

***Bothriospermum* (Boraginaceae), a new generic record for the Flora of Peninsular Malaysia**

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ABSTRACT. *Bothriospermum zeylanicum* (J.Jacq.) Druce (Boraginaceae), a species native to Asia, has recently become naturalised in Cameron Highlands, Pahang, Malaysia. A description of the genus and species together with colour photographs are provided. It is the only representative of Boraginaceae *sensu stricto* (i.e. subfam. Boraginoideae) in Peninsular Malaysia.

Keywords. Boraginaceae, *Bothriospermum*, naturalised weed, new genus record, taxonomy, Malaysia

Introduction

In 2007 a fieldtrip to Cameron Highlands, Pahang, Peninsular Malaysia led to the discovery of a species of Boraginaceae that was tentatively identified as a *Myosotis*, a genus not otherwise recorded from Peninsular Malaysia. Realising it was something new, a second fieldtrip was organised in April 2014 to obtain more material and to take photographs so that it could be correctly identified. It proved to be *Bothriospermum zeylanicum*, which is a new record for the genus and species for Peninsular Malaysia; the genus is not recorded in either the *Flora Malesiana* revision of the Boraginaceae (Riedl, 1997), nor in the checklist by Turner (1997). New weeds, often of temperate species, are regularly introduced into the Cameron Highlands, where extensive vegetable and flower farms have replaced the lower montane forest. For example, Kiew (2009) recently reported 17 new records of naturalised weed species, of which ten were from Cameron Highlands. Interestingly, *Bothriospermum zeylanicum* occurs at a lower altitude (c. 1200 m) than most of these other weeds. A full morphological description of the genus and species, together with colour photographs, is provided here.

Turner (1997), in his catalogue of Peninsular Malaysian plants, listed under Boraginaceae 16 species in 9 genera: *Argusia* (1 species), *Carmona* (1 species), *Coldenia* (1 species), *Cordia* (4 species), *Ehretia* (4 species), *Heliotropium* (1 species), *Pteleocarpa* (1 species), *Rotula* (1 species) and *Tournefortia* (2 species). Recent molecular work by Refulio-Rodriguez & Olmstead (2014) separated *Cordia* and *Coldenia* into Cordiaceae; *Ehretia*, which now includes *Carmona* and *Rotula* (Gottschling et al., 2014), into Ehretiaceae; and *Argusia*, *Heliotropium* and *Tournefortia*

into Heliotropiaceae. *Pteleocarpa* is now placed in Gelsemiaceae (Struwe et al., 2014). In other words, all the genera listed by Turner under Boraginaceae have been assigned to other families meaning that now the Boraginaceae s.s. is represented in Malaysia only by this new record, *Bothriospermum zeylanicum*. Even if the narrow family circumscription adopted by Refulio-Rodriguez & Olmstead (2014) is not followed and one prefers to recognise Cordiaceae, Ehretiaceae and Heliotropiaceae as subfamilies Cordioideae, Ehretioideae and Heliotropoideae (e.g. Engler & Prantl, 1897; APG III, 2009), it remains true that *Bothriospermum zeylanicum* is the only Malaysian representative of the type subfamily Boraginoideae.

Taxonomic treatment

Bothriospermum Bunge, Enum. Pl. China 47 (1833); Clarke, Fl. Brit. India 4: 167 (1885); Backer & Bakhuizen f., Fl. Java 2: 463 (1965); Zhu et al., Fl. China 16: 418 (1995); Riedl, Fl. Malesiana ser. I, Spermat. 13: 63 (1997); Hsiao & Liu, Fl. Taiwan 4: 387 (1998). – TYPE: *Bothriospermum chinense* Bunge.

Annual or biennial herbs, hispid or pubescent. **Stems** erect or prostrate. **Leaves** spirally arranged; lamina elliptic, ovate or oblanceolate, margin entire. **Flowers** extra-axillary, small, solitary but often forming a leafy raceme in distal part of the branches, distinctly pedicellate; calyx 5-lobed, the lobes divided to the base, narrowly lanceolate, slightly enlarged in fruit; corolla blue or white, rotate, tube short, lobes 5, spreading, obtuse, 5 small scale-like appendages present in the throat. **Stamens** included in the corolla, filaments very short, anthers 5, ovoid. **Ovary** deeply 4-lobed, style short, persistent, stigma small, capitate; gynobase flat. **Fruits**: nutlets 4, very small, erect, ellipsoid or subglobose attached to the flat or nearly flat receptacle, surface usually sculptured, ventral side with a large aperture surrounded by prominent margin.

Distribution. About 5 species, distributed in Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Russia, Pakistan, India, China (its centre of distribution), Japan, Korea, Taiwan, Vietnam and the Philippines; naturalised in Indonesia (Java).

Bothriospermum zeylanicum (J.Jacq.) Druce, Bot. Exch. Club Brit. Isles 4: 610 (1917); Zhu et al., Fl. China 16: 419 (1995); Riedl, Fl. ser. I, Spermat. 13: 63 (1997); Hsiao & Liu, Fl. Taiwan 4: 388 (1998). – *Anchusa zeylanica* J.Jacq., Ecl. Pl. Rar. 1(3): 47, t. 29 (1812). – TYPE: Plate t. 29 in Jacquin, Ecl. Pl. Rar. 1(3) (1812). (Fig. 1 & 2)

Anchusa tenella Hornem., Hort. Bot. Hafn. 1: 176 (1813). – *Bothriospermum tenellum* (Hornem.) Fisch. & C.A.Mey., Index Sem. Hort. Petrop. 1: 23 (1835); Clarke, Fl. Brit. India 4: 168 (1885); Backer & Bakhuizen, f., Fl. Java 2: 463 (1965). – TYPE: *Herb. Vahl s.n.* ‘Hab. in China’ (holotype C n.v.).

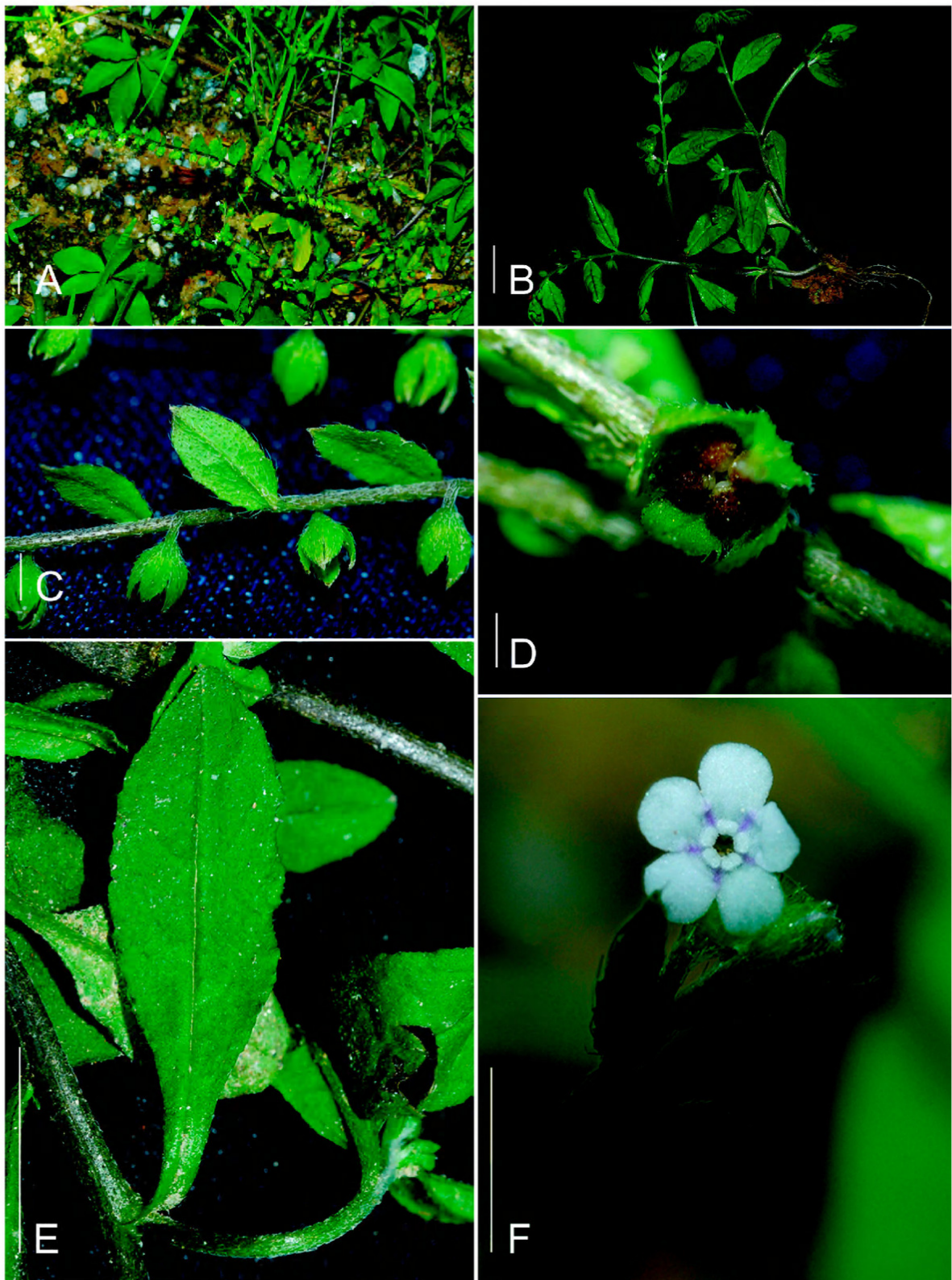


Fig. 1. *Bothriospermum zeylanicum* (J.Jacq.) Druce. **A–B.** Habit. **C.** Arrangement of flowers and fruits. **D.** Nutlet. **E.** Leaf. **F.** Flower. Scale bars: A, B, C (5 cm); D (1 mm); E (2 mm); F (5 mm). (Photos: A.R. Rafidah)



Fig. 2. Habitat of *Bothriospermum zeylanicum* (J.Jacq.) Druce. (Photo: A.R. Rafidah)

Short-lived herbs with prostrate stems. **Stems** slender, densely pubescent throughout, much branched, up to 50 cm long. **Leaves:** petiole short, c. 5 mm long in lower leaves, lacking in the upper; lowermost laminas $20\text{--}30 \times 6\text{--}10$ mm, decreasing in size to $4\text{--}10 \times 2\text{--}4$ mm in the upper ones, elliptic to lanceolate, margin slightly undulate, densely strigose on both surfaces, base cuneate, midrib impressed above, prominent beneath, apex acute. **Pedicels** c. 2 mm long. **Flowers:** calyx green, densely hairy outside; corolla white or very pale purple (in Peninsular Malaysia), c. 2 mm long, lobes 5, longer than the tube, c. 2 mm long, apex broadly rounded, throat appendages white, trapeziform, emarginate, c. 0.2 mm. **Stamens** 5, included, inserted at the middle of corolla tube, filaments short, anther yellowish turning brown. **Ovary** green, style less than 1 mm long, terete. **Nutlets** green turning brown, ellipsoid, to 1 mm long, aperture longitudinally elliptic, surface warty; calyx persistent, c. 3 mm long.

Distribution. As for the genus, in Peninsular Malaysia only from Cameron Highlands, Pahang.

Ecology. Growing in waste land on sandy soil or in open fields or near rivers, at c. 1200 m altitude.

Specimens examined. PENINSULAR MALAYSIA: **Pahang:** Cameron Highlands, Belati Estate, 4°27'N 101°28'E, 8 Oct 2007, *Kiew et al.*, FRI70433 (KEP), Kampung Terla, 4°31'N 101°23'E, 8 Oct 2007, *Kiew et al.*, FRI70473 (KEP), Habu, 4°26'N 101°23'E, 23 Apr 2014, *Rafidah et al.*, FRI75968 (KEP), Habu, 4°26'N 101°23'E, 23 Apr 2014, *Rafidah et al.*, FRI75969 (KEP).

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