ARPHA Preprints

PENSOFT

PREPRINT

Author-formatted, not peer-reviewed document posted on 18/05/2022

DOI: https://doi.org/10.3897/arphapreprints.e86687

Ardisia whitmorei (Primulaceae-Myrsinoideae), a new species from north east of Peninsular Malaysia

Avelinah Julius, Timothy Utteridge

ARPHA Preprints *Author-formatted, not peer-reviewed document posted on 18/05/2022* DOI: https://doi.org/10.3897/arphapreprints.e86687

Ardisia whitmorei (Primulaceae-Myrsinoideae), a new species from north east of Peninsular Malaysia

Avelinah Julius[1,*] & Timothy M.A. Utteridge[2]

[1]Forest Research Institute Malaysia, Kepong, Selangor, 52109, MALAYSIA
[2]Royal Botanic Gardens, Kew, Richmond, TW9 3AE, U.K.
*Corresponding author

Abstract

Ardisia whitmorei Julius & Utteridge sp. nov. (Primulaceae-Myrsinoideae), a member of *Ardisia* subgenus *Stylardisia* on account of the style protruding from the closed petals prior to anthesis, is herein described and illustrated as new species. This new species is easily distinguished by the combination of the inflorescences with a slender rachis branched to two orders, the corolla lobes are abaxially glabrous with only two gland-dots near the apex, and the brochidrodromous secondary veins with double loops near the margin.

Keywords

Ericales, Gunung Padang, Malesia, *Stylardisia*, taxonomy, Terengganu, IUCN status, endemic

Introduction

The genus *Ardisia* Sw. is one of the largest tropical genera in Primulaceae subfamily Myrsinoideae (containing the woodier, tropical members), having a pantropical distribution with approximately 725 species. In Peninsular Malaysia, the last comprehensive account of the genus was that of Stone (1989) who treated 74 species in an annotated key in the Tree Flora of Malaya (because most *Ardisia* species do not reach the arborescent limit to merit full descriptions in the Tree Flora). An additional five species were added by Hu (2002; two species), Julius and Utteridge (2012, 2021; two species) and Julius et al. (2017: one species), bringing the total number of species in Peninsular Malaysia to 79.

Ardisia is classified into 16 subgenera (indicated here with the silcrow: §) using characters of habit, leaf morphology, inflorescence position and floral morphology (Mez 1902; Stone 1993; Larsen and Hu 1995), with ten subgenera present in Malesia (see Stone 1982; Larsen and Hu 1995). In Peninsular Malaysia, all these subgenera are present with most speciose groups being §*Tinus* and §*Stylardisia*, with 16 and 15 species, respectively.

A new species from southern Peninsular Malaysia, *Ardisia gasingoides* Julius & Utteridge, was initially assigned to §*Stylardisia* based on collections of fruiting material (Julius et al. 2017). However, recent molecular results suggest it is better placed in §*Acrardisia* (Julius 2019; Julius et al. 2021). This example shows the importance of having flowering specimens, or sequenced material, available for a definitive subgeneric placement in *Ardisia*. Stone (1989) annotated specimens of §*Stylardisia* in the herbarium of the Forest Research Institute Malaysia at Kepong (KEP) during his work for the Tree Flora account, but several could not be identified due to incomplete material. A single fruiting collection from Gunung (G.) Padang collected by Timothy Whitmore in 1969 was annotated by Stone (6 Oct. 1980) as '*Ardisia* sp. "Y" near *A. sessilis* Scheff. but distinct', but Stone (1989) did not list

this taxon in his annotated key to the genus in his Tree Flora account. Recently, flowering material of the species was collected during an expedition to G. Padang in 2010 (Ummul-Nazrah et al. 2011), allowing us to critically scrutinize the floral and fruit morphology against the known species in the subgenus from Peninsular Malaysia. After careful examination of the specimens and the relevant literature of species known from §*Stylardisia*, we confirm that this is an undescribed taxon, and it is formally described and illustrated as new to science here. The new taxon described here brings the number of §*Stylardisia* species native to Peninsular Malaysia to 16.

Materials and methods

This study was based on examination of herbarium specimens at K, KEP and the relevant taxonomic literature (e.g. Stone 1982, 1992; Larsen and Hu 1991; Chen and Pipoly 1996; Hu 2002); in addition, specimen images from Global Plants JSTOR (http://plants.jstor.org/), Kew Herbarium Catalogue (http://apps.kew.org/herbcat/gotoHomePage.do) and Plants of the World Online (POWO: http://www.plantsoftheworldonline.org/) were consulted. All measurements were taken from herbarium specimens and rehydrated material for the floral description; shape terminology follows Systematics Association Committee (1962). Flowering and fruiting materials are indicated by 'fl.'and 'fr.', respectively. The conservation assessment of the species was undertaken using IUCN categories of threat (see IUCN 2012, 2016) following the guidelines and procedures developed at FRIM for the Malaysia Plant Red List (Chua and Saw 2006).

Taxonomy

Ardisia whitmorei Julius & Utteridge, sp.nov. (§*Stylardisia*)

Figure 1

Diagnosis. Among the Peninsular Malaysian members of subgenus (§) *Stylardisia*, the new species is easily recognised by the following combination characters: lateral veins brochidrodromous with double loops toward the margin and prominent on both surfaces, the relatively large leaves (15–23 cm long), the inflorescences with a slender rachis and branched to 2 orders, and the glabrous corolla lobes with only two gland-dots near the apex abaxially (Fig. 1).

Type. MALAYSIA. Peninsular Malaysia: Terengganu, Hulu Terengganu, G. Padang, trail to summit of G. Padang, 4°51.06' N, 102°53.22' E, 1236 m alt., 20 March 2010 (fl.), *Mohd. Hairul et al. FRI70884* (holotype KEP!).

Description. A woody shrub with about 2 m high. *Indumentum* of scale or short, brown, simple or branched trichomes, with or without glands on vegetative and reproductive part. *Leaves* alternate; petiole stout, 1–2 cm long, covered with dense scale; lamina subcoriaceous, elliptic-oblong, 15–23 × 5.5–7.5 cm, base cuneate-attenuate, margin entire, apex acuminate, with acumen 1–1.5 cm long, glabrous on both surfaces except the dense, brown scale beneath; midrib flat above, raised below; lateral veins 21–28 pairs, closely spaced, brochidrodromous with double looping in the margin, distinct on upper surface, prominent beneath, intersecondary veins present within each pair; intercostal veins reticulate, distinct on both surfaces. *Inflorescences* terminal on the uppermost leaves on lateral branches, paniculate, c. 12 cm long, 2 times branched, racemes laxly to closely arranged on branchlets;

peduncle and rachis 10 cm long, flexuous and winged, densely hairy; bracts lanceolate, c. 1 mm long, glabrous on both surfaces, margin ciliate, deciduous. *Flower* 5-merous; pedicels 4–10 mm long, slender and obconically flared towards calyx base; calyx lobes not overlapping, spreading, covered with 2–4 brown gland-dots abaxially, glabrous on both surfaces, narrowly lanceolate to ovate, 1–1.2 × 1 mm, margin ciliate, with laxly spaced, pale brown hairs, apex obtuse; corolla contorted, lobes pinkish, with two gland-dots near apex abaxially, ovate-acuminate, c. 3.5 × 1.5 mm, glabrous on both surfaces; stamens subsessile, anther lanceolate-mucronate, c. 2 × 0.8 mm, glabrous except densely covered with gland-dots near midrib abaxially, thecae not locellate, dehiscent by longitudinal slits; ovary globose, c. 1 × 1 mm, glabrous, style and stigma slender, c. 4 mm long, ovules c. 12 in 2 series. *Fruits* with dense gland-dots, globose, c. 4 × 4 mm, glabrous.

Distribution. Endemic in Peninsular Malaysia, Terengganu (G. Padang).

Ecology. Growing in primary lower montane forest.

Etymology. It is named after Dr. Timothy C. Whitmore, a tropical botanist whose interests covered all aspects of tropical rain forests, 1935–2022, and who first collected this species from G. Padang.

Conservation status. Least Concern (LC). This species can be classified as Vulnerable (VU) because it occurs in only to one locality with a small area of occupancy (<20 km^2). However, the habitat 1000 m above sea level is a protected area according to the *Garis Panduan Perancangan Pembangunan di Kawasan Bukit dan Tanah Tinggi* [Guidelines for the Development Planning in Hilly and Highlands Areas] in Peninsular Malaysia (Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia & Kementerian Perumahan dan Kerajaan Tempatan 2009). In addition, the habitat is an intact mossy forest where a healthy population was observed along the steep slopes ridge towards the summit plateau (Mohd. Hairul Mohd. Amin, pers. com.). Therefore, it is assessed as Least Concern (LC) according to the Malaysia Red List (Chua and Saw 2006) and IUCN Red List categories and criteria (IUCN 2012, 2016).

Additional specimen examined. MALAYSIA. Peninsular Malaysia: Terengganu, Gunong Padang Expedition, Summit plateau G. Padang, closed 40 ft. lower montane type forest on eastern side of plateau [4°51'N, 102°52'E], 4200 ft. alt. [1280 m.], 20 Sept 1969 (fr.), *Whitmore FRI12727* (KEP!).

Notes. This species was initially flagged as distinct by Stone who assumed it to be similar to *Ardisia sessilis* Scheff., no doubt due to the leaf size and the venation, but to date there is no valid name for this taxon. Although the new species shows some similarity to *A. sessilis* in the shape of the leaves (elliptic-oblong), which are in the same size range (15–25 cm long) and in the reticulation (intercostal veins ±reticulate), it differs from the latter in several morphological characteristics such as the marginal veins absent (but double marginal veins present in *A. sessilis*), the inflorescence rachis is slender (but stout in *A. sessilis*) and the pedicel is longer and slender (while short or almost sessile and thick in *A. sessilis*).

There are several members of §*Stylardisia* that have large leaves and slender inflorescences rachis, but the new species most resembles *Ardisia nurii* Furtado in having elliptic-oblong leaves and a brochidrodromous venation. However, the inflorescence in *Ardisia nurii* is usually branched to 3 and rarely 2 orders, whereas in *A. whitmorei* it is branched to 2 orders. In addition, the brochidrodromous venation is double looped in *Ardisia*

whitmorei, but not in *A. nurii*. The new species is also similar to *Ardisia pterocaulis* Miq. (*A. platyclada* King & Gamble sensu Stone (1989)), also with the inflorescence rachis being slender, but *A. whitmorei* has inflorescences branched to 2 orders (whereas branched to 3 orders in *A. pterocaulis*), and has larger leaves (compared to the smaller leaves, 9.5–13 cm long, of *A. pterocaulis*) with a flat lamina surface (*A. pterocaulis* is bullate), the brochidrodromous lateral veins (in *A. pterocaulis* the lateral veins meet in prominent looped intramarginal veins), and the corolla lobes are pinkish (but waxy white in *A. pterocaulis*), that are abaxially covered with only two gland-dots near the apex (in contrast to gland-dots over the entire surface in *A. pterocaulis*).

Excluding *Conamomum utriculosum* Ridl. (synonym: *Amomum utriculosum* (Ridl.) Holttum), about ten taxa are listed as endemic to G. Padang (Ummul-Nazrah et al. 2011; with more not yet named due to incomplete material, but known to be distinct from known species). The addition of the new species described here brings the total number of endemic species for G. Padang to 11, suggesting that there are very likely more taxa that may be endemic and waiting to be described.

Figure 1. *Ardisia whitmorei* Julius & Utteridge, sp. nov.

Acknowledgements

This research was carried out as part of the Flora of Peninsular Malaysia Project at the Forest Research Institute Malaysia (FRIM). Financial support for the Flora of Malaysia projects, including the field work undertaken for this paper, was supported by the Ministry of Energy and Natural Resources (KeTSA) of Malaysia under the 11th Malaysian Plans (SPPII No: P23085100018003). The encouragement and useful comments from anonymous reviewer for reviewing and proof reading my manuscript are greatly acknowledged. We thank to Wendy YSY for valuable assistance with the conservation assessments; to Mohamad Aidil Noordin for the botanical illustration; and to the dedicated staff of KEP herbarium at FRIM for their support in the field.

References

Chen J, Pipoly JJIII (1996) Myrsinaceae. In: Wu ZY, Raven PH (Eds), Flora of China 15. Science Press, Beijing, and Missouri Botanical Garden Press, St Louis, 1–38.

Chua LSL, Saw LG (2006) *Malaysia Plant Red List: Guide for Contributors*. Forest Research Institute Malaysia, 1–28.

IUCN (2012) IUCN Red List Categories and Criteria.Version 3.1. Second edition. IUCN Species Survival Commssion, IUCN, Gland, Switzerland and Cambridge, UK.

IUCN Standards and Petition Subcommittee (2016) Guidelines for using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee of the IUCN Species Survival Commission. http://www.iucnredlist.org/documents/RedListGuidelines.pdf (accessed 28 February 2022)

Hu CM (2002) New species of *Ardisia* (Myrsinaceae) from Malesia. Blumea 47: 493–512.

Julius A, Utteridge TMA (2012) Revision of *Ardisia* subgenus *Bladhia* in Peninsular Malaysia; studies in Malaysian Myrsinaceae I. Kew Bulletin 67: 379–388. https://doi.org/10.1007/s12225-012-9374-4

Julius A, Kajita T, Utteridge TMA (2017) *Ardisia gasingoides* (Primulaceae-Myrsinoideae), a new species from southern Peninsular Malaysia. Phytotaxa 291(4): 281–286. https://doi.org/10.11646/phytotaxa.291.4.5

Julius A (2019) Evolution of leaf nodulation in Myrsinoideae (Primulaceae). PhD dissertation, Chiba University, Japan, 116 pp.

Larsen K, Hu CM (1991) New taxa of Myrsinaceae from Thailand. Nordic Journal of Botany 11(1): 61–78. https://doi.org/10.1111/j.1756-1051.1991.tb01795.x

Larsen K, Hu CM (1995) Reduction of *Tetrardisia* to *Ardisia*. Nordic Journal of Botany 15(2): 161–162. https://doi.org/10.1111/j.1756-1051.1995.tb00134.x

Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia & Kementerian Perumahan dan Kerajaan Tempatan (2009) *Garis Panduan Perancangan Pembangunan di Kawasan Bukit dan Tanah Tinggi*, 1–28.

Julius A, Utteridge TMA (2021) *Ardisia recurvisepala* (Primulaceae-Myrsinoideae), a new species from Peninsular Malaysia. Phytotaxa 480(1): 79–84. https://doi.org/10.11646/phytotaxa.480.1.7

Julius A, Gutiérrez-Ortega JS, Sabran S, Tagane S, Naiki A, Darnaedi D, et al. (2021) Phylogenetic relationship of tropical Asian *Ardisia* and relatives (Primulaceae) shows non-monophyly of recognized genera and subgenera. Journal of Japanese Botany 93: 149–165.

Mez C (1902) Myrsinaceae. In: Engler A (Ed) Das Pflanzenreich, Heft 9, IV. Fam. 236. Verlag von Wilhelm Engelmann, Leipzig, 1–473.

POWO (2022). *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; http://www.plantsoftheworldonline.org/ Retrieved 7 April 2020.

Stone BC (1982) New and noteworthy Malaysian Myrsinaceae, I. Malaysian Forester 45: 101–121.

Stone BC (1989) New and noteworthy Malesian Myrsinaceae, III. On the genus *Ardisia* Sw. in Borneo. Proceedings of the Academy of Natural Sciences of Philadelphia 141: 263–306.

Stone BC (1992) A revision of the genus *Tetrardisia* Mez (Myrsinaceae). Malayan Nature Journal 46: 1–11.

Stone BC (1993) New and noteworthy Malesian Myrsinaceae, VI. *Scherantha*, a new subgenus of *Ardisia*. Pacific Science 47(3): 276–294.

Systematics Association Committee (1962) IIa. Terminology of simple symmetrical plane shapes (Chart 1a)*. Taxon 11(8): 245–247. https://doi.org/10.2307/1217034 [Addendum]

Ummul-Nazrah AR, Rafidah AR, Kiew R, Imin K (2011) The botany of Gunung Padang, Terengganu. Malayan Nature Journal 63(4): 625–641.

Figure caption

Figure 1. *Ardisia whitmorei* Julius & Utteridge, sp. nov. **A** Flowering leafy twig **B** Mature flower **C** Aerial view of opened flower **D** Flower dissected to show the stamen arrangement **E** anther, lateral (left) and front view (right) **F** Petals removed to show calyx, ovary and pistil **G** Calyx, abaxial (left) and lateral view (right) **H** Ovary dissected to show the ovules **I** Flower prior to anthesis, showing one flower with exerted style **J** Infructescence **K** Fruit **L** Fruit, cross-section. (Illustration by Mohd Aidil Nordin. **A**–**I** from *FRI70884*; **J**–**L** from *FRI12727*).