).

In this manuscript, we describe and illustrate two new species, *D. khaoluangense* Rueangr. & Tagane and *D. ranongense* Nagam., Rueangr. & Tagane, discovered during our botanical surveys in Khao Luang National Park, Nakhon Si Thammarat Province and Khlong Na Kha Wildlife Sanctuary, Ranong Province, Peninsular Thailand in 2015. In addition, a specimen collected in Thailand of *Dichapetalum cambodianum*, recently described by Tagane *et al.* (2015) was found in the herbarium of the Royal Botanic Gardens, Kew (K), and is reported as a new record for the country.

Regarding the *Dichapetalum* specimens found in herbaria, flowers are rarely collected and often cannot be used for species identification, so that fruit characters are more helpful. In this study, we provide a key to the species of *Dichapetalum* in Thailand based on fruit and vegetative characters, such as foliar glands, venation and indumentum of the twigs and leaves.

TAXONOMIC TREATMENT

Dichapetalum cambodianum Tagane & Nagam., Acta Phytotax. Geobot. 66: 100. 2015. Fig. 1.

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Thailand.— SOUTH-EASTERN: Trat [Kao Kuap, 22 May 1930 (fr.), *Put 2955* (**K!**)].

Distribution.— Cambodia.

Conservation status in Thailand.— DD (Data Deficient).

Note.— *Dichapetalum cambodianum* is newly recorded for the flora of Thailand here. This species was recently described based on material collected from Mt Bokor, southern Cambodia and is known to occur in the Cardamon-Elephant mountains. Thus, the occurrence in SE Thailand is not surprising. Measurements of the characters of the above-mentioned Thai specimen are within previously known variation (Tagane *et al.*, 2015). *Dichapetalum cambodianum* is easily distinguished from the other species of *Dichapetalum* in Thailand by its twigs with many lenticels, relatively smaller leaves, finely reticulated and prominent tertiary venation on the lower surface of the lamina, and villous fruits covered with dense fulvous hairs.

Dichapetalum khaoluangense Rueangr. & Tagane, **sp. nov.**

Similar to *Dichapetalum gelonioides*, but differing in having smaller and thinner leaves, foliar glands scattered on the abaxial side of lamina (vs usually only a few near the base in *D. gelonioides*), drupe 3-lobed with 3 dehiscent lines on the surface [vs 1(–2)-lobed with 1(–2) line(s)]. Type: Thailand. Nakhon Si Thammarat Province, Khao Luang National Park, on the trail from Kiriwong Village to the summit, in lower montane evergreen forest, 8°29′26.6″N, 99°44′47.8″E, alt. 1,368 m, 10 Feb. 2015 (fr.), *S. Tagane, H. Toyama, H. Nagamasu, A. Naiki, S. Rueangruea, H. Kanemitsu, W. Keiwbang & C. Hemarat T3734* (holotype **BKF!**; isotypes **FU!**, **K**, **KYO!**, **P**, **VNM**). Figs. 2 & 4A–E.

Shrub to small tree, to 4 m tall. *Young branches* and buds grayish appressed hairy; old branches glabrous, grayish brown, with sparse lenticels. *Stipules* narrowly triangular, 2–3 mm long, appressed hairy, caducous. *Leaves* alternate, adaxially greenish when dry; petiole 3–6 mm long, appressed hairy; lamina narrowly elliptic to elliptic-oblong, 5–11 × 2–3.9 cm wide, chartaceous, apex acuminate, caudate, rarely acute, acumen up to 1.2 cm long, base cuneate, slightly oblique, margin entire, with glands, sparsely ciliate when young, glabrous on both surfaces except for midrib on lower surface which is sparsely appressed hairy, foliar glands scattered on lower surface; midrib prominent on both surfaces, secondary veins 8–12 pairs, anastomosing, prominent on both surfaces, tertiary veins reticulate. *Flowers* not seen. *Infructescence* axillary, main axis 0.8–1.6 cm long, appressed hairy. *Drupe* 3-celled, obovoid, ca 1.6 × 1.3 cm, greenish when fresh, densely and shortly tomentose, apparently indehiscent, 3-lobed, the three angles usually with distinct sutures from the apex, suture lines 1–1.3 cm long; endocarp crustaceous, glabrous inside; pedicel ca 2 mm long, grayish appressed hairy; sepals 5, narrowly oblong, ca 2 mm long, persistent, appressed grayish hairy on both sides; seeds 1–3, 1 seed per locule, 1.1 × 0.5 cm, glabrous.

Thailand.— PENINSULAR: Nakhon Si Thammarat [Khao Luang National Park, *Tagane et al. T3734* (**BKF!**, **FU!**, **K**, **KYO!**, **P**, **VNM**); ibid., 8°29′24.4″N, 99°45′03.2″E, alt. 1,200 m, 18 Dec. 2015, *Tagane et al. T5224* (**BKF!**, **FU!**)].

Distribution.— Endemic (so far known only from Mt Khao Luang).

Ecology.— In lower montane evergreen forest, growing with *Castanopsis acuminatissima* (Blume) A.DC., *Quercus ramsbottomii* A.Camus, *Lithocarpus aggregatus* Barnett, *L. curtisii* (King ex Hook.f.) A.Camus, *Syzygium antisepticum* (Blume) Merr. & L.M.Perry, *S. acuminatissimum* (Blume) DC., *S. claviflorum* (Roxb.) Wall. ex A.M.Cowan & Cowan, and *Cryptocarya densiflora* Blume; at 1,200–1,400 m altitude.

Etymology.— The specific epithet refers to the type locality of this species.

GenBank accession no.— *Tagane et al. T3734*: LC381847 (*rbcL*), LC381848 (*matK*).

Conservation status.— Critically Endangered (CR). *Dichapaetalum khaoluangense* is so far known by less than 50 individuals at a narrow range of altitude (ca 1,200–1,400 m) on Mt Khao Luang. Therefore we propose the status of this species as CR according to the IUCN criterion D (IUCN 2012).

Note.— Grote (2018) recorded "*Dichapetalum* sp. 1" from the same mountain, Mt Khao Luang, at ca 750 m altitude, in the Flora of Thailand. However, *D. khaoluangense* is morphologically different from *Dichapetalum* sp. 1 in having smaller leaves (5–11 × 2–3.9 cm vs 11–13 × 4–5 cm), more secondary veins (8–12 pairs vs 5–7 pairs) and 0.8–1.6 cm long

Figure 1. *Dichapetalum cambodianum* Tagane & Nagam. A. specimen (*Put 2955*) at **K;** B. abaxial leaf surface showing finely reticulated and prominent tertiary veins; C. label; D. living plant, leafy branch; E. abaxial leaf surface; F. fruit. A–C: *Put 2955* (**K**); D–E: Bokor National Park, Cambodia, 8 Dec. 2013, from *Tagane et al. 6114* (**KYO**); F: Bokor National Park, Cambodia, 19 July 2012, from *Tagane et al. 4093* (**KYO**). Photos taken by Shuichiro Tagane.

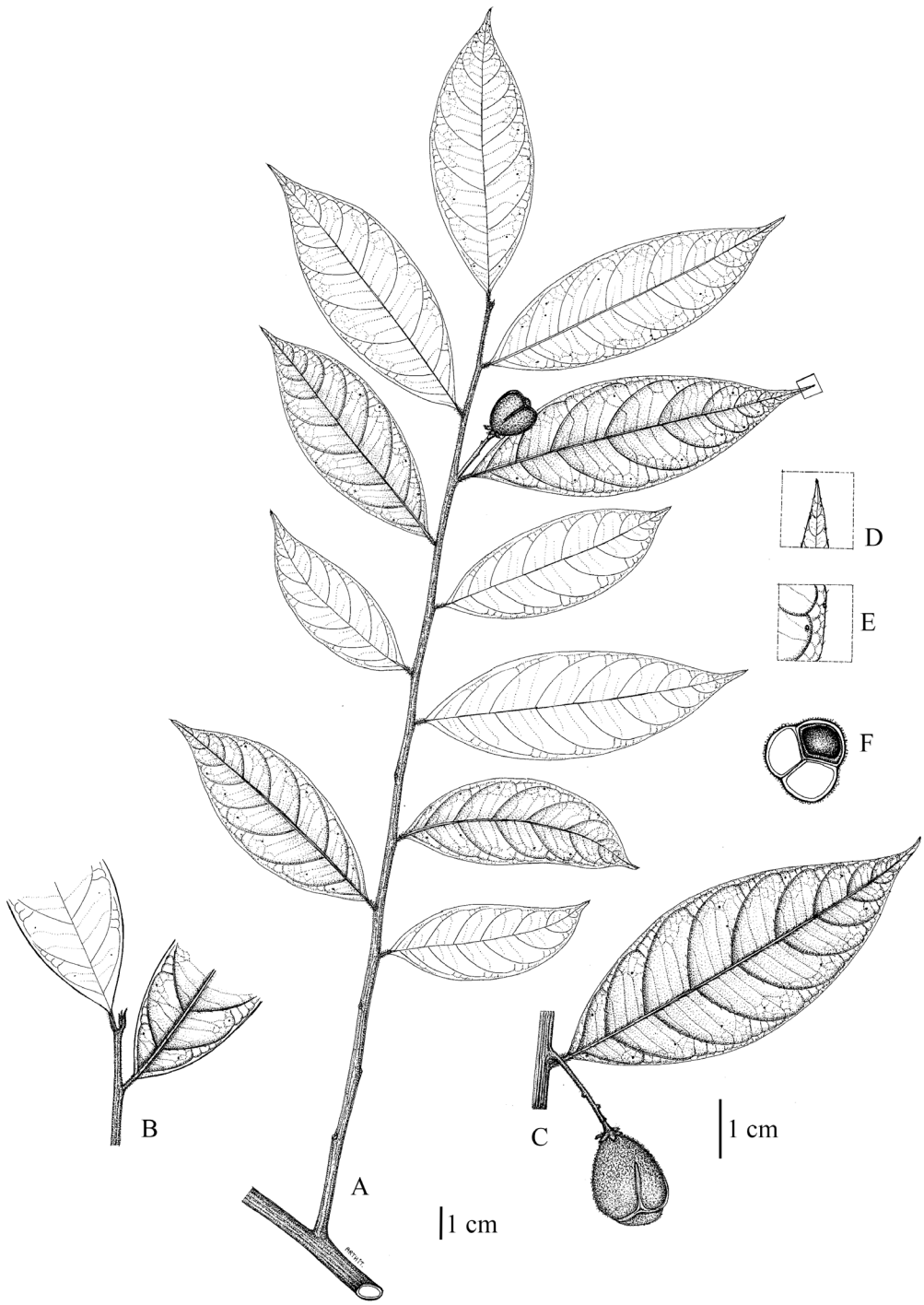

Figure 2. *Dichapetalum khaoluangense* Rueangr. & Tagane. A. fruiting twig; B. young branch and terminal bud; C. branch with leaf and fruit; D. glands at leaf apex; E. gland at leaf margin; F. fruit cross section; A–F from *Tagane et al. T3734* (**BKF**). All drawn by Arthit Khamkamnoed.

peduncles in fruiting specimens (vs sessile in flowering and no information available for fruiting specimens). Considering these morphological differences as well as the habitat differences in altitude, we consider the two as distinct species. We need to collect additional specimens of *Dichapetalum* sp. 1 (especially fruiting material) to clarify its taxonomic identity.

Dichapetalum ranongense Nagam., Rueangr. & Tagane, **sp. nov.**

Similar to *D. sordidum* (Ridl.) Leenh. and *D. helferianum* in hairiness on young twigs, leaves and fruits, and shape of drupes, but differs by narrower leaves, more numerous secondary veins (8–10 pairs vs 5–8 pairs in *D. sordidum* and vs 7–8 pairs in *D. helferianum*), lacking foliar glands (vs usually on upper surface in *D. sordidum* and vs only near the base in *D. helferianum*) and indistinct sutures of drupes (vs distinct sutures in both species). Type: Thailand. Ranong Province, Khlong Na Kha Wildlife Sanctuary, in mixed evergreen forest, 9°27′44.6″N, 98°30′23.0″E, alt. 82 m, 22 Dec. 2015 (fr.), *S. Rueangruea, C. Hemarat, W. Keiwbang, S. Tagane, H. Toyama & H. Nagamasu T5364* (holotype **BKF!**, isotype **KYO!**). Figs. 3 & 4 F–H.

Shrub, 1.5 m tall. *Young branches* and buds ferruginous appressed hairy; old branches glabrous, grayish brown. *Stipules* narrowly triangular, 0.5–1 mm long, appressed hairy, caducous. *Leaves*: petiole 2–3 mm long, appressed hairy; lamina green when dry, thinly coriaceous, narrowly elliptic or lanceolate, 9.5–17 × 3–5 cm wide, apex acute to obtuse, base oblique, margin entire, glabrous on both surfaces except midrib on lower surface sparsely appressed hairy, foliar glands absent; secondary veins 8–10 pairs, tertiary veins reticulate, prominent. *Infructescence* axillary, sessile. *Flowers* not seen. *Drupe* 2-celled, quadrate-circular, laterally flattened, ferruginous hirsute, ca 1 × 1 cm, sutures indistinct; pedicel ca 2 mm long, ferruginous appressed hairy; sepals 5, caducous.

Thailand.— PENINSULAR: Ranong [Khlong Na Kha Wildlife Sanctuary, *Rueangruea et al. T5364* (**BKF!**, **KYO!**)].

Distribution.— Endemic (so far known only from the type locality).

Ecology.— In lowland evergreen rainforest, dominated by species of Dipterocarpaceae such as *Dipterocarpus grandiflorus* (Blanco) Blanco, *D. kerrii* King, *Hopea oblongifolia* Dyer, *H. pierrei* Hance, *Parashorea stellata* Kurz and *Shorea gratissima* (Wall. ex Kurz) Dyer; ca 100 m altitude.

Etymology.— The specific epithet refers to the type locality of this species.

Conservation status.— DD (Data Deficient). Only a single individual is known from the type locality. Further investigations are needed for assessing the number of individuals/populations and distribution range.

Note. —This species is easily distinguishable from the other Thai species of *Dichapetalum* by having densely ferruginous hairs on young branches, leaves and fruits. The leaf texture and venation are similar to *D. gelonioides*, but the species is distinguished by its absence of foliar glands (vs usually a few near base of the lamina) and fruit shape (laterally flattened quadrate-circular vs bean-shaped).

KEY TO THE SPECIES OF DICHAPETALACEAE IN THAILAND

(based on fruiting specimens; *Dichapetalum* sp. 1 of Grote (2018) is not included since the fruits of this species are not yet known).

1. Adaxial side of midribs and secondary veins ferruginous-hairy — **D. longipetalum**
1. Adaxial side of midribs and secondary veins glabrous or glabrescent
  2. Secondary veins 8–12 pairs
    3. Petioles 3–6 mm long; leaf base symmetrical or slightly oblique; drupe with 3 distinct sutures — **D. khaoluangense**
    3. Petioles 2–3 mm long; leaf base oblique; drupe with indistinct sutures — **D. ranongense**
  2. Secondary veins less than 8 pairs
    4. Leaves coriaceous; leaf margin and abaxial side of midrib covered with dense brown hairs; peduncles longer than 7 mm; fruit with 2 or 3 sutures — **D. helferianum**
    4. Leaves chartaceous to subcoriaceous; leaf margin and abaxial side of midrib glabrous; peduncle shorter than 5 mm; fruit with 1 (rarely 2) sutures
      5. Twigs with many lenticels; drupe broadly ellipsoid, flattened, longer than 2 cm — **D. cambodianum**
      5. Twigs with sparse lenticels; drupe globular, 1–1.8 cm long — **(D. gelonioides)**
        6. Drupe smooth, densely pilose — **D. gelonioides** subsp. **gelonioides**
        6. Drupe tuberculate, subglabrescent — **D. gelonioides** subsp. **tuberculatum** Leenh.

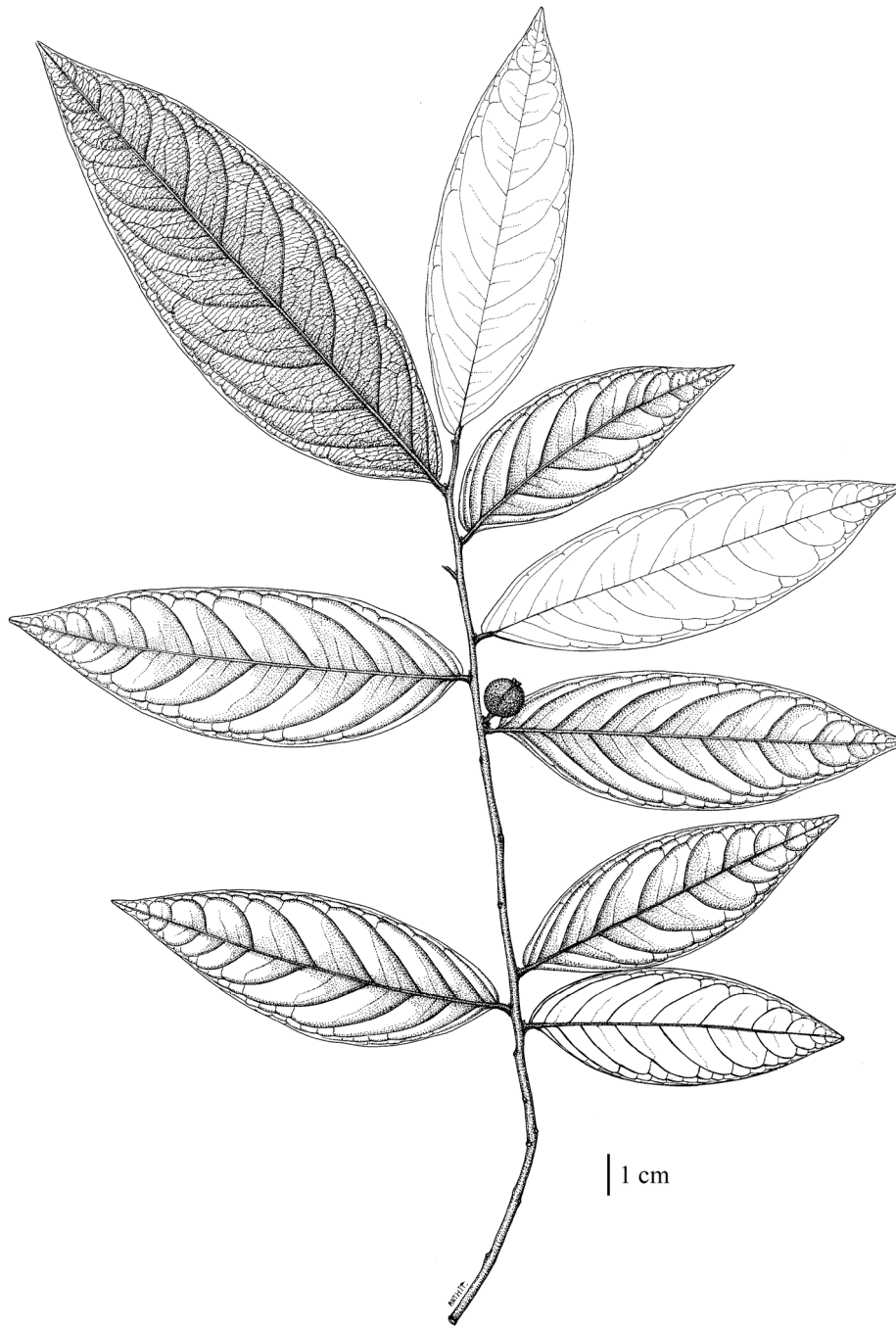

Figure 3. *Dichapetalum ranongense* Nagam., Rueangr. & Tagane. Fruiting twig; from *Tagane et al. T5364* (**BKF**). Drawn by Arthit Khamkamnoed.

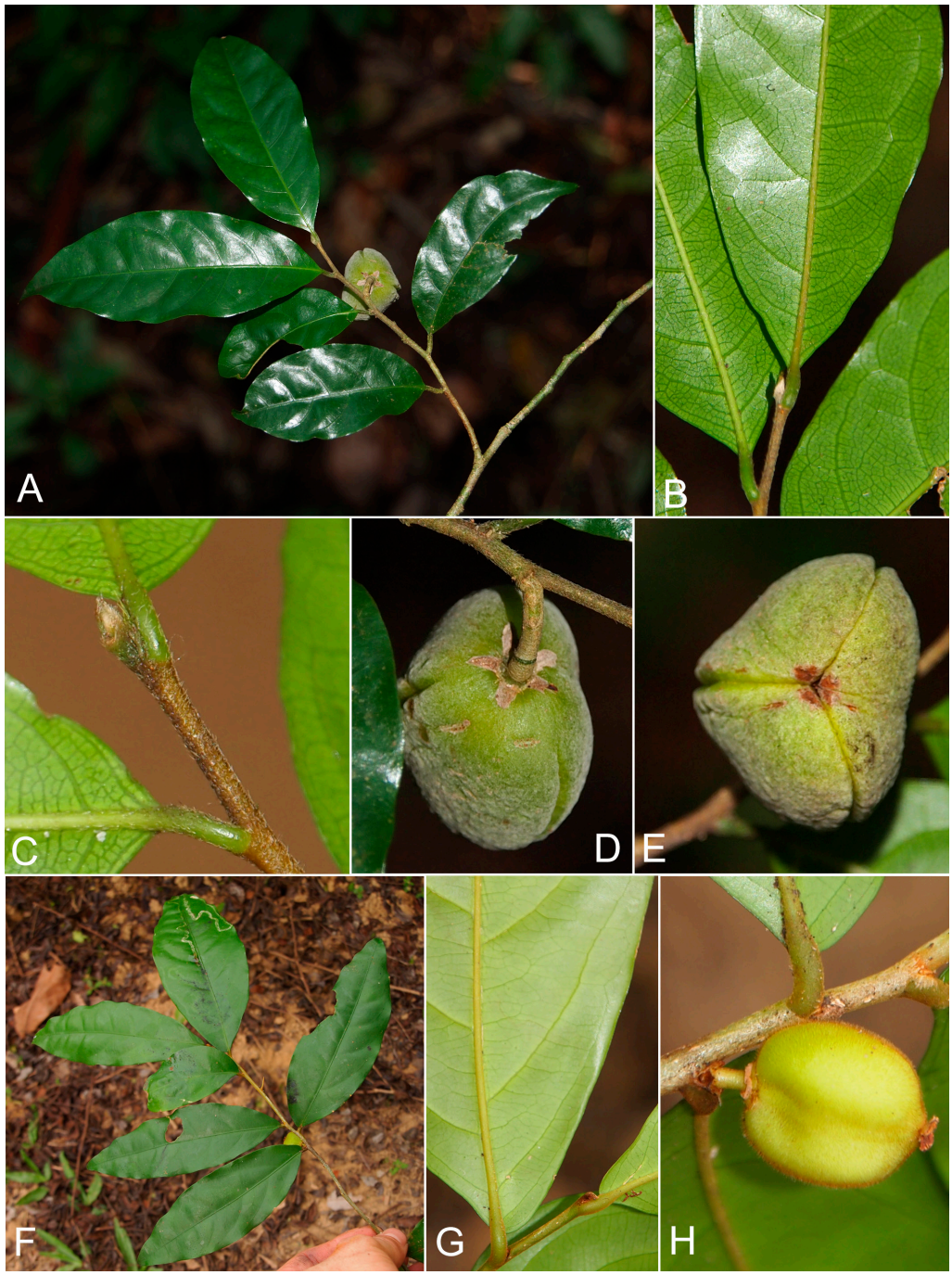

Figure 4. *Dichapetalum khaoluangense* Rueangr. & Tagane: A. fruiting branch, B. portion of abaxial surface of lamina, C. terminal bud and branch, D. fruit (bottom view) with persistent sepals, E. fruit (top view); *Dichapetalum ranongense* Nagam., Rueangr. & Tagane: F. fruiting branch, G. branch apex with portion of abaxial surface of lamina, H. fruit. Photographs: A–E from *Tagane et al. T3734*; F–H. from *Rueangruea et al. T5364*. All Photos taken by Shuichiro Tagane.

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