

Two new species of *Ilex* (Aquifoliaceae) from Thailand

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ABSTRACT

Two new species of Aquifoliaceae are reported for Thailand. *Ilex depressifructu* is newly recorded from Umphang District, Tak Province (leaf blades ovate, ovate-oblong or oblong, base obtuse; infructescences solitary dichasia; fruits depressed globose with capitate stigma; pyrenes 5, shallowly-5-sulcate, 6-striate) and *Ilex phanganensis* (like *I. umbellulata*, but glabrous, smaller leaves, less veins, diplothyrsoid inflorescences with mainly alternate branches, less pyrenes), is newly recorded from Ko Phangan Islands, Surat Thani Province. The descriptions and illustrations of the taxa are presented.

KEYWORDS: Depressed globose fruit, dichasial infructescences, diplothyrsoid inflorescences, endemic, Surat Thani, Tak.

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INTRODUCTION

The Aquifoliaceae comprises only the genus *Ilex* L., which is estimated to include more than 600 species distributed around the world (Loizeau *et al.*, 2016). In the surrounding regions of Thailand, there are records of 204 species in China (Chen *et al.*, 2008) and 120 species in Southeast Asia (Andrews, 2002). Several species of *Ilex* are widely known as ornamental and/or herbal plants (e.g., Galle, 1997; Hu, 2005); there is also extensive knowledge of the reproductive biology of the genus (e.g., Tsang & Corlett, 2005), which all increased the interest for *Ilex* diversity in Thailand. At the moment the knowledge of the family is limited as a restricted amount of published information on Thai species exists. Fortunately, sufficient herbarium collections are available, which provide valuable resources for a preliminary study of the genus in Thailand.

During earlier studies the first author found a new species, that ranged from Northern Thailand to Yunnan in China, called *Ilex pubifructa* Pruesapan, S. Andrews & D.A. Simpson (Pruesapan *et al.*, 2017). More interesting specimens were found, which did not match any existing species known in the family

and which are described here as two new taxa. One new species is collected in Umphang District, Tak Province (Northern Thailand), which resembles the Myanmar species, *I. englishii* Lace (Lace, 1914). The new taxon, *I. depressifructu* Pruesapan & Welzen, is, unfortunately, only known from fruiting material, due to a limited number of collections available. More collections with staminate and pistillate flowers are needed to allow full description of the species. However, the fruits and the leaves are sufficient to distinguish it.

The second taxon is from Ko Phangan Islands, Surat Thani Province (Peninsular Thailand). The specimens resemble *Ilex umbellulata* (Wall.) Loes. in fruit characters, but they can clearly be distinguished by the diplothyrsoid instead of umbellate cymose inflorescences. The differences in the inflorescence type within *Ilex* are important for grouping and identifying the species (Hu, 1949, 1950a, 1950b; Loizeau & Spichiger, 1992; Hicks, 2006). Hicks (2006) for example, arranged the New Guinean species in two groups based on racemose and non-racemose inflorescences and newly described six species with racemose inflorescences for New

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Guinea. In agreement with Hicks, our taxon is distinct by its inflorescence and we describe it here as *I. phanganensis* Pruesapan & Welzen.

MATERIAL AND METHODS

The measurements, descriptions and drawings were based on herbarium specimens, which are deposited in BK and BKF (for abbreviations see Thiers, 2020). The photographs were taken with digital cameras and the specimens were studied with a stereo-microscope.

TAXONOMY

Ilex depressifructu Pruesapan & Welzen, *sp. nov.*

Differs from other *Ilex* species in Thailand and surrounding countries in the combination of leaves

with an ovate or ovate-oblong or oblong shape and obtuse base, infructescences solitary dichasial cymes, fruits depressed globose with capitate stigma; pyrenes 5, shallowly-5-sulcate, 6-striate. Type: Thailand, Tak, Umphang District, Pa Wai Waterfall, 801 m, 27 July 2012, *Suddee, Neupane & BKF staff 4392* (holotype **BKF** [SN204758!]; isotype **BKF** [SN221811!]). Figs. 1–2.

Trees up to 10 m tall, ca 10 cm dbh. *Bark* brown. *Twigs* pubescent, brownish green, older twigs subglabrous, lenticels present. *Leaves* alternate; blade ovate or ovate-oblong or oblong, 10–15 × 4–6 cm, subcoriaceous, base obtuse, margin entire, apex acute or obtuse (or slightly retuse), dark green above, light green below, glabrous; midrib glabrescent, sunken above and prominent below; lateral veins 13–15(–18) pairs, subopposite to alternate, widely spaced, parallel, ascending and looping before leaf

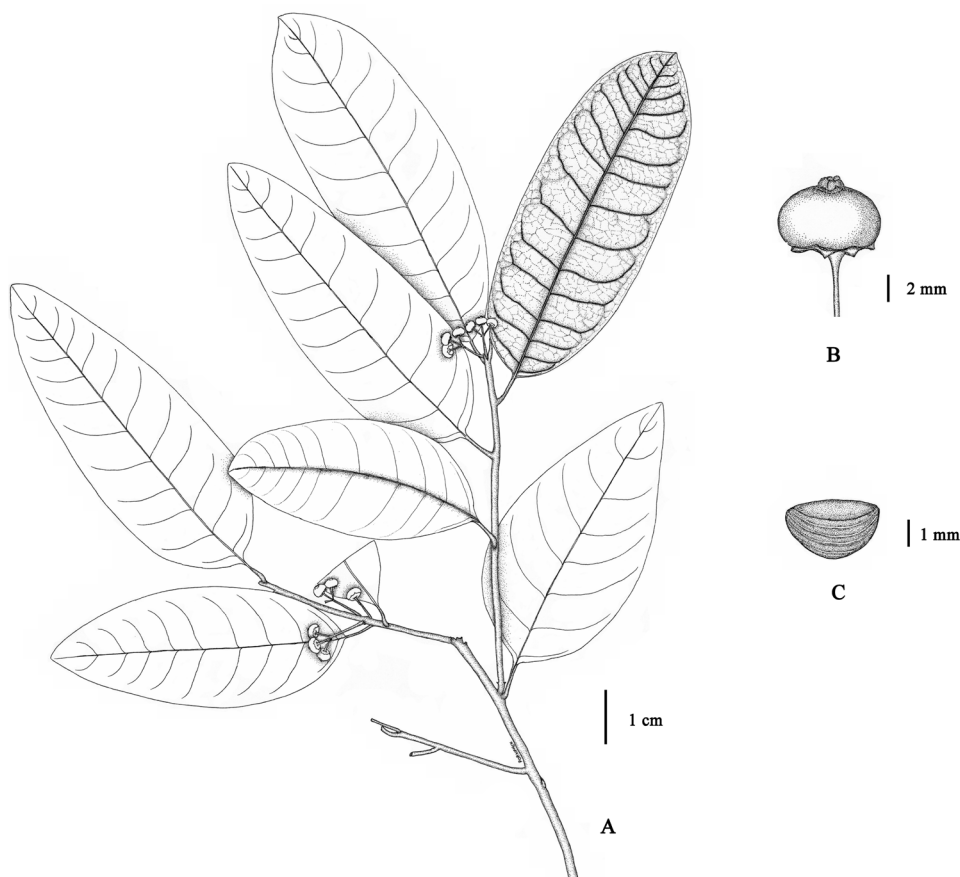


Figure 1. *Ilex depressifructu* Pruesapan & Welzen: A. leafy twig with infructescences; B. fruit; C. pyrene. All from *Suddee et al. 4392* (**BKF**). Drawn by Pornphen Supachok.

margin, subobscure above and prominent below; intercostal venation broadly reticulate, obscure above, subprominent below; petioles (sub)glabrous, channelled above, 10–15 mm long. *Inflorescences* and flowers not seen. *Infructescences* axillary, solitary dichasia; peduncles (5–)15–18 mm long, secondary branch sessile; bracts triangular-ovate, puberulent to glabrescent; bracteoles as bracts. *Fruits* depressed globose, ca 7 mm diam.; fruiting pedicel 4–6 mm long, puberulent; prophyll basal, subglabrous; calyx

persistent, explanate, subcircular, slightly 5-lobed, ca 4 mm diam., glabrous; stigma persistent, capitate, slightly 5-lobed, ca 1 mm wide, subpuberulent. *Pyrenes* 5, ellipsoid, ca 3 × 2 mm, dorsally shallowly 5-sulcate, 6-striate, laterally smooth; endocarp woody.

Thailand.— NORTHERN: Tak [Umphang District, Pa Wai Waterfall, 801 m, 27 July 2012 (fr.), *Suddee et al.* 4392 (BKF-2 sheets)].

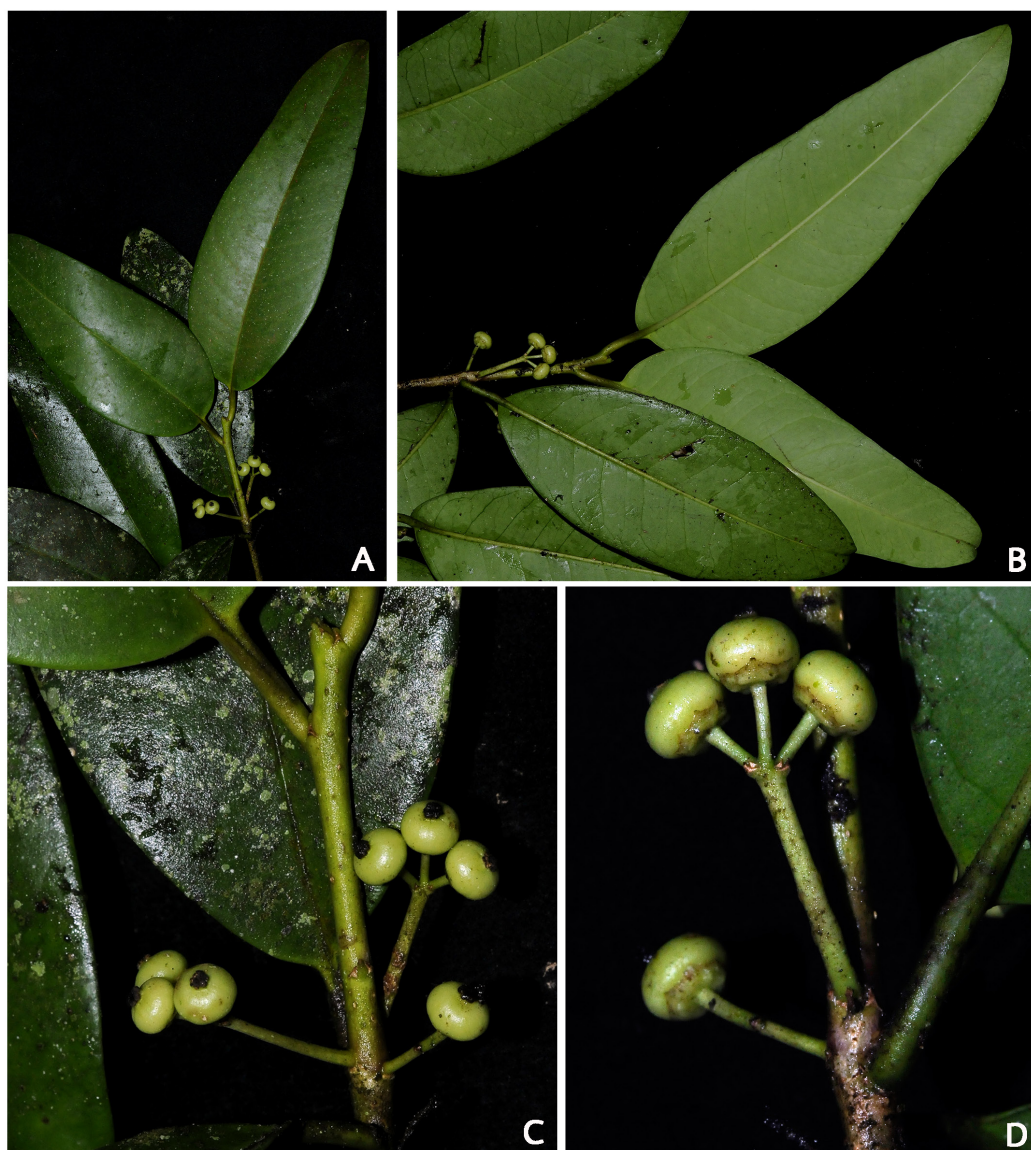


Figure 2. *Ilex depressifructu* Pruesapan & Welzen: A–B. leafy twig showing upper and lower surfaces of leaves, respectively; C–D. infructescences in front and back view, respectively. Photos by Sukid Rueangrua.

Distribution.— Endemic to Thailand (so far known only from Pa Wai Waterfall).

Ecology.— In dry evergreen forest along stream with limestone bedrock; ca 800 m altitude.

Phenology.— Flowering unknown; fruiting in July.

Vernacular.— Khiao song (เขี้ยวสอง)(name given by the first author).

Etymology.— The epithet '*depressifructu*' refers to the depressed globose fruit shape.

Conservation status.— DD (Data Deficient). This species is only known from one locality and its population size is unknown.

Use.— None recorded.

Notes.— The new species is unique in having the following combination of characters: ovate or ovate-oblong or oblong leaves with obtuse base, depressed globose fruit with capitate stigma and 5 pyrenes that are shallowly 5-sulcate and with a 6-striate ornamentation. Its leaves are beautiful in shape and colour (Fig. 2). Based on a limited number of specimens, we consider that *Ilex englishii* from Myanmar resembles the species most. The digital images of *I. englishii* of Lace's collections, in total seven specimens, were used to compare with *Suddee et al.* 4392. These included *Lace* 5283 (E00890193), *Lace* 6155 (E00890192, E00890194), and the type collection, *Lace* 6164 (K000669493, K000669494, E00890190, E00890191). The two fruiting duplicates of *Suddee et al.* 4392 were compared with the fruiting collection of *Lace* 5283 (E00890193) for *I. englishii*. The infructescences of both taxa are similar in having solitary dichasia and the depressed globose fruit with capitate stigma. Unfortunately, the few dichasial infructescences available to examine for *I. depressifructu* did not show the umbellate cymose infructescences present in *I. englishii*. The type of *I. englishii* showed a cross-section of a depressed globose fruit with capitate stigma as in *I. depressifructu*; however, the number of pyrenes is 6 in *I. englishii* and 5 in *I. depressifructu*, but this is not sufficient to conclude that they are different species. *Lace* 6155 and *Lace* 6164 have pistillate inflorescences with 4–6 (or 7) petals and likely the number of pyrenes is variable from 4–6 (or 7) like other *Ilex* species as the first author generally observed. The important characters that clearly separate *I. englishii* from *I. depressifructu* is in the combination of obovate or obovate-oblong

or subelliptic leaf shape and cuneate leaf base in the former one and the combination of ovate or ovate-oblong or oblong leaf shape and obtuse leaf base in the latter.

Ilex phanganensis Pruesapan & Welzen, sp. nov.

Similar to *Ilex umbellulata* (Wall.) Loes. in the globose fruit shape with discoid stigma, pyrenes that are 3-striate and 2-sulcate, but differs in having dark brown and glabrous young twigs (black and pubescent to puberulent in *I. umbellulata*), smaller leaves, 3–11 × 1.8–5 cm [*I. umbellulata*: (6–)8–15 × (3–)4–7.2 cm)], lesser lateral veins with 6 or 7 inconspicuous pairs [*I. umbellulata*: 7–10(–12) pairs, distinct], glabrous petiole (*I. umbellulata*: somewhat puberulent), inflorescences diplothyrsoid with mainly alternate branches (*I. umbellulata*: umbellate cymes), 5 or 6 pyrenes (*I. umbellulata*: 6–10 pyrenes). Type: Thailand, Surat Thani, Ko Pha Ngan District, Ko Pha Ngan Sub-District, Ban Maduea Whan, Moo 3, 19 June 2019, *Khiriwong & Pruesapan KP2019-1* (holotype **BK** 268874!; isotypes **BK** 268873!, **BK** 268875!). Figs. 3–4. Paratypes are listed underneath the description.

Tree or treelets, 10–18 m tall. *Bark* whitish brown. *Twigs* glabrous, dark brown when young, whitish to pale grey when mature; lenticels minute, densely scattered, (in)conspicuous. *Stipules* small, linear-triangular, glabrous. *Leaves* alternate; lamina subelliptic to oblong-elliptic or oblong-obovate, 3–11 × 1.8–5 cm, subcoriaceous, base cuneate, margin entire (serrate in young plants), apex subacute to acuminate, shiny mid-green above, pale green below, glabrous; midrib glabrous, sunken above, prominent below; lateral veins 6 or 7 pairs, subopposite to alternate, widely spaced, ± parallel, ascending and looping before leaf margin, subobscure above, subprominent below; intercostal venation broadly reticulate, obscure on both sides; petioles glabrous, 9–12 mm long. *Staminate inflorescences* axillary, solitary, diplothyrsoid with mainly alternate branches (Loizeau & Spichiger, 1992: Fig. 5), axis 30–60 mm long, puberulent; peduncle 0.6–1 cm long, secondary axes slightly indistinct, to ca 1 mm long, puberulent; bracts suborbicular, puberulent, persistent; bracteoles small, linear-triangular, ca 0.5 mm long, (sub)puberulent, persistent. *Staminate flowers*: calyx (3–)4–5 lobes, ca 2 mm in diam., lobes suborbicular, subglabrous; corolla (3–)4–5 lobes, petals oblong,

ca 2 mm long, basally connate; stamens (3–)4–5, as long as or slightly longer than petals; pistillode subovoid, rostellate, glabrous; pedicel ca 2 mm long, subglabrous, prophyll basal. *Pistillate inflorescences* as staminate ones. *Pistillate flowers*: calyx 4–5 lobes, ca 1.5 mm diam., lobes suborbicular or truncate at apex; petals 8–10, oblong, ca 2 mm long, basally connate; ovary glabrous, subglobose-subovoid, stigma sessile, capitate; staminode absent(?); pedicel ca 2 mm long, puberulent, prophyll basal. *Fruit* globose, 4–5 mm diam., glabrous, green turning red to black when ripe; persistent calyx explanate, ca 3 mm diam., puberulent; persistent stigma slightly capitate when young and discoid when mature, puberulent. *Pyrenes* 5–6, ellipsoid, ca 3–4 × 1–2 mm, dorsally 3-striate, 2-sulcate, laterally smooth; endocarp woody.

Thailand.—PENINSULAR: Surat Thani [Ko Pha Ngan District, Ko Pha Ngan Sub-District, Ban Maduea Whan, Moo 3, 11 Sept. 2018 (fr.), *Khiriwong & Pruesapan, KP2018-32* (BK-5 sheets [BK

268868–BK 268872]); *ibid.*, 19 June 2019, (fl.), *Khiriwong & Pruesapan, KP2019-1* (BK-3 sheets [BK 268873–BK 268875]); *ibid.*, 12 July 2019, (fr.), *Pruesapan et al. KP2019-2* (BK-5 sheets [BK 268876–BK 268880]); *ibid.*, 12 July 2019 (fl.), *Pruesapan et al. KP2019-3* (BK-6 sheets [BK 268881–BK 268886]).

Distribution.— Endemic to Thailand (so far known only from Ko Pha Ngan Islands).

Ecology.— Evergreen open area; ca 40 m altitude. This species was collected in an abandoned coconut plantation.

Phenology.— Flowering in June–July; fruiting in July–September.

Vernacular.— Phrom pha-ngan (พรมพวงจัน), name given by Prompiriyah Khiriwong who found the plant.

Etymology.— The epithet '*phanganensis*' refers to the location where the species was collected, Ko Pha Ngan Islands.

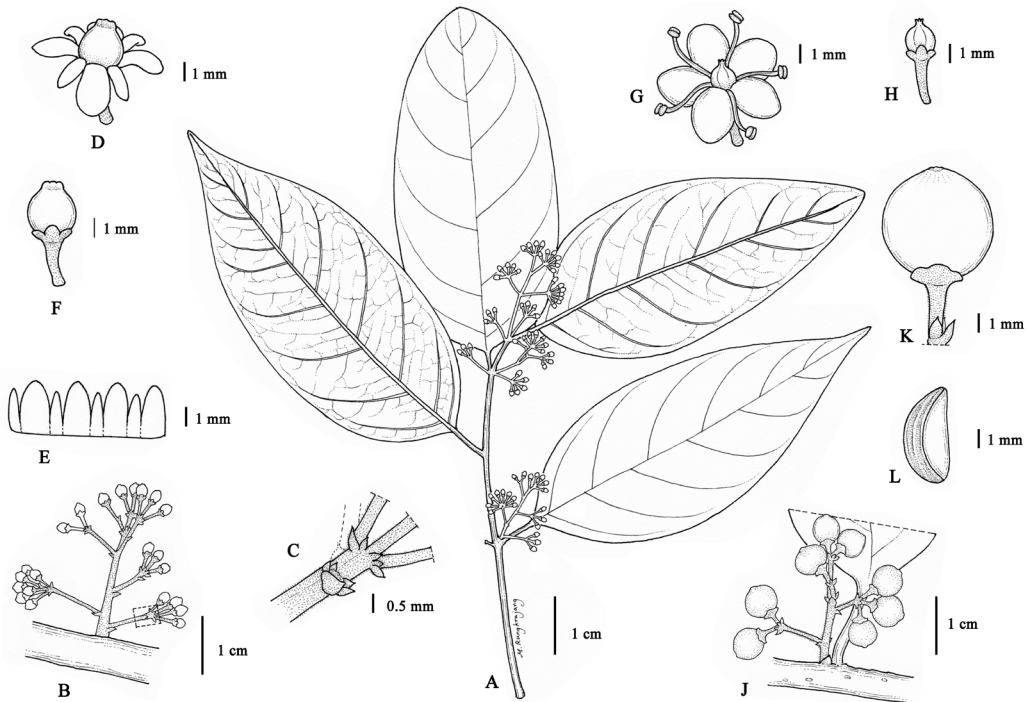


Figure 3. *Ilex phanganensis* Pruesapan & Welzen: A. leafy twig with pistillate inflorescences; B. pistillate inflorescence; C. portion of inflorescence showing bracts, bracteoles and prophylls; D. pistillate flower; E. petals of pistillate flower; F. ovary; G. staminate flower; H. pistillode of staminate flower; J. inflorescence; K. fruit; L. pyrene. A–F from *Khiriwong & Pruesapan KP2019-1* (BK), G–H from *Pruesapan et al. KP2019-3* (BK), J from *Pruesapan et al. KP2019-2* (BK), K–L from *Khiriwong & Pruesapan KP2018-32* (BK). Drawn by Mahsarakha Rungkrajang.

Conservation status.— DD (Data Deficient). The species is only known from four collections collected from two plants (staminate and pistillate plants) from the same locality. According to the collector, Prompiriyah Khiriwong, this species is also found in Cha-lok Ban Khao Village (Moo 5) and Ban Tai Sub-district of Ko Pha Ngan Islands with only a single plant present in each area. Further field observations on the species and an assessment of the quality of the habitat are needed.

Use.— The leaves of this new species, *Ilex phanganensis*, are used for making tea. Prompiriyah Khiriwong, the collector, fried the leaves in a hot pan and brewed it as tea. The taste and smell are like diluted honey (pers. comm. of the first author).

Notes.— Young plants of *Ilex phanganensis* show leaves with a serrate margin (Fig. 4A), which is also present in young plants of the related species, *I. umbellulata* (observations by first author and Sukid Rueangruea).

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Figure 4. *Ilex phanganensis* Pruesapan & Welzen: A. serrate leaf margin of young plant; B. pistillate flowers; C. staminate flowers; D. bark; E. ripe fruits; F. pyrenes. Photos by Prompiriyah Khiriwong (A–B, E) and Kanchana Pruesapan (C–D, F).

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