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A new species of *Alphonsea* (Annonaceae)

IAN M. TURNER[1, 2] & TIMOTHY M.A. UTTERIDGE[3]

ABSTRACT

Alphonsea isthmicola I.M.Turner & Utteridge is described. It is a species of tree currently known from two limestone outcrops in Peninsular Thailand and one limestone hill near the Thai border in Peninsular Malaysia. A key to the *Alphonsea* species of Peninsular Malaysia and Southern Thailand is included.

KEYWORDS: limestone, South-East Asia, taxonomy.

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INTRODUCTION

In working on the genus *Alphonsea* for the Flora of Peninsular Malaysia, the first author noted a fruiting collection from Kaki Bukit, Perlis, which did not fit any of the 11 known species from Peninsular Malaysia (Sinclair, 1955; Kessler, 1996; Turner & Utteridge, 2015; Turner, 2016). As the collection site is close to the border with Thailand, material collected north of the border was investigated. A matching fruiting specimen from Surat Thani and a flowering specimen from Nakhon Si Thammarat in Peninsular Thailand were found. All the collections were made on limestone outcrops and have similar foliage. We therefore consider them to represent a single undescribed species and present a description here. A key to the *Alphonsea* species of Peninsular Malaysia and Southern Thailand is also included.

Photographs and a description of the flowering plant, from which the flowering specimen (and type) was gathered, appear in Gardner *et al*. (2015) as *Alphonsea* sp. B. In the description of sp. B, the number of carpels per flower is given as 1. The herbarium material definitely has more than one carpel per flower. It may be that the carpels are tightly pressed together in the living state and therefore appear as a single entity. The fruiting specimens certainly have more than one monocarp per infructescence.

DESCRIPTION

Alphonsea isthmicola I.M.Turner & Utteridge, **sp. nov.**

Similar in vegetative and floral morphology to *Alphonsea boniana* but differs in having more than one carpel per flower, monocarps smooth rather than verrucose and not distinctly nipple-tipped. Differs from *Alphonsea siamensis* in have leaf bases generally cuneate rather than rounded and not having irregular latitudinal constrictions in the monocarps when dry. Type: Thailand, Nakhon Si Thammarat, Tha Sala District, Khao Luang National Park, Krung Ching Waterfall, alt. 270 m, nature trail east of camp, canopy of slightly disturbed lowland evergreen forest on narrow ridge at edge of limestone doline, 8˚431'N, 99˚40'E, 28 Feb. 2006, *Gardner ST2393* (holotype **BKF**, isotype **K**). Figs. 1–2.

[1] Singapore Botanical Liaison Officer, Royal Botanic Gardens, Kew, Herbarium, Kew, Richmond, Surrey, TW9 3AE, U.K.; email: i.turner@kew.org

[2] Herbarium, Singapore Botanic Gardens, National Parks Board, 1 Cluny Road, Singapore 259569.

[3] Royal Botanic Gardens, Kew, Herbarium, Kew, Richmond, Surrey, TW9 3AE, U.K.; email: t.utteridge@kew.org

Tree to 24 m tall, 43 cm dbh. *Twigs* dark grey or dark brown, longitudinally striate, becoming brown or grey-brown with age; youngest parts with adpressed brown or pale hairs, soon lost. *Leaves* chartaceous to subcoriaceous, slightly shiny, drying grey or brown above, pale brown beneath with the midrib generally a darker and redder brown, lamina margin also frequently a redder brown; generally glabrous though some long adpressed hairs may be present on the midrib below and pale hairs on the midrib above near leaf base, midrib above flush to slightly sunken in dry leaves, prominent below; lamina elliptic, 3.5–9 × 1.5–3.5 cm, base cuneate, apex acute to acuminate, lateral nerves 10–12 pairs though difficult to distinguish from intercostal veins; tertiary venation more or less reticulate, obvious from below, more obscure from above; petiole 2–3 mm long, 1 mm diameter, drying dark brown or blackish, wrinkled, sometimes with scattered hairs. *Inflorescences* extra-axillary, axis ca 3 mm long bearing flowers in distichous arrangement. *Flowers* with pedicel (3–)5–10 mm long, ca 0.5 mm wide, with dense short brown hairs; tiny medial bract ca 1 mm long, 0.8 mm wide, brown hairy; sepals ovate, ca 1 × 1 mm; outer petals ovate, ca 6 mm long, 4 mm wide, thin, drying dark brown with short pale hairs outside and inside; inner petals ovate-lanceolate, ca 7 mm long, 3 mm wide, apex prolonged and reflexing at anthesis, drying dark brown, densely pale hairy outside, more or less glabrous within; stamens many, ca 1 mm long; carpels 3–5, ca 1.5 mm long, densely covered with ascending pale hairs. *Fruits* with pedicel 8–15 mm long, ca 3 mm thick, longitudinally wrinkled, covered with short brown hairs; monocarps 3–5, ellipsoidal to 3 cm long, 2.5 cm wide, drying brown, surface minutely pimpled, covered in very dense, very short brown hairs, monocarp wall to 3 mm thick; stipe to 7 mm long, 3 mm wide. *Seeds* ca 6.

Thailand.— PENINSULAR: Nakhon Si Thammarat, Tha Sala District, Khao Luang National Park, Krung Ching Waterfall, alt. 270 m, nature trail east of camp, canopy of slightly disturbed lowland evergreen forest on narrow ridge at edge of limestone doline, 8˚431'N, 99˚40'E, 28 Feb. 2006, *Gardner ST2393* (**BKF**, **K**); Surat [Thani], Ban Nasan [Ban Na San District], 13 Aug. 1927, *Kerr 13366* (**K**, **BM**).

Malaysia.— Perlis, Kaki Bukit, ca 300 ft, 11 Apr. 1938, *Kiah SFN 35235* (**K** (×2), **L**).

Field notes.— Bark mid grey-brown with vertical lines of raised lenticels, inner bark dense, yellow-brown with a few pale vertical streaks and a fine network of think dark lines (*ST2393*). Flower petals pale yellow (*ST2393*). Fruit pale green (*SFN 35235*).

Distribution.— Known from three collections from Peninsular Thailand and the Peninsular Malaysia near the border with Thailand. All lie in the relatively narrow isthmus region of the Malay Peninsula (Fig. 2).

Phenology.— Reported as evergreen. No clear pattern of reproductive phenology is discernible from the limited collections.

Ecology.— All collections are from limestone outcrops.

Conservation status.— *Alphonsea isthmicola* is known only from three collections and has an Extent of Occurrence (EOO) of only 3,027 km^2; in addition, the Area of Occupancy (AOO) is 12 km^2 (when using a user-defined cell width of 2 km) – both of these fall within the Endangered category of the IUCN Red List Categories (IUCN, 2012). The species has been collected at the extreme ends of the Nakhon Si Thammarat Range: at the southern end in the Malaysian state of Perlis, and at the northern end in Thailand. The mountain range runs north from Perlis along the centre of the Isthmus of Kra through to the northern tip of Nakhon Si Thammarat/border of Surat Thani, and has a total area of ca 9560 km^2. The species is only collected from limestone areas which are relatively small outcrops in the Nakhon Si Thammarat Range, especially in the northern part, and thus the AOO is a good estimate of the occurrence of *A. isthmicola*. Large areas of granite dominate the Range, and using detailed geological maps (Suensilpong *et al.*, 1984), we have estimated the granite to have an area of ca 3915 km^2 – thus reducing the species potential EOO to ca 5645 km^2. That would further reduce with refinement of field observations, as we have had to include various conglomerate classes etca which may not be suitable habitat, and also does not take into account destruction of

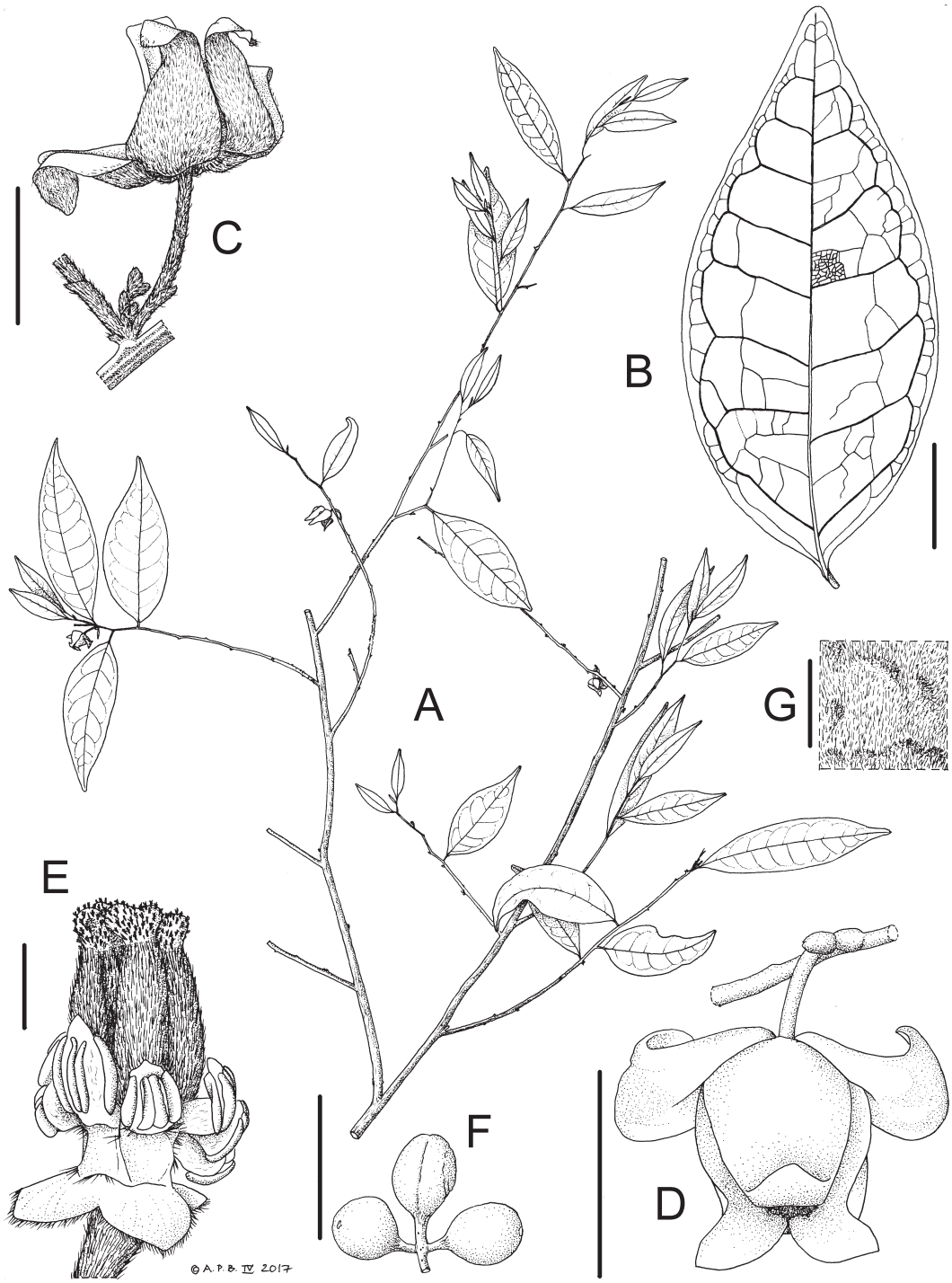

Figure 1. *Alphonsea isthmicola* I.M.Turner & Utteridge, sp. nov. A. Habit, B. Mature leaf, adaxial surface, C. Flower (one outer petal missing), D. Flower in vivo drawn from photograph (hairs omitted), E. Reproductive structures from C, F. Infructescence, G. Indumentum on surface of monocarp. Scale bars: A and F = 5 cm, B = 1 cm, C = 5 mm, D = 5 mm, E = 1 mm, G = 500 μm. Material used *Gardner ST2393* (A–C, E); *Kiah SFN 35235* (F–G); Photograph Gardner *et al*. (2016: 98, *Alphonsea* sp. B) (D)

limestone habitats, especially in the heavily urbanised region around Don Sak at the northern end of the Range. In addition, whilst the Malaysian collection is within the Perlis State Park and one of the Thai collections is from Khao Luang NP, outside protected areas much of the range, especially the lowland plains right up to the edge of the hills, has been converted to agriculture, mainly oil palm and rubber plantations. The species is only known from three collections from three locations, with two of the collections from 1927 and 1938. We assign a provisional conservation assessment of Endangered EN B1ab(i, ii, iii)+2ab(i, ii, iii) following, IUCN (2012).

Vernacular.— Kerr reported the Thai name sang yu [สังยู้], which is used for a number of Annonaceae species in Thailand, more often written as สังหยู (R. Pooma pers. comm.).

Etymology.— from the Latin, *isthmus* and *–icola* (dweller); living on an isthmus.

Figure 2. Map showing the known distribution of *Alphonsea isthmicola* I.M.Turner & Utteridge, sp. nov.

KEY TO *ALPHONSEA* SPECIES OF PENINSULAR MALAYSIA AND SOUTHERN THAILAND

The species covered include those from Peninsular Malaysia (Sinclair, 1955; Kessler, 1996; Turner & Utteridge, 2015; Turner, 2016) and the ones listed by Gardner *et al.* (2015) for Southern Thailand, including a still unnamed species. Three species (*A. keithii*, *A. siamensis* and *A.* sp. A) are not recorded from Peninsular Malaysia. The key is based largely on fruit characters as fruiting material is collected more often than flowering material (carpel number can be inferred from monocarp number), though the fruits of *Alphonsea keithii* remain unknown.

1. Carpels 1–2
  2. Young twigs densely red-brown hairy; petals to 5 mm long — **A. keithii** Ridl.
  2. Youngs twigs glabrous or glabrescent; petals more than 5 mm long
    3. Monocarps ellipsoidal, apex acute — **A. boniana** Finet & Gagnep.
    3. Monocarps globose or cylindrical, apex rounded
      4. Monocarps globose, apex rounded — **A. malayana** Kessler
      4. Monocarps cylindrical, apex rounded — **A. sp. A** of Gardner *et al*.
1. Carpels 3–6 or carpels more than 6
  5. Carpels 3–6
    6. Young twigs with dense tomentum — **A. cylindrica** King
    6. Young twigs glabrous or sparsely hairy
      7. Monocarps verrucose

8. Secondary venation very distinct; monocarps ellipsoidal, warts closely packed, densely covered with short brown tomentum **A. lucida** King
8. Secondary venation relatively obscure; monocarps ± cylindrical, warts not closely packed, appearing glabrous **A. kingii** J.Sinclair
7. Monocarps smooth or rugose, but not verrucose
9. Leaves generally lanceolate; monocarps subsessile **A. curtisii** King
9. Leaves generally ovate or elliptic; monocarps distinctly stipitate
10. Monocarps with surface rugose, glabrous **A. rugosa** I.M.Turner & Utteridge
10. Monocarps with surface smooth, tomentose
11. Leaves generally more than 4 cm wide; stipe of monocarp to 20 mm long **A. elliptica** Hook.f. & Thomson
11. Leaves to 4 cm wide; stipe of monocarp to 7 mm long
12. Leaf base generally rounded; monocarps ± cylindrical, drying with irregular latitudinal constrictions **A. siamensis** Kessler
12. Leaf base generally cuneate; monocarps ellipsoidal, not drying with irregular constrictions **A. isthmicola** I.M.Turner & Utteridge, sp. nov.
5. Carpels more than 6
13. Young twigs with dense tomentum **A. maingayi** Hook.f. & Thomson
13. Young twigs glabrous or sparsely hairy
14. Leaves generally less than 4 cm wide, secondary venation indistinct; monocarps verrucose, to 1.5 cm in diameter **A. johorensis** J.Sinclair
14. Leaves generally more than 4 cm wide, secondary venation distinct; monocarps not verrucose, mostly more than 3 cm in diameter **A. javanica** Scheff.

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