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The genus *Haymondia* A.N.Egan & B.Pan bis (Fabaceae) in Thailand

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ABSTRACT

A synopsis of the genus *Haymondia* A.N.Egan & B.Pan bis in Thailand, comprised of a single species: *H. wallichii* (DC.) A.N.Egan & B.Pan bis, is given. The genus and species descriptions are provided, along with nomenclature, vernacular names, distributional data and specimens examined.

KEYWORDS: Fabaceae, *Haymondia*, Leguminosae, *Pueraria*, northern Thailand.

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INTRODUCTION

Haymondia A.N.Egan & B.Pan bis is a genus in the legume family (Fabaceae, Leguminosae) in South East Asia, distributed in mainly mountainous regions from Nepal eastward to southern Yunnan and the golden triangle of Myanmar and Thailand. *Haymondia* was recently segregated from the genus *Pueraria* DC. on the basis of molecular and morphological evidence (Egan & Pan, 2015; Egan *et al*., 2016). De Candolle first described *Pueraria* in 1825, wherein he included only two species, *P. tuberosa* (Willd.) DC., moved from *Hedysarum* L. based on the observation that the species lacked the articulated pods of Hedysareae, and *P. wallichii* DC., named for Dr Nathaniel Wallich, who sent him the specimens from Nepal (De Candolle, 1825).

De Candolle (1825) united these two species based on broadly shared morphological characters, including the climbing, twining habit, woody, cylindrical stems, broad trifoliolate leaves, and elongated, axillary, "almost paniculate" inflorescences. However, the affiliation of *P. wallichii* to other congeners has been questioned by several contemporary botanists: Van der Maesen (1985) segregated *P. wallichii* from the main body of *Pueraria* species based on the observation that *P. wallichii* had 4 or more flowers per thickened brachyblast or node as opposed to 2 or 3 per node and basifixed as opposed to medifixed stipules; Lackey (1977a,b) discovered that *P. wallichii* lacked paraveinal mesophyll while most other congeners did not and that *P. wallichii* was distinct in containing canavanine, a non-proteinogenic amino acid that is lacking in most genera of subtribe Glycininae. Because of this, Lackey suggested that *P. wallichii* was generically, and perhaps subtribally or tribally misplaced. Lackey's hypothesis was recently supported by molecular phylogenetic analysis of three DNA markers, *matK*, *AS2*, and the *trnD-trnT* intergenic spacer, placing outside subtribe Glycininae and outside the core Phaseoleae with strong support, and with loose association with Kennedinae and Desmodieae (Egan *et al*., 2016). As such, a new genus was named to accommodate *Haymondia wallichii* (DC.) A.N.Egan & B.Pan, the only species of the genus (Egan & Pan, 2015). Here, we describe *Haymondia* in Thailand.

MATERIALS AND METHODS

This study is based on observations in the field and on the examination of 88 collections from the following herbaria: A, AAU, BKF, BM, C, E, G, K, L, MO, P, QBG, US. All specimens cited have been seen by the authors, unless otherwise annotated as *n.v.*

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TREATMENT

Haymondia A.N.Egan & B.Pan bis, Phytotaxa 218(3): 212. 2015. Type: *Haymondia wallichii* (DC.) A.N.Egan & B.Pan bis (based on *Pueraria wallichii* DC.)

Perennial scandent shrub with woody erect or climbing stems. *Roots* not tuberous. *Leaves* trifoliolate with basifixed, lanceolate stipules, caducous, leaving a narrowly elliptic stipule scar. *Petioles* terete; terminal leaflet broadly ovate, rhomboid-elliptic, to suborbicular, entire; stipels bristle-like. *Inflorescences* solitary, axillary pseudoracemes or terminal panicles, nodose or shortly branched, bearing 4 or more flowers per node, ascending or pendulous. *Calyx* campanulate; lobes 5, short and blunt with the upper two fused or minutely bifid. *Corolla* large; vexillum apex rounded, without callosities; sides not reflexed; center green spot and white rays. *Stamens* monadelphous, the vexillary stamen connate to staminal column in the middle, free below; stamens and style move up to touch vexillum in late blooming. *Ovary* elongate, strongly upcurved distally. *Pods* coriaceous, oblanceolate, glabrous; valves twisting upon dehiscence. *Seeds* orbicular, compressed.

A monotypic genus in the foothills of the Himalayas and golden triangle of Asia.

Etymology.— *Haymondia* is named after Welby Dean Haymond and Mildred Winona Davies Haymond, maternal grandparents of author Ashley N. Egan, who instilled and cultivated in her a love of nature and science.

Note.— *Haymondia* is characterized as a scandent shrub with basifixed, caducous stipules, solitary axillary or terminal pseudoracemes (sometime panicles in terminal inflorescences) that have 4 or more flowers per thickened brachyblast or short, lateral inflorescence branches. A particularly distinctive character state of *Haymondia* is the position of the stamens throughout flowering. At the onset of anthesis, the staminal column is positioned within the keel petals then later moves upward until the stamens and stigma are touching the vexillum, or nearly so, and fully reflexed from the wing and keel petals. Several other genera that share this character state include *Apios*, *Mucuna*, and *Cochlianthus*.

Haymondia wallichii (DC.) A.N.Egan & B.Pan bis, Phytotaxa 218(3): 212. 2015.— *Pueraria wallichii* DC., Ann. Sci. Nat. (Paris) 4: 97. 1825. Type: Nepal, 1821, *N. Wallich 5353a* (holotype **G!**; isotypes **BM** 000958610**!**, **C** 10012332**!**, **C** 10012333**!**, **C** 10012334**!**, **K** 001120653**!**). Figs. 1–2.

— *Dolichos frutescens* Buch.-Ham. ex D.Don in D.Don, Prodr. Fl. Nepal. 240. 1825. NEPAL: 1802–1803, *F. Hamilton* (holotype: **CAL** *n.v.*).

— *Pueraria wallichii* DC. var. *composita* Graham ex Wall. ex Benth., J. Linn. Soc. Bot. London 9: 124. 1867. Type. Myanmar, Taong Dong, *N. Wallich 5570* (holotype: **K** 001121317**!**; isotypes: **BM** 000958611**!**, **G** 00370594**!**, **G** 00370591**!**, **K** 000264070**!**, **K** 000264071!).— *Pueraria composita* Graham ex Wall., Numer. List, Number 5570. 1831 (*nom. nud.*).

Plants 2–4(–7) m tall. *Stems* sparsely pubescent with adpressed hairs, glabrescent. *Leaves* with stipules 4–11 × 2 mm, early caducous; petioles striate, 5–18 cm long; terminal leaflets 8–28 × 8–26 cm; lateral leaflets smaller, oblique, 7–23 × 4–16 cm; apex acuminate, rarely obtuse; base cuneate; leaflets green and glabrous above, grey-green and sparsely adpressed pubescent below; veins conspicuous below, in ca 7 pairs; petiolules 4–10 mm long with spreading hairs; stipels small, 1–3 mm long, falling with age. *Inflorescences* (4–)10–40(–55) cm long; bracts subtending the nodes, 2–5 mm long, caducous; pedicels 2–6 mm long, pubescent; bracteoles 2 per flower, ovate to lanceolate, 0.5–3 mm long, caducous. *Calyx* 4–6 mm long, short appressed hairs on the outside, the tube 3–5 mm long, the upper two lobes fused entirely or nearly so, other lobes obtuse, 0.5–1 mm long. *Corolla* white to pink; vexillum obovate, (10–)16–19(–23) × 8–15(–18) mm; wing petals white or pink, darker than vexillum or keel petals, 15–17 × 2–3 mm; keel petals strongly curved ventrally and basally fused, white to light pink, 14–18 × ca 3 mm. *Ovary* finely hirsute, 8–12 mm long; style 4–6 mm long, the last 2–3 mm strongly upcurved, glabrous; stigma terminal, globose. *Stamens* 14–15 mm long, the free end 1–2 mm long, upcurved, stamens and style move up to touch vexillum in late blooming; anthers dorsifixed, alternately on long and short filaments. *Fruits* leguminous pods, flattened, tan to medium brown, 5–8 ovules, not septate, 6–13 × 0.8–1.2 cm, acuminate at both ends; style persistent, dehiscent when mature. *Seeds* orbicular to oblong, 5–7 × 3–6 mm, ca 2.5 mm thick, brown or with black mottling; funicle broad, triangular in shape; aril elongate.

Thailand.— NORTHERN: Chiang Mai [12 Nov. 1911, *Kerr 1556B* (**P**); *ibid*, 540–1700 m, 8 Jan. 1911, *Kerr 1556* (**E**, **K**); Ban Kong, 700–1100 m, 21 Dec. 1978, *Bjørnland & Schumacker 553* (**AAU**, **C**); Ban Mae Tala Nuea, Mae Dat Subdistrict, 1350 m, [18°55'18"N 98°28'45"E], 10 Dec. 2007, *Tanaka et al. HN8060* (**QBG**); Chiang Dao, 12 Dec. 1954, *Suvarnakoses 976* (**AAU**, **L**); Doi Chiang Dao, 31 Dec. [1931], *Put 4436* (**AAU**, **E**); roadside to Khun Huai Ma Kok checkpoint, Doi Chiang Dao Wildlife Sanctuary, 1400 m, 25 Feb. 2003, *Chamchumroom et al. 1914* (**BKF**); western part of Doi Chiang Dao, 1270–1350 m, 29 Nov. 1984, *Koyama et al. T39873* (**L**); Doi Angka [Doi Inthanon], Me Ka Pak drainage, ca 1070 m, 26 Nov. 1926, *Garrett 313* (**E**); Doi Inthanon, 1500 m, 13 Dec. 1984, *Nanakorn WN1094* (**NY**); Kio Mae Pan, Doi Inthanon National Park , 900–1200 m, 29 Nov. 1996, *Nanakorn et al. 7966* (**QBG**); Doi Suthep, 5000 ft, 31 Oct. 1909, *Kerr 878* (**K**, **P**); *ibid*, 1800 ft, 15 Nov. 1910, *Kerr 1556* (**US**); *ibid*, 1000–1700 ft, 12 Dec. 1904, *Hosseus 207* (**C**); *ibid*, 10 Feb. 1926, *Collins 1222* (**US**); *ibid*, 1150 m, 23 Oct. 1958, *Sørensen et al. 5857* (**C**, **P**); *ibid*, 450 m, 26 Oct. 1958, *Sørensen et al. 5914* (**C**, **L**); *ibid*, 1250 m, 29 Oct. 1958, *Sørensen et al. 5972* (**C**, **E**); *ibid*, ca 500 m, Feb. 1987, *Niyomdham & Kubat*

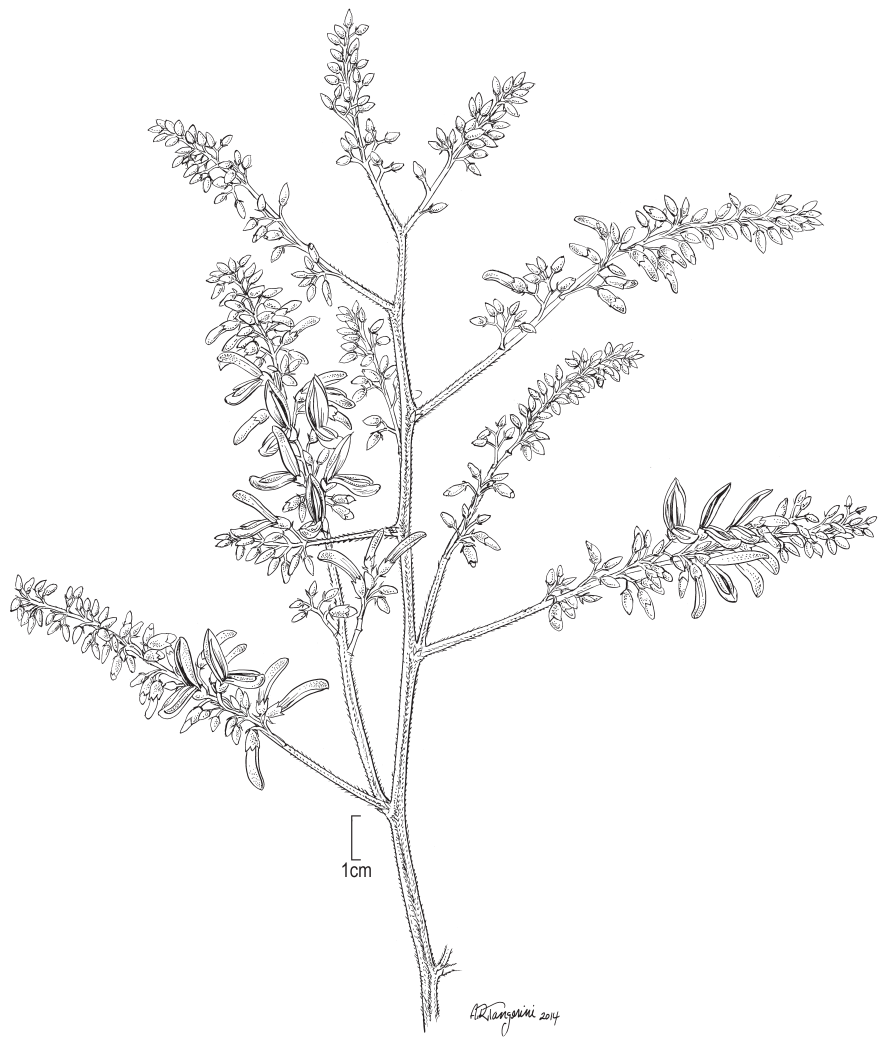

Figure 1. *Haymondia wallichii* (DC.) A.N.Egan & B.Pan bis. Inflorescence showing terminal panicle type. Illustration by Alice Tangerini.

1358 (**P**); *ibid*, below the Bhuping Royal Palace, near the helicopter area, 1275 m, 26 Dec. 1987, *Maxwell 87-1633* (**L**); Camp Hoi Chan Kiang, Doi Suthep mountain range, ca 600 m, 26 Oct. 1920, *Rock 116* (**US**); S of Pang Faen 5 km along road 1252, a side-road to 118, 1000 m, [19°01'N 98°20'E], 25 Nov. 1993, *Larsen et al. 44817* (**AAU**); between Pang Kia and Mae Kha Chan, basin of the Mae Lao, 750–900 m, 2 Jan. 1922, *Rock 1620* (**US**); Payap, Doi (Mt) Buak Ha, W of Chiang Mai, ca 1575 m, [18°50'N 98°55'E], 30 Nov. 1965, *Hennipman 3175* (**C**, **K**, **L**, **P**); Pha Hom Pok, 1100 m, 25 Feb. 1958, *Sørensen et al. 1659* (**C**); Queen Sirikit Botanic Garden, 700 m, 12 Nov. 1993, *Nanakorn et al. 128*

Figure 2. *Haymondia wallichii* (DC.) A.N.Egan & B.Pan bis: A. habit; B. flowering branch of terminal panicle inflorescence; C. fruit; D. axillary inflorescence in bud (note the lateral branches shortened to brachyblasts). Photo credits: Ashley N. Egan [A,D; *A.N. Egan 13-0750* (US)], Bo Pan (B,C).

(**QBG**)]; Chiang Rai [Khun Tan Mts, 4000 ft, 22 Nov. 1928, *Smith 454* (**US**)]; Lamphun [Mi Li, 410 m, 3 Nov. 1925, *Winit 1521* (**K**); Doi Khun Dahn [Tan] National Park, along the trail from Yaw 2 to Yaw 3, 1125 m, 3 Feb. 1994, *Maxwell 94-188* (**BKF**)]; Mae Hong Son [western flank of Doi Inthanon, ca 1000 m, [18°40'N 98°25'E], 6 Dec. 1969, *van Beusekom & Phengklai 2359* (**AAU**, **C**, **E**, **P**); Kio Lom, border between Pai and Muang Districts, 1490 m, 16 Jan. 1983, *Koyama et al. 32566* (**BKF**); *ibid*, 16 Jan. 1983, *Koyama et al. 32640* (**BKF**)]; Nan [50 km W of Nan, W of Ban Luang, 600 m, [18°51'N 100°21'E], 22 Nov. 1993, *Larsen et al. 44733* (**AAU**)]; Phayao [Doi Pha Dam, Ban Pang Tham, 1030 m, [19°30'30.17"N 100° 27'10.76"E], 14 Dec. 2012, *La-ongsri et al. 2592* (**QBG**)]; Phrae [Phre, 180 m, *Vanpruk 478* (**K**)]; NORTH-EASTERN: Loei [Phu Kradueng, S of Loei, 1100 m, [16°53'N 101°53'E], 10 Nov. 1970, *Charoenphol et al. 4850* (**AAU**, **K**, **P**); Phu Kradueng, ca 1300 m, [16°52'N 101°52'E], 27 Dec. 1971, *van Beusekom et al. 4620* (**C**, **K**, **P**); Phu Kradueng National Park, 1200 m, 14 Nov. 1979, *Shimizu T22661* (**L**)]; WESTERN: Kanchanaburi [Tapoh, 4 Jan. 1962, *Larsen 9144* (**C**, **K**); Tham Pha, 29 Dec. 1961, *Phengkhlai 344* (**K**, **BK**F)].

Distribution.— Following the base of the Himalayas eastwards from Nepal, Bhutan, India (Sikkim, Meghalaya), Bangladesh, Myanmar/Burma (Chin, Mon and Shan), northern Thailand, China (Yunnan), to northern Laos. Unconfirmed records from Uttarakhand (India) and Tibet/Xizang (China).

Ecology.— Elevation 180–2000(–2300) m; hill sides, mountain slopes, and along rivers. A climber on shrubs in semi-evergreen oak, and pine-dipterocarp forests, such as those typified by *Dipterocarpus tuberculatus* Roxb. and in opium fields and roadsides.

Phenology.— Flowering October–December (to February at lower elevations). Fruiting December–February.

Conservation.— *Haymondia* is common in Thailand and Myanmar throughout dry dipterocarp forests and occurs within or near the borders of several national parks, such as Doi Inthanon, Doi Khun Tan and Phu Kradueng. It is now less common in Yunnan, China through 19th century forest conversion to opium poppy cultivation. It is assessed here as Least Concern (LC) according to the criteria of IUCN (2001) based on frequency within its range and presence within protected areas.

Vernacular.— Ma paep wo (มะแปบวอ)(Northern); paep kwang yai (แปบกวางใหญ่), ma paep kwang (มะแปบกวาง)(Chiang Mai).

Notes.— According to IPNI [accessed Jan. 28, 2016] both *Pueraria wallichii* and *Dolichos frutescens* were published in January 1825, the former sometime during the month (Jan. 1825) and the latter in the last week of the month (26 Jan.-1 Feb. 1825). Van der Maesen (1985) placed *Dolichos frutescens* in synonymy of *Pueraria wallichii* and without clearer dates of publication, the priority of *P. wallichii* is retained. Van der Maesen (1985) erroneously listed the combination *Neustanthus wallichii* (DC.) Benth. as being published by Bentham (Pl. Jungh. 2: 234. 1852), however, Bentham (1852) does not place this species in his genus *Neustanthus*, but associates it with Phaseoleae or perhaps Dalbergieae.

Etymology.— The epithet *wallichii* commemorates Nathaniel Wallich (28 Jan. 1786–28 April 1854) who was appointed Surgeon to the Danish settlement at Serampore in Bengal, then later the Superintendent of the Calcutta Botanic Garden, India.

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